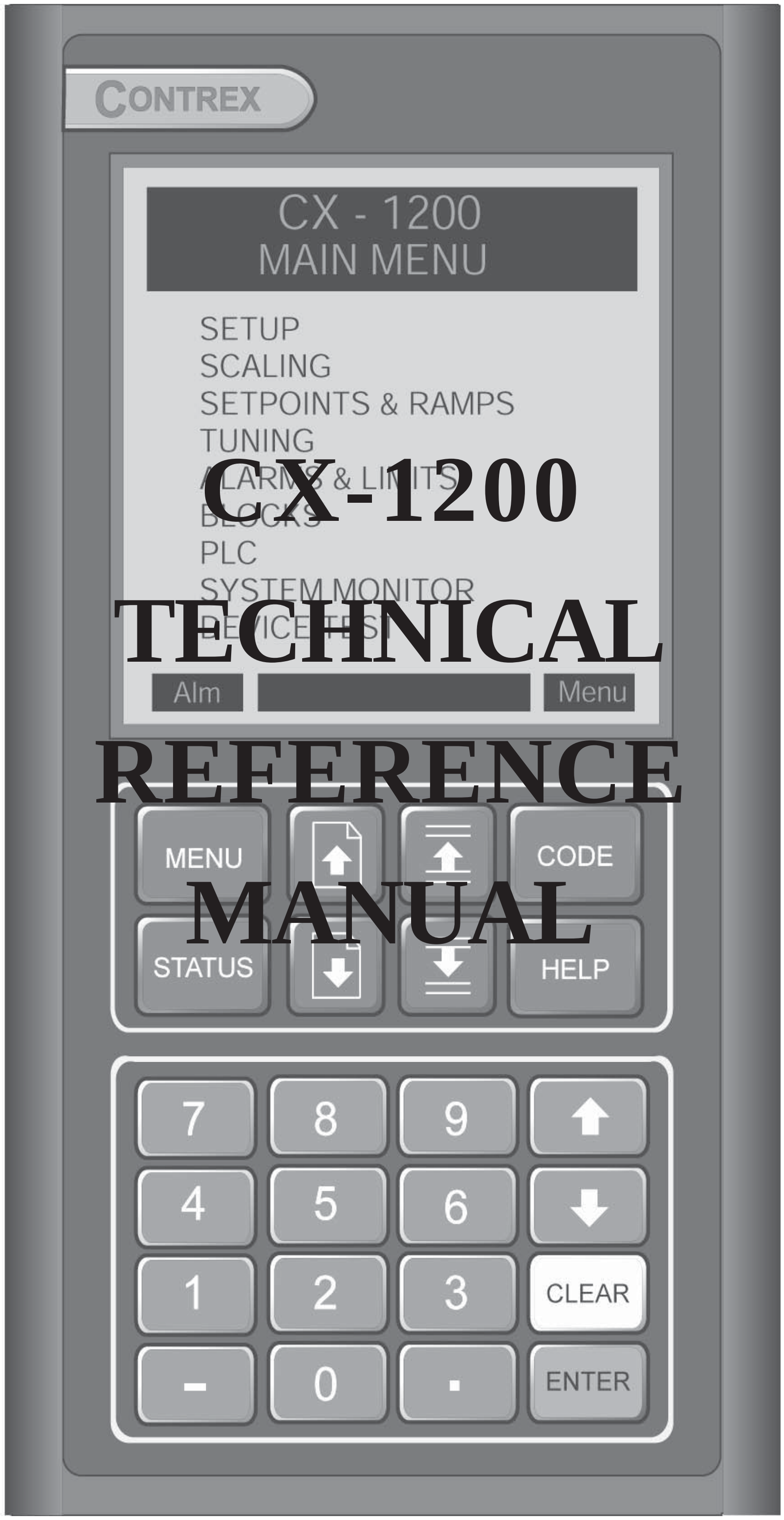
CX-1200
TECHNICAL REFERENCE MANUAL



CONTREX®

0001-0136 Rev C

Technical Assistance

If you have comments or questions concerning the operation of the CX–1200, a member of our Technical Support Staff will be happy to assist you. Ask for Technical Support:
763.424.7800 or 800.342.4411

Contrex®

8900 Zachary Lane North
Maple Grove, Minnesota 55369 USA
Phone:763.424.7800
Fax:763.424.8734
www.contrexinc.com
info@contrexinc.com

DANGER

Improper installation can cause severe injury, death or damage to your system.

Integrate this motion control unit into your system with caution.

Comply with the National Electrical Code and all applicable local and national codes.

Table of Contents

Introduction

Introducing the CX-1200
Examples of CX-1200 Applications

INTRODUCING THE CX-1200

The CX-1200 is a Synchronizing Controller. It controls the Follower machine in a Lead-Follow machine coordination process. It will command the Follower to match both speed and phase as it tracks the lead machine, to achieve automatic synchronization between the machines.

Typical applications include packaging, filling, transfer conveyors, wicket ovens, flighted conveyors with cleats or pockets, and overhead chains with hooks or grippers. The Lead and Follow machines may be of similar construction, or may be completely different designs, with different motor drives, gear ratios, or process functions.

The CX-1200 uses four 4 basic signals. An encoder device on each machine gives high resolution speed information, and also provides a tracking signal to assist the position control. Two marker pulses (photo eyes, or prox switches) give precise positional information. These synchronization pulses, also called job-size markers, permit automatic alignment of the correct machine phase or position lock. The follower machine can start/stop with the lead machine, or it can be started at random into a “running lead” and still achieve synchronization.

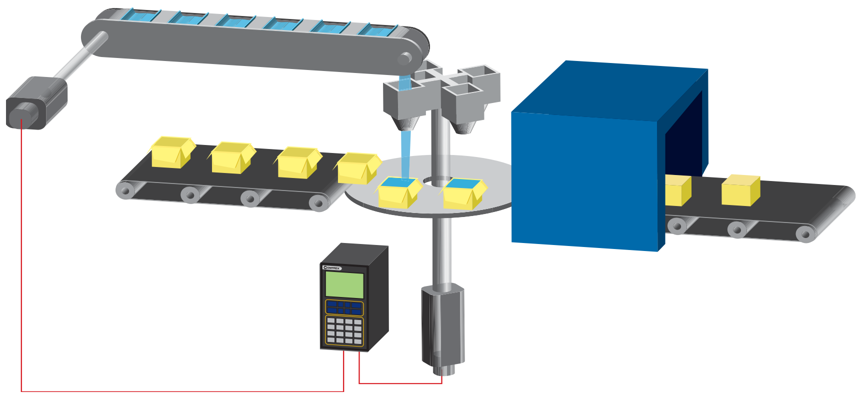
The CX-1200 is a Universal Controller that can operate through a DC, DC Regen, AC Inverter, AC Vector Drive, or Servo controller. It can be used to retrofit old drives, or work with the latest digital drive products of any brand.

The built-in operator’s interface, with keypad, multi-line display, and help screens make set-up and operation simple. A PLC function can help customize the application or coordinate with other machine control devices. Automatic Learn Mode, Trending Mode, or Fixed Ratio Modes allow it to adapt to any machine configuration. Multiple configurations or Set points can be pre-programmed, and changed on-the-fly. Advance/Retard functions permit operator supervision when desired. Serial link, or optional remote analog signal, or optional DeviceNet card further enhance integration with host control schemes.

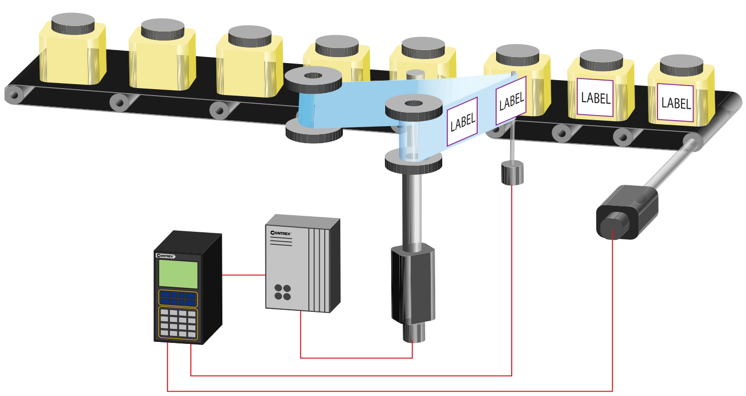
EXAMPLES OF CX-1200 APPLICATIONS

The CX-1200 accommodates a wide range of configurations. The universal motor speed control provides digital control to virtually any drive. It accepts quadrature encoders, plus analog inputs.

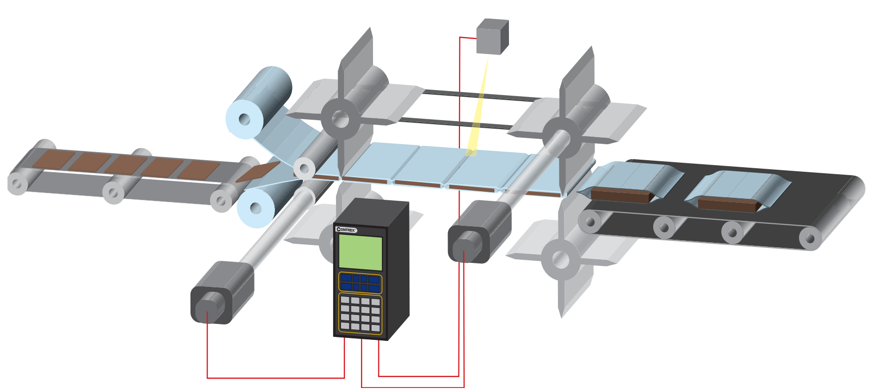
Buckey Conveyor Synchronizing



Labeler Synchronizing

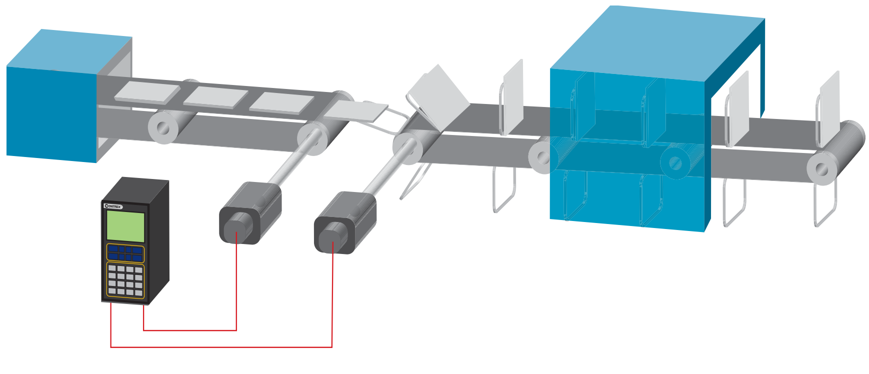


Seal & Cut Synchronizing



Examples of CX-1200 Applications (continued)

Wicket Oven Synchronizing



Installation / Wiring Guide

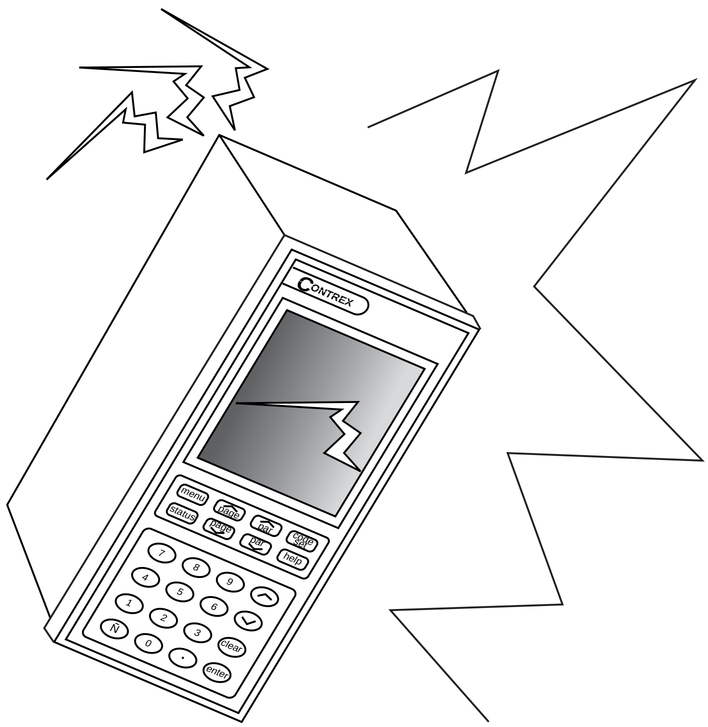
CONFIGURATION

This section will show you how to re-configure the CX-1200 for electrical compatibility. Complete this procedure prior to installation. This procedure does not require power to complete.

The area that is involved in re-configuring the CX-1200 is the AC Power Input Voltage switch. This switch is located in an external location on the CX-1200. You will not be required to access the interior of the CX-1200.

Figure 1 (page 5) illustrates the location of this switch.

WARNING



You will damage the CX-1200 if you apply 230 VAC to the AC Power input while the AC Power Input Voltage switch is in the 115 V position.

The AC Power Input Voltage switch is located on the rear of the CX-1200. The default configuration for the AC Power Input Voltage switch is 115 VAC.

To re-configure for 230 VAC Input, move the switch from the 115V position (up) to the 230V position (down).

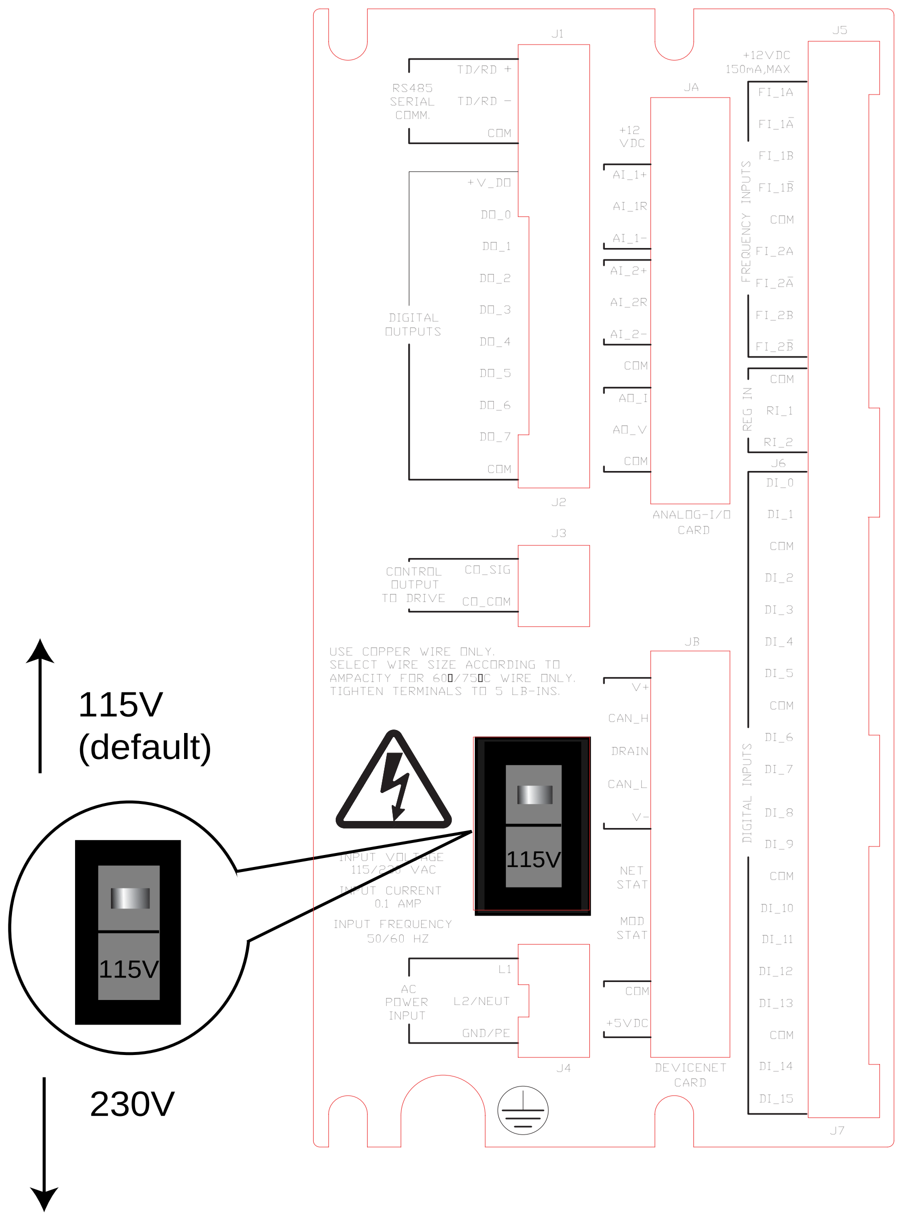
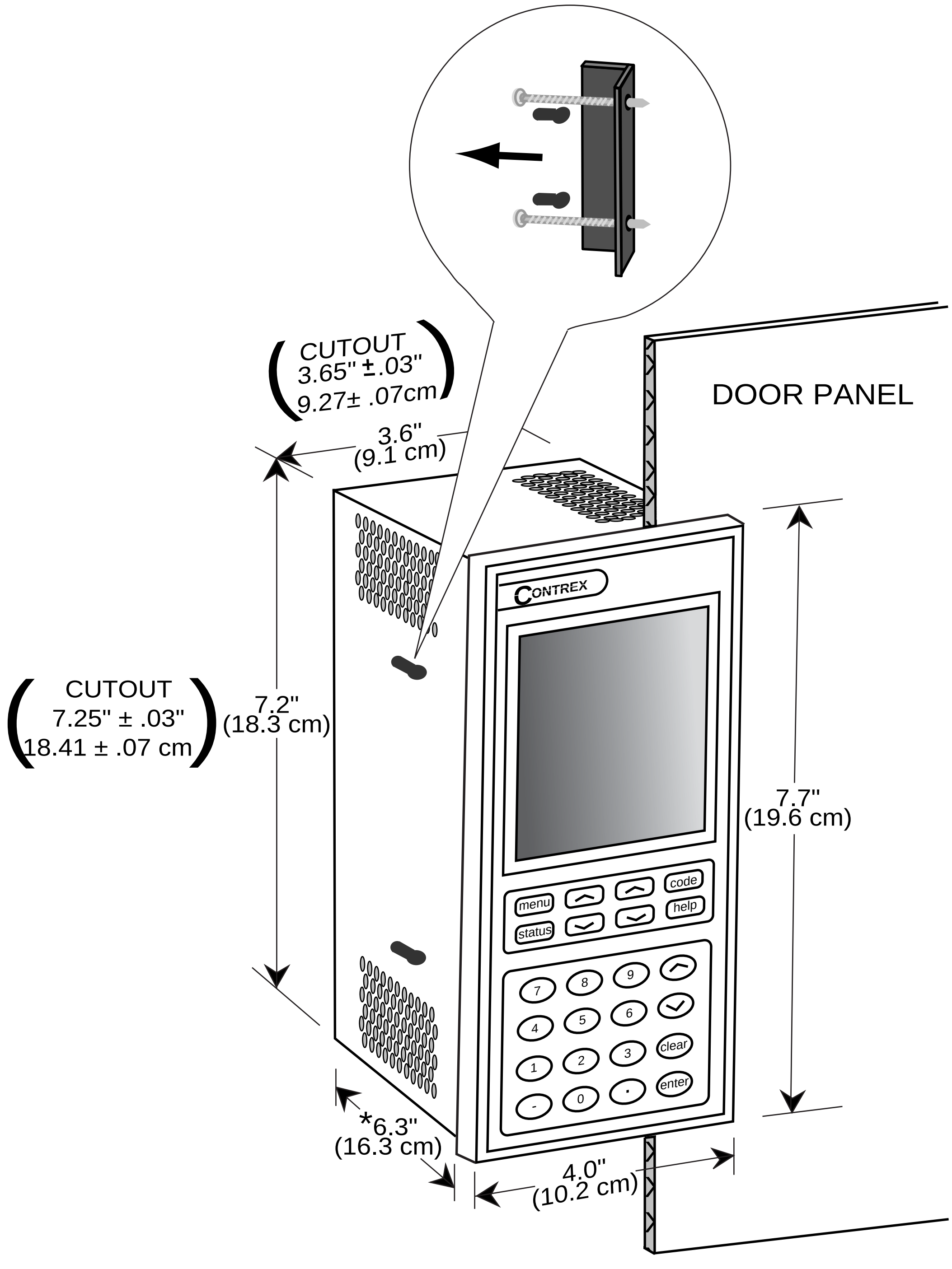


Figure 1 AC Power Input Voltage Switch



* From the rear of the door panel to the back of the connectors

Figure 2 CX-1200 Cutout Dimensions and Mounting Guide

MOUNTING

This section contains instructions for mounting the CX-1200 in the door panel of an industrial electrical enclosure. The CX-1200 is packaged in a compact 1/2 DIN vertical instrument enclosure that mounts easily in the door of your industrial electrical enclosure. The CX-1200 meets the NEMA 4 and the IP65 standards. To ensure compliance with these standards, enclose the CX-1200 in a Nema 4 or IP65 industrial electrical enclosure.

To mount the CX-1200:

1) The industrial electrical enclosure that will house the CX-1200 must conform to the following environmental conditions:

   Temperature: 0 - 55 degrees C
   (Internal enclosure temperature)

   Humidity: 0 - 95% RH non-condensing

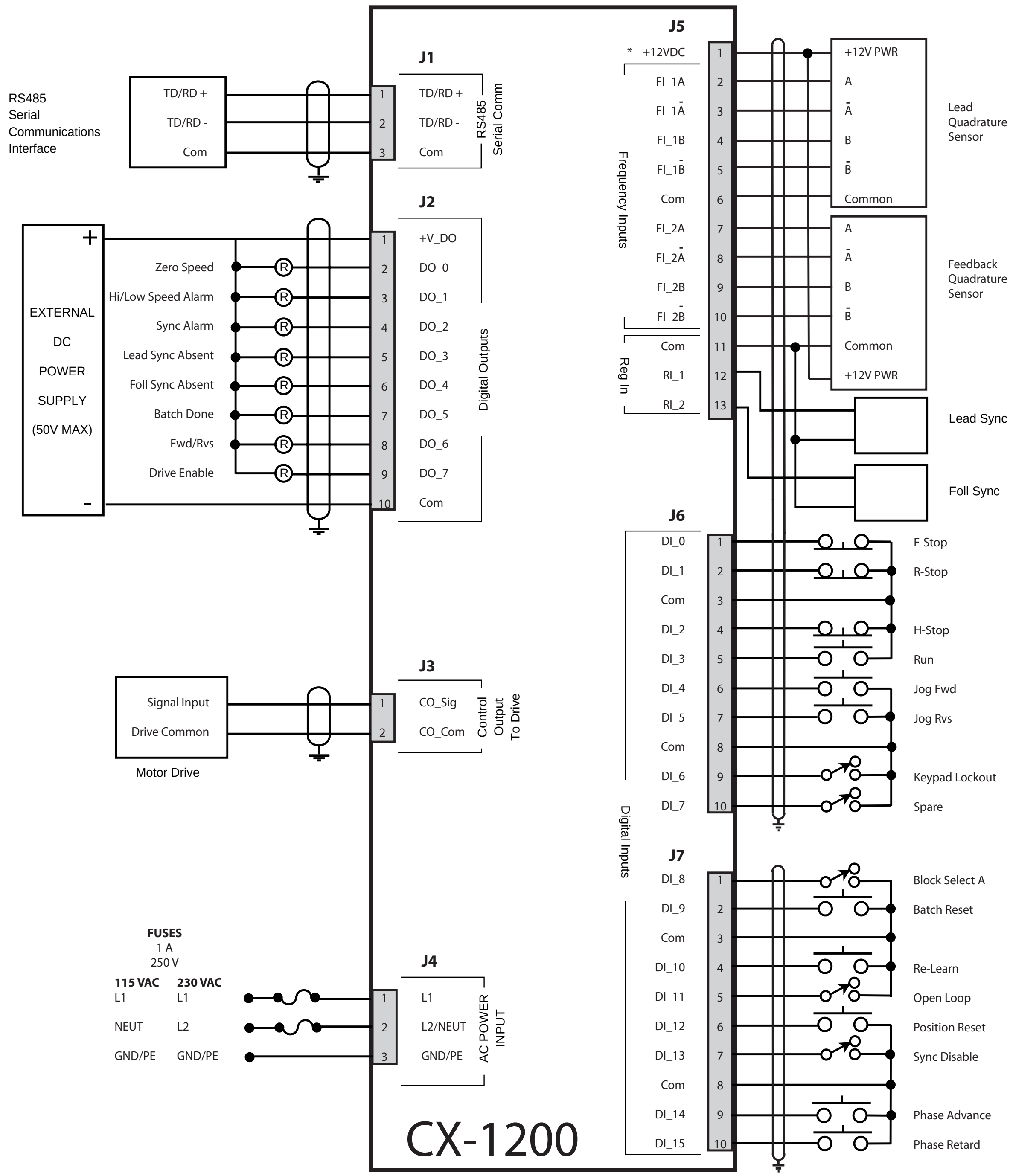
   Environment: Pollution degree 2 macro - environment

   Altitude: To 3300 feet (1000 meters)

2) The dimensions for the door panel cutout are 3.65"± .03" x 7.25 ±.03" (9.27 x 18.41cm). See figure 2. Allow two inches of clearance on both sides of the cutout and four inches of clearance on the top and bottom of the cutout for mounting clamp attachments, wire routing and heat convection.

3) Insert the CX-1200 through the door panel cutout until the gasket and bezel are flush with the door panel (see figure 2).

4) Slide the two mounting clamp bars into the slots that are located on either side of the CX-1200. See figure 2. Tighten the mounting screws until the CX-1200 is mounted securely in the electrical enclosure. Do not overtighten.



* Power for frequency input sensors may be supplied by J5, pin 1.
Total current should not exceed 150 mA .

Figure 3 CX-1200 General Wiring

WIRING

This section contains the input, output and serial communications wiring information for the CX-1200. Please read this section prior to wiring the CX-1200 to ensure that you make the appropriate wiring decisions.

NOTE: The installation of this motor control must conform to area and local electrical codes. See *The National Electrical Code* (NEC,) Article 430 published by the National Fire Protection Association, or *The Canadian Electrical Code* (CEC). Use local codes as applicable

Use a minimum wire gauge of 18 AWG.

Use shielded cable to minimize equipment malfunctions from electrical noise and terminate the shields at the receiving end only.

Keep the AC power wiring (J4) physically separated from all other wiring on the CX-1200. Failure to do so could result in additional electrical noise and cause the CX-1200 to malfunction.

Inductive coils on relay, contactors, solenoids that are on the same AC power line or housed in the same enclosure should be suppressed with an RC network across the coil.

A hand operated supply disconnect device must be installed in the final application. The primary disconnect device must meet EN requirements.

Install an AC line filter or isolation transformer to reduce excessive EMI noise, such as line notches or spikes, on the AC power line.

DANGER

Hazardous voltages.
Can cause severe injury, death
or damage the equipment.
The CX-1200 should only be installed by a
qualified electrician.

INPUTS

NOTE: The installation of this motor control must conform to area and local electrical codes. Refer to page 9 before you begin wiring.

AC Power Input

(J4 pins 1, 2,3)

The CX-1200 operates on either a 115 VAC - 10% + 15%, 0.250 Amp., 50/60 Hz or a 230 VAC -10% +15%, 0.125 Amp, 50/60 Hz. Use the separate 3 pin connector (J4) for the power connection.

* Fuse L1 for 115 VAC applications. Fuse L1 and L2 for 230 VAC applications. Use 1 Amp 250 V normal blow fuses.

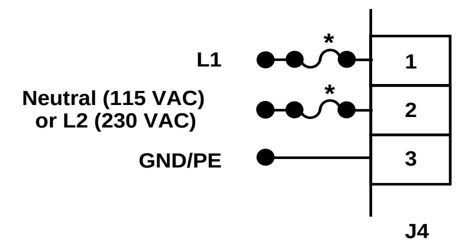


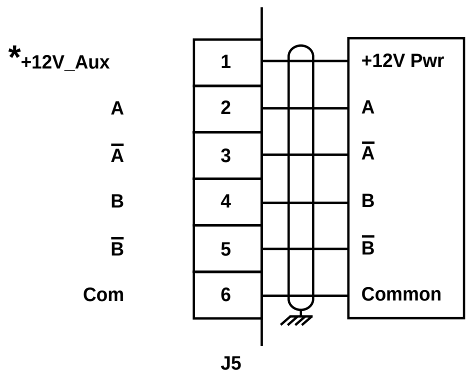
Figure 4 AC Power Input

WARNING

You will damage the CX-1200 if you apply 230 VAC to the AC Power input when the AC Power Input Voltage switch is in the 115 V position.

Lead Frequency
(J5 pins 1, 2, 4, 5, 6)

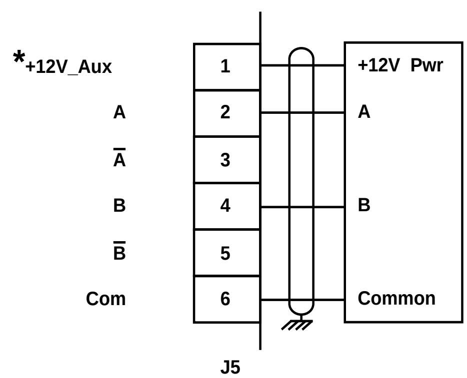
The wiring for the Lead Frequency is determined by the sensor. Figures 5 through 8 illustrate the wiring for the various sensors. For signal level and performance specifications, refer to *Appendices: Appendix A* .



Total currant draw from the +12V_Aux (J5-Pin 1) should not exceed 150 Milliamps.

Figure 5 Lead Frequency
Quadrature Differential Sensor (Bidirectional)

Figure 6 Lead Frequency
Quadrature Single-Ended Sensor (Bidirectional)



* Total currant draw from the +12V_Aux (J5-Pin 1) should not exceed 150 Milliamps.

Lead Frequency continued...

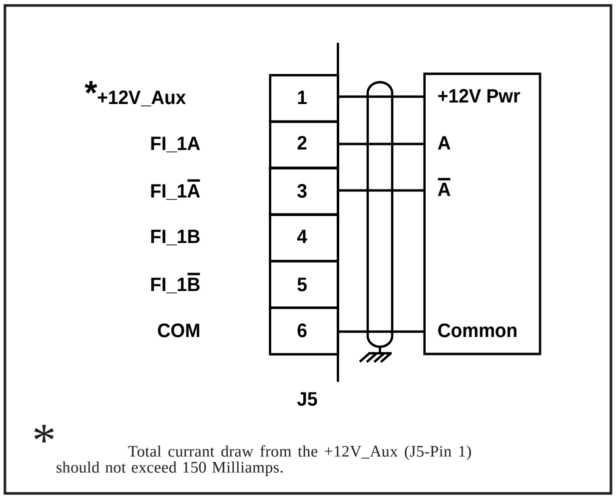


Figure 7 Lead Frequency
Single Channel Differential Sensor (Unidirectional)

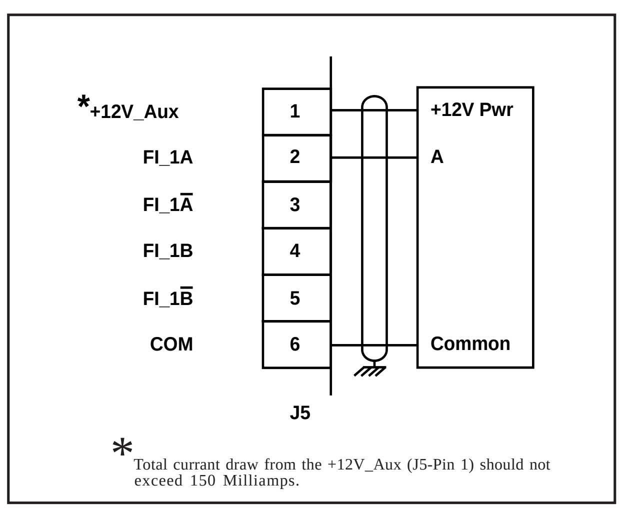


Figure 8 Lead Frequency
Single Channel Single-Ended Sensor (Unidirectional)

Feedback Frequency
(J5 pins 1, 7, 8, 9, 10, 11)

The wiring for Feedback Frequency is determined by the sensor. Figures 9 through 12 illustrate the wiring for the various sensors. For signal level and performance specifications refer to *Appendices: Appendix A*.

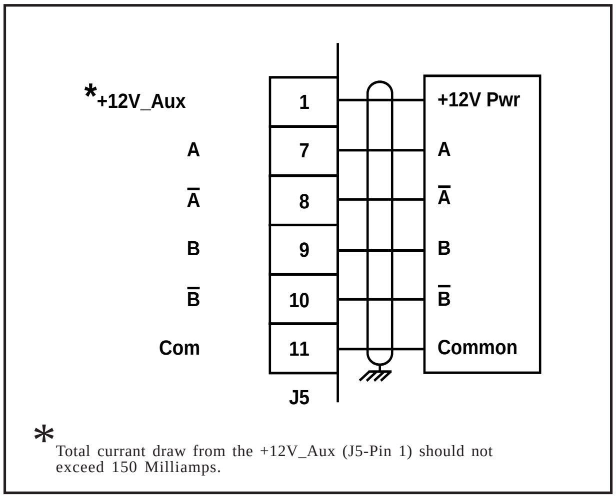
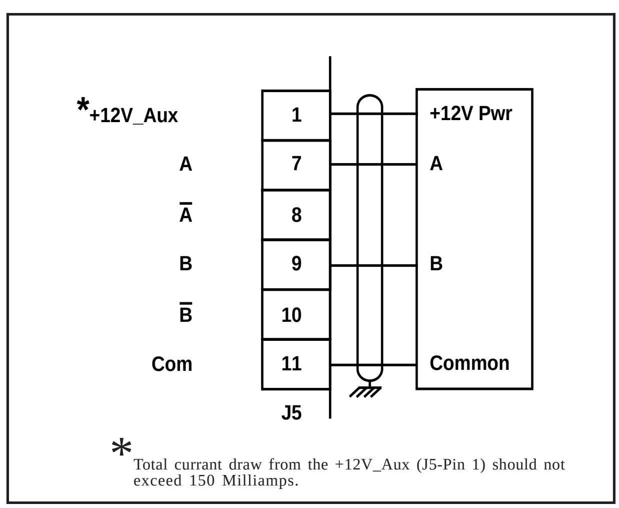


Figure 9 Feedback Frequency
Quadrature Differential Sensor (Bidirectional)

Figure 10 Feedback Frequency
Quadrature Single-Ended Sensor (Bidirectional)



Feedback Frequency continued...

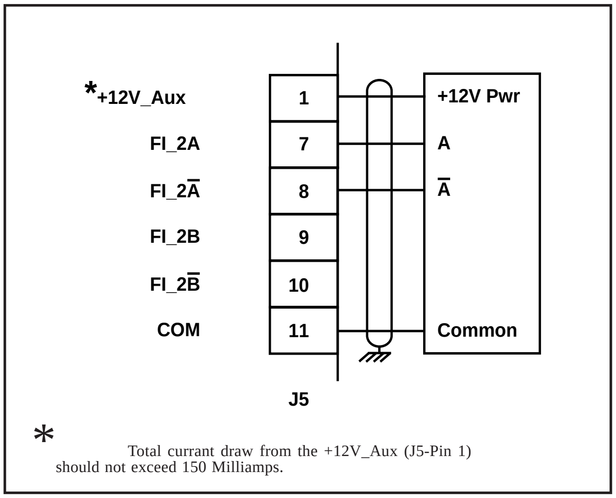
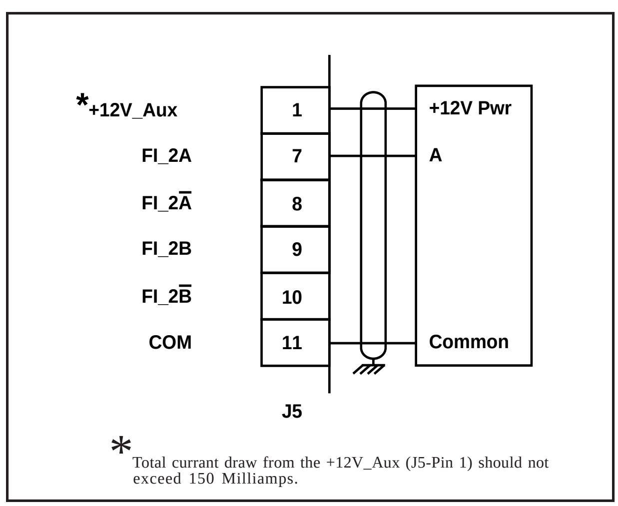


Figure 11 Feedback Frequency
Single Channel Differential Sensor (Unidirectional)

Figure 12 Feedback Frequency
Single Channel Single-Ended Sensor (Unidirectional)



Lead Sync
(J5 pins 11, 13)
Registration Input 0

The Lead Sync is a pulse input used to indicate the position of the lead product or machine part. This input is usually generated by a proximity switch or optical sensor switch.

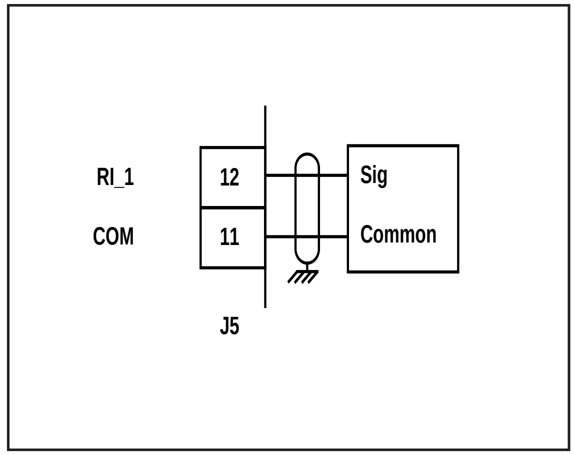


Figure 13 Lead Sync

Follower Sync
(J5 pins 11, 12)
Registration Input 1

The Follower Sync is a pulse input used to indicate the position of the follower device for synchronization purposes. This input is usually generated by a proximity switch or optical sensor switch.

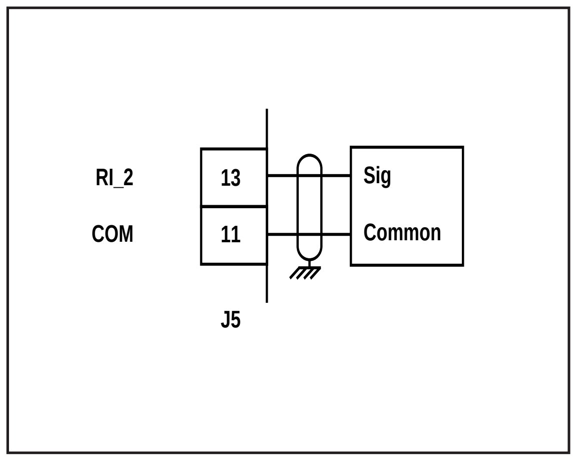


Figure 14 Follower Sync

F-Stop
(J6 pins 1, 3)
Digital Input 0

F-Stop is a momentary input. When it is opened, the CX-1200 commands a zero speed immediately and ignores the specified deceleration rate. However, F-Stop does not hold zero speed or position (drive disabled). As a momentary input, F-Stop is internally latched and does not need to be maintained open by an operator device.

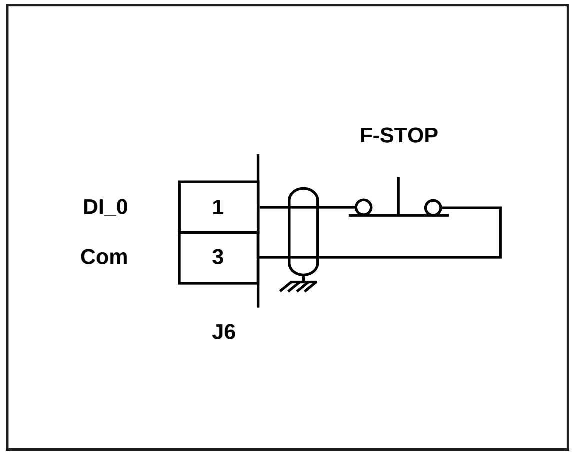


Figure 15 F-Stop

R-Stop
(J6 pins 2, 3)
Digital Input 1

R-Stop is a momentary input. When it is opened, the CX-1200 ramps to a zero speed command at the specified deceleration rate. However, R-Stop does not hold zero speed after the deceleration ramp has been completed (drive disabled). As a momentary input, R-Stop is internally latched and does not need to be maintained open by an operator device.

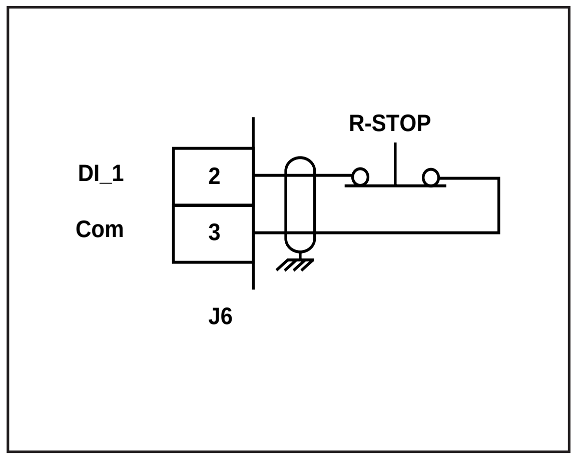


Figure 16 R-Stop

H-Stop
(J6 pins 4, 3)
Digital Input 2

H-Stop is a momentary input. When it is opened, the CX-1200 ramps to a zero speed command at the specified deceleration rate. In addition, H-Stop holds zero speed after the deceleration ramp has been completed (drive enabled). As a momentary input, H-Stop is internally latched and does not need to be maintained open by an operator device.

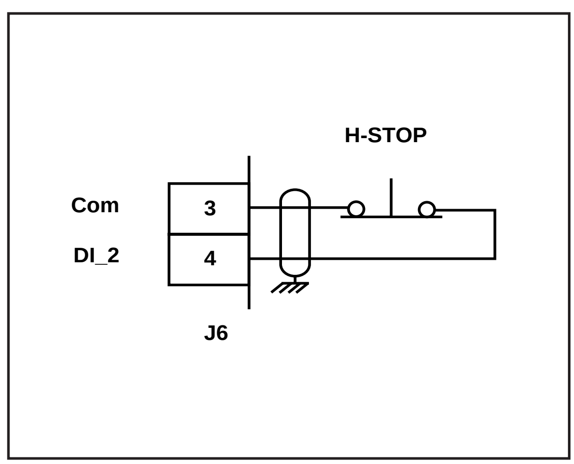


Figure 17 H-Stop

Run
(J6 pins 5, 3)
Digital Input 3

When the Run input (J6, pin 5) is momentarily shorted to common, the CX-1200 enters the Run state. As a momentary input, Run is internally latched and does not need to be maintained closed by an operator device.

NOTE: Close the R-Stop, H-Stop, and F-Stop inputs prior to entering the Run state. If you are only using one of the Stop inputs, wire short the other Stop inputs to the common or the CX-1200 will not enter run.

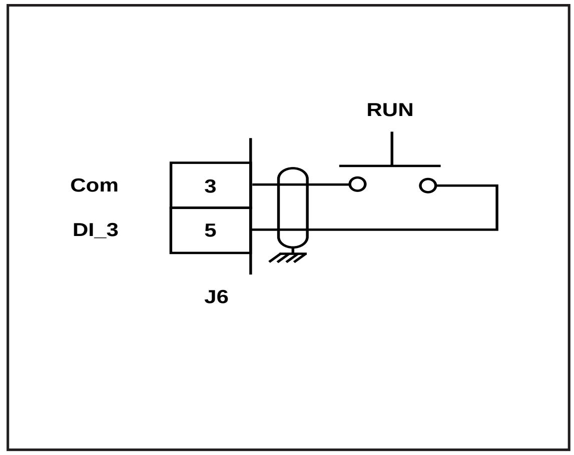


Figure 18 Run

Jog Forward
(J6 pins 6, 8)
Digital Input 4

Jog Forward is a maintained input. When it is closed, it sends a forward speed command signal to the drive at the selected Jog Setpoint. As a maintained input, Jog Forward is only active when the operator device is closed.

NOTE: Close the R-Stop, H-Stop and F-Stop inputs prior to entering the Jog state. If you are only using one of the Stop inputs, wire short the other Stop inputs to the common or the CX-1200 will not enter Jog.

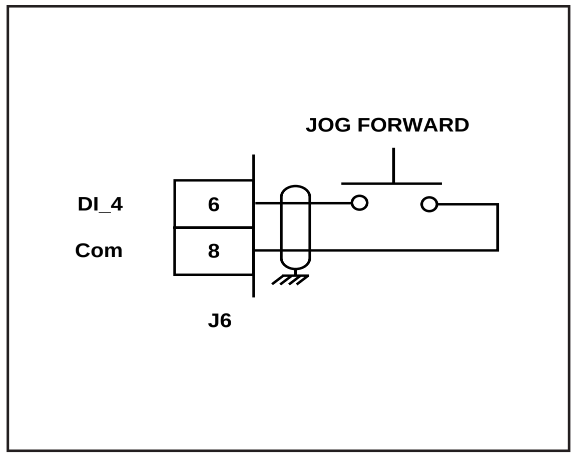


Figure 19 Jog Forward

Jog Reverse
(J6 pins 7, 8)
Digital Input 5

Jog Reverse is a maintained input. When it is closed, it sends a reverse speed command signal to the drive at the selected Jog Setpoint. As a maintained input, Jog Reverse is only active when the operator device is closed.

NOTE: Close the R-Stop, H-Stop and F-Stop inputs prior to entering the Jog state. If you are only using one of the Stop inputs, wire short the other Stop inputs to the common or the CX-1200 will not enter Jog.

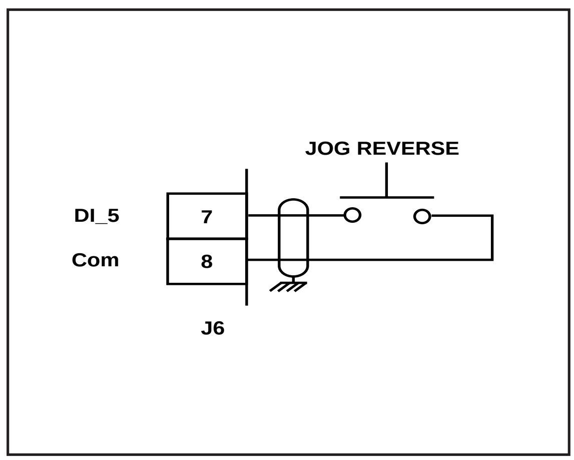


Figure 20 Jog Reverse

Keypad Lockout
(J6 pins 9, 8)
Digital Input 6

When the Keypad Lockout input is closed, the Control Parameters that you have selected to "lock out" are inaccessible from the front keypad. All of the Monitor Parameters remain enabled.

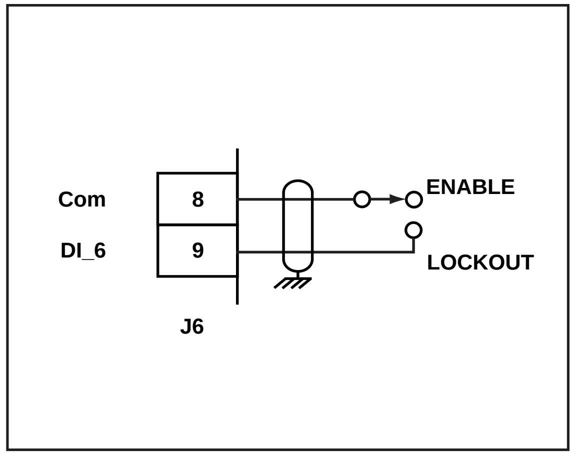


Figure 21 Keypad Lockout

Spare
(J6 pins 10, 8)
Digital Input 7

The Spare input is not defined at this time.

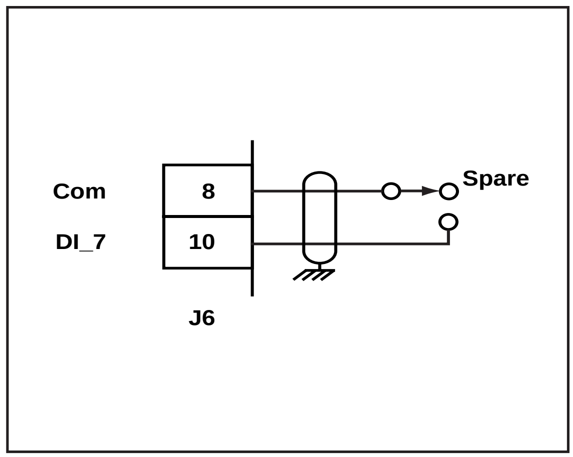


Figure 22 Spare

Block Select A
(J7 pins 1, 3)
Digital Input 8

Use Block Select A to select one of the two Parameter Blocks.

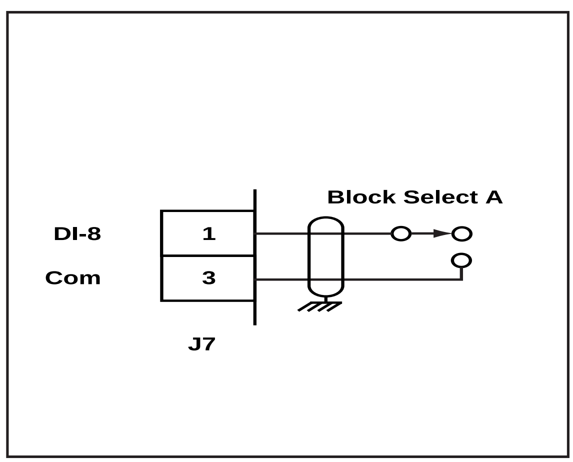


Figure 23 Block Select A

Batch Reset
(J7 pins 2,3)
Digital Input 9

Batch Reset is a momentary input. When it is closed, the CX-1200 resets the internal batch counter to zero.

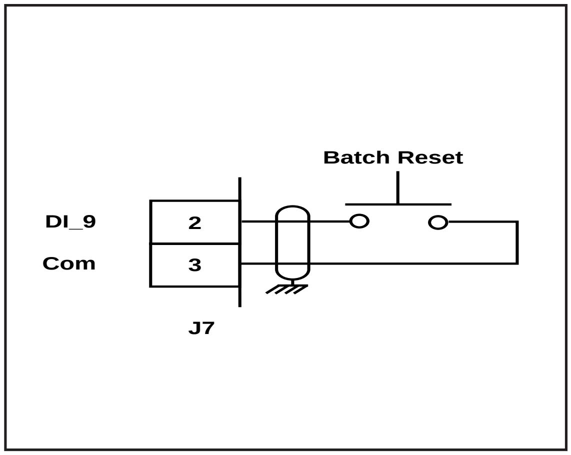


Figure 24 Batch Reset

Re-Learn
(J7 pins 4, 3)
Digital Input 10

Re-Learn is a maintained input. When it is closed, . As a maintained input, Re-Learn is only active when the operator device is closed.

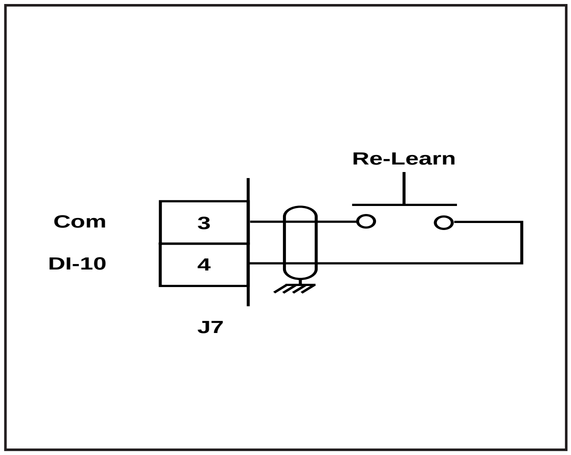


Figure 25 Re-Learn

Open Loop
(J7 pins 6, 3)
Digital Input 11

Open Loop is a maintained input. When it is closed (Open Loop), it the Control Output is adjusted in response to the setpoint changes only and feedback and error are ignored. When it is open (Closed Loop), the control algorithm adjusts the Control Output to reduce the error to zero.

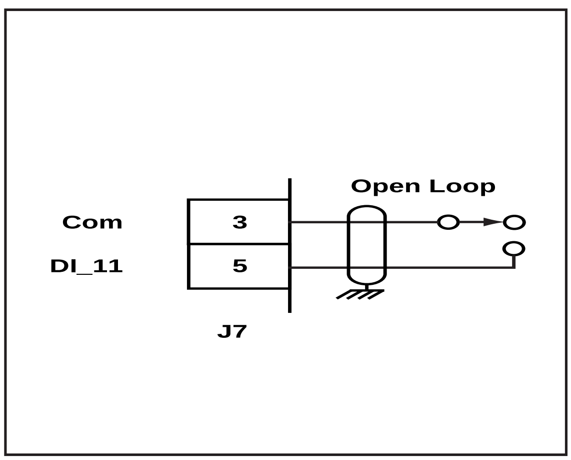


Figure 26 Open Loop

Position Reset
(J7 pins 6, 8)
Digital Input 12

Position Reset is a momentary input. When it is closed, the CX-1200 resets the Lead and Follower position information to zero.

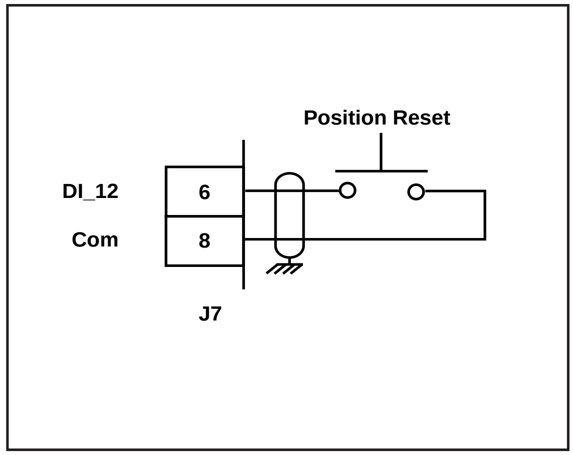


Figure 27   Position Reset

Sync Disable
(J7 pins 7, 8)
Digital Input 13

Sync Disable is a maintained input. When it is closed, it disables sync corrections.

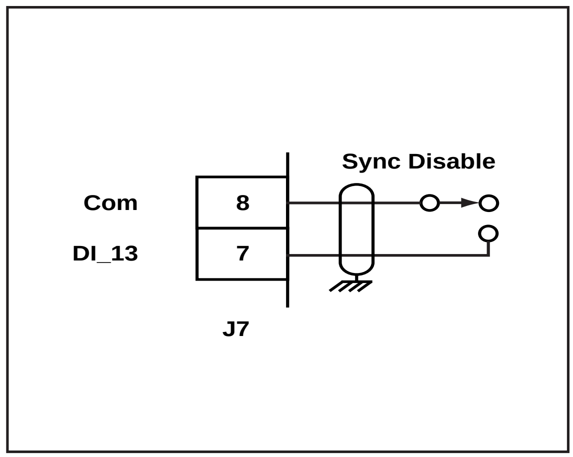


Figure 28   Sync Disable

Phase Advance
(J7 pins 9, 8)
Digital Input 14

Phase Advance is a maintained input. When it is closed it increments the CP selected by "Remote Scroll" (CP-400) at the rate set by "Rmt Scroll Rate" (CP-401). As a maintained input, Phase Advance is only active when the operator device is closed.

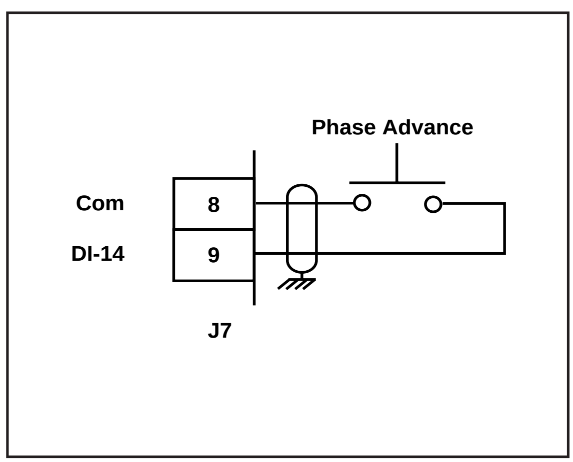


Figure 29   Phase Advance

Phase Retard

(J7 pins 10, 8)

Digital Input 15

Phase Retard is a maintained input. When it is closed it increments the CP selected by "Remote Scroll" (CP-400) at the rate set by "Rmt Scroll Rate" (CP-401). As a maintained input, Phase Retard is only active when the operator device is closed.

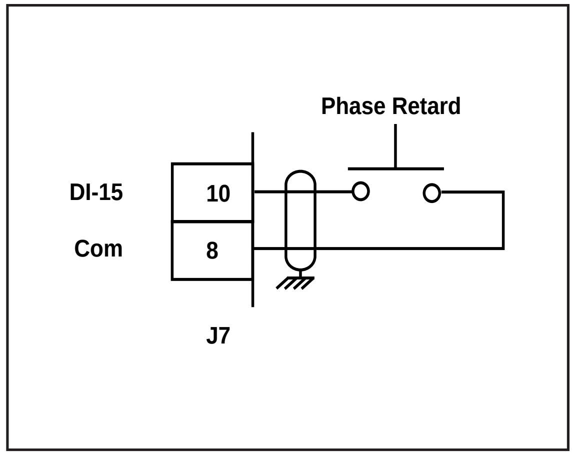


Figure 2-30 Phase Retard

OUTPUTS

NOTE: The installation of this motor control must conform to area and local electrical codes. Refer to page 9 before you begin wiring.

Control Output
(J3 pins 1, 2)

Control Output is an isolated analog output signal that is sent to the motor drive to control the speed of the motor. Wire the Control Output into the speed signal input of the drive. If the motor drive has a potentiometer speed control, remove the potentiometer connections and wire the Control Output to the potentiometer wiper point. The CX-1200's Isolated Common should always be connected to the drive common.

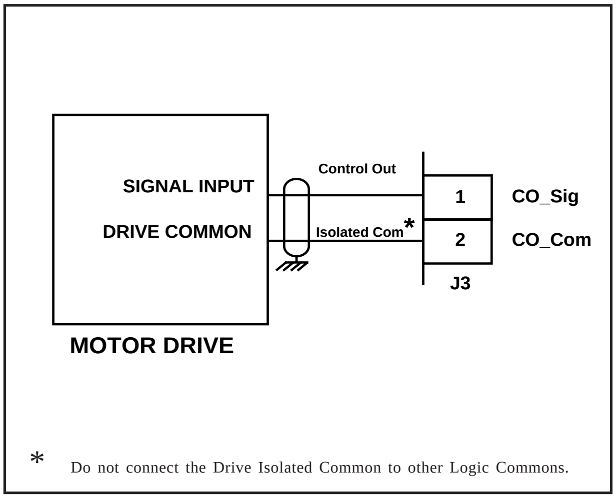


Figure 31 Control Output

NOTE: All Digital Outputs are activated via the PLC and so are subject to the active PLC program.

Zero Speed
(J2 pin 2)
Digital Output 0

The Zero Speed output is activated (driven low) when the feedback is less than or equal to zero speed, as determined by the value that you enter in the Zero Speed Alarm Control Parameter (CP-332). See Figure 32.

Hi/Low Speed Alarm
(J2 pin 3)
Digital Output 1

The HI SPEED ALARM output is activated (driven low) if the system's speed is greater than the speed alarm value that you enter in the CMPR1 Val Control Parameter (CP-388), The LO SPEED ALARM output is activated (driven low) if the system's speed is lower than the value that you enter in the CMPR2 Val Control Parameter (CP-389). See Figure 32.

Sync Alarm
(J2 pin 4)
Digital Output 2

The Sync Alarm output is activated (driven low) the Lead and Follower sync pulses are not syncronized. See Figure 32.

Lead Sync Absent
(J2 pin 5)
Digital Output 3

The Lead Sync Absent output is activated (driven low) when the Lead Sync Pulse is absent. See Figure 32.

Foll Sync Absent
J2 pin 6)
Digital Output 4

The Foll Sync Absent output is activated (driven low) when the Follower Sync Pulse is absent. See Figure 32.

Batch Done
(J2 pin 7)
Digital Output 5

The Batch Done output is activated (driven low) when the CX-1200's internal batch counter reaches the batch count that you enter in the Cntr1Trig (CP-420). See Figure 32.

Fwd/Rvs
(J2 pin 8)
Digital Output 6

The Fwd/Rvs is activated (driven low) when the CX-1200 commands a forward direction to the motor drive. The Fwd/Rvs output is deactivated (driven high) when the CX-1200 commands a reverse direction to the motor drive. See Figure 32.

Drive Enable
(J2 pin 9)
Digital Output 7

The Drive Enable output is activated (driven low) when the CX-1200 signals a run command to the motor drive. The Drive Enable output is driven high (relay deactivated) after Power Up and at the completion of F-Stop. See Figure 32.

NOTE: The Digital Outputs are open-collector relay drivers. For specification details, see *Appendices: Appendix A* . Use an external DC power supply to power the relays. Free-wheeling diodes are incorporated internally in the CX-1200 and do not need to be added externally.

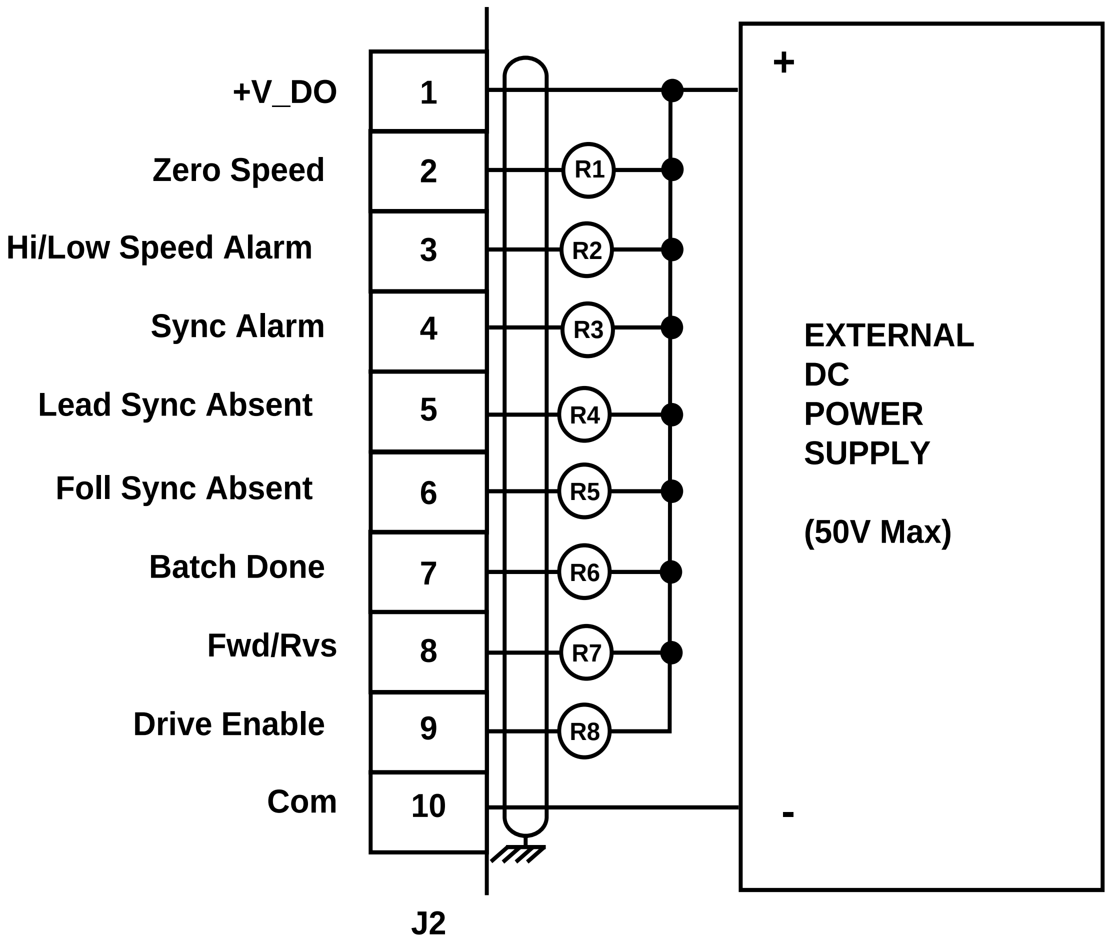


Figure 32 CX-1102 Digital Outputs

SERIAL COMMUNICATIONS

NOTE: The installation of this motor control must conform to area and local electrical codes. Refer to page 9 before you begin wiring.

The Serial Communications interface on the CX-1200 complies with EIA Standard RS-485-A for balanced line transmissions. This interface allows the host computer to perform remote computer parameter entry, status or performance monitoring, and remote control of the CX-1200. See *Serial Communications* for information on using Serial Communications.

Figures 33 and 34 illustrate a multidrop installation of the Serial Communications link and Serial Communications connections.

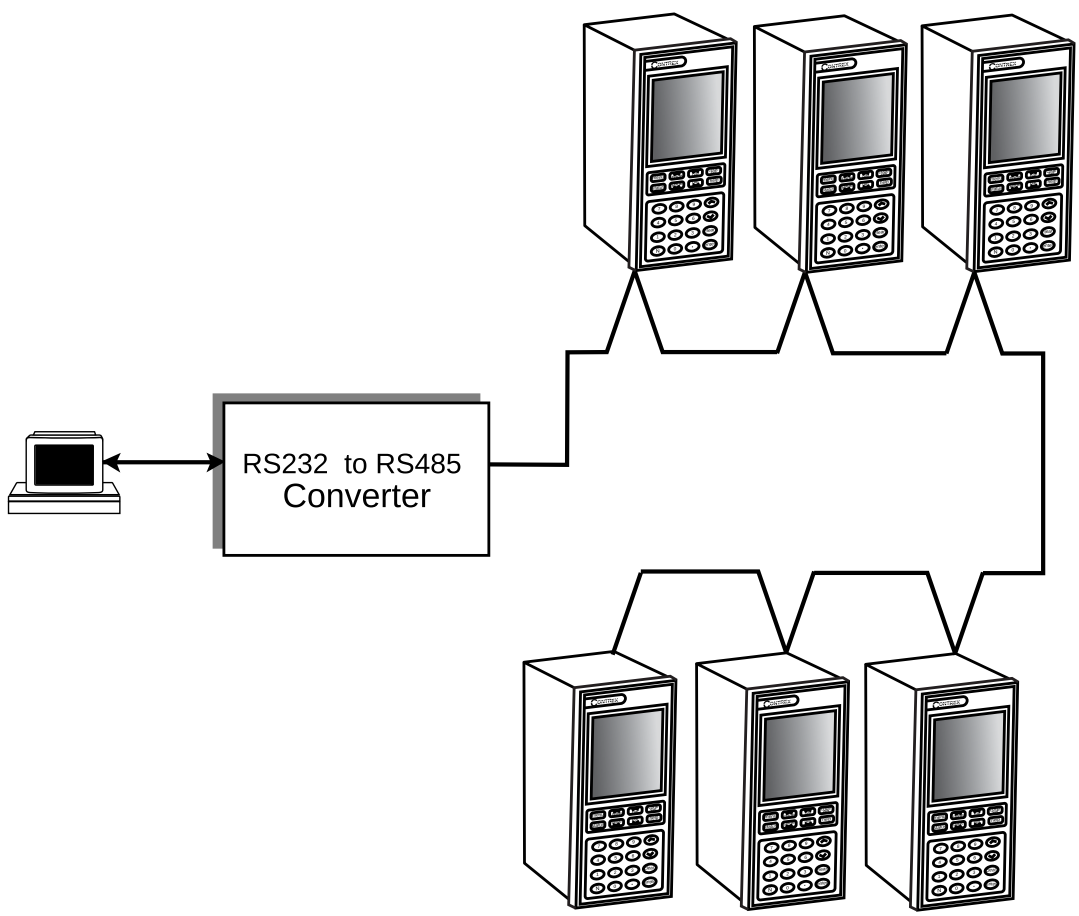
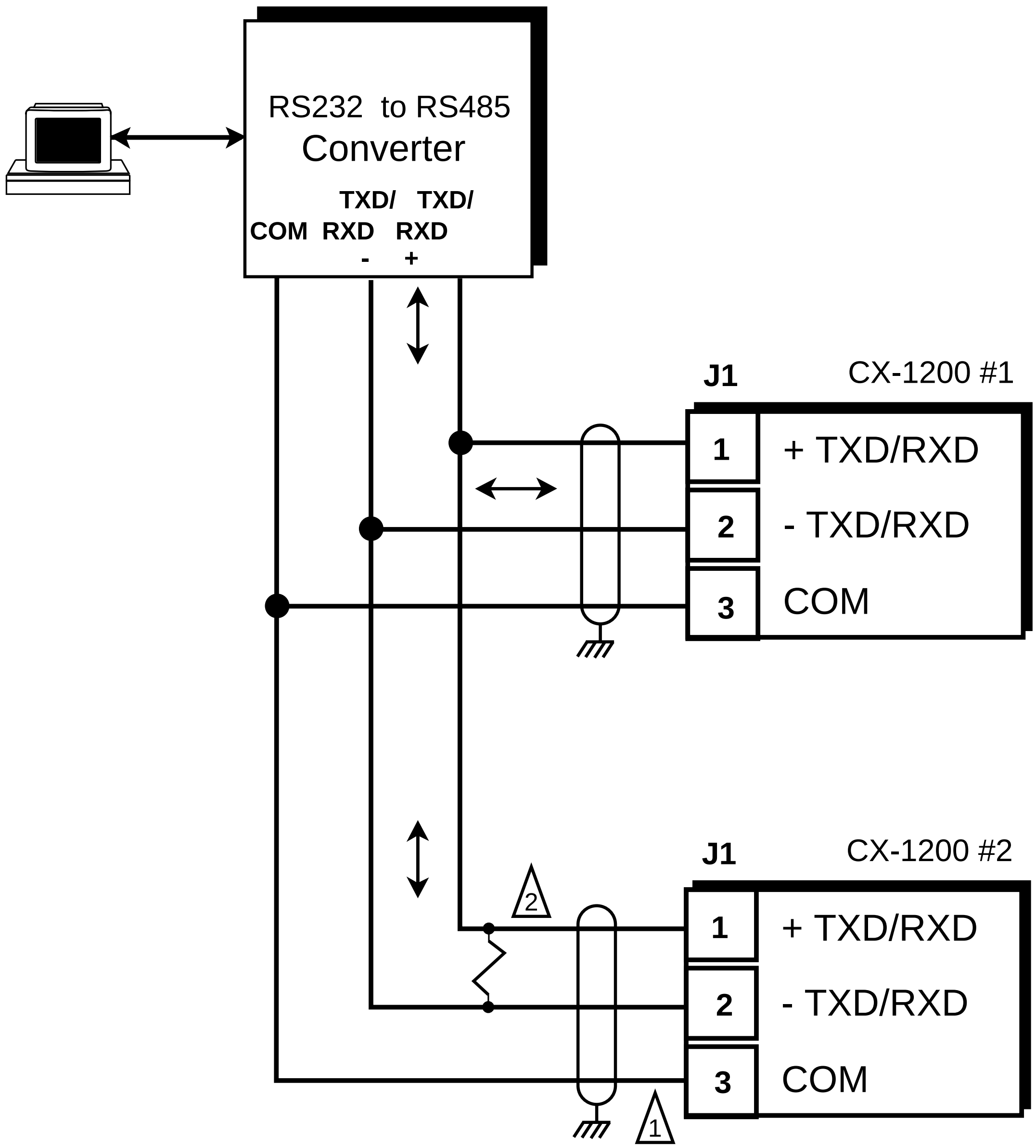


Figure 33 CX-1200 Multidrop Installation



1. Shield only at one end of the cable.

2. If you need to terminate the communication line, then terminate it at the unit which is the furthest away from the converter. A 100 ohm, 1/2 Watt resistor will usually terminate successfully. Refer to EIA Standard RS-485A, for more information.

Figure 34 CX-1200 Serial Communications Connections

—NOTES—

ANALOG I/O CARD (OPTIONAL)

This section contains the mounting and wiring information for the Analog I/O Card. Please read this section prior to mounting or wiring the Analog I/O Card to ensure that you make the appropriate decisions.

The Analog I/O Card is an auxiliary analog card with two analog inputs and one analog output. Both the inputs and output are factory calibrated for $\pm$ 12V or 0 to 20 mA signals. Some of the Monitor Parameters can be used in connection with the analog output for either auxilary control or monitoring. Analog process signals can be used in connection with the analog inputs to replace the following:

Lead Sensor Offset Source
Follower Sensor Offset Source
Phase Source

—NOTES—

MOUNTING

This section contains the mounting information for the CX-1200 Analog I/O card. Please read this section as you mount the Analog I/O card to ensure that the Analog I/O card is mounted correctly. If the Analog I/O card does not function properly after installation, then verify that the mounting procedure has been completed accurately. For the specifications on the Analog I/O card, refer to *Appendices: Appendix A.*

The CX-1200 will support one Analog I/O card in either of the two available slots, however, the upper slot is preferred.

Warning

The Analog I/O Card should only be installed by a qualified technician.

Take the proper antistatic precautions.

1) If the CX-1200 unit has power connected to it, remove the power. If the CX-1200 has been mounted in your system, disable it from the system.

2) Remove the connectors on the rear of the CX-1200. Pay careful attention to the location of each connector so that you can replace them in their proper locations. It is possible to replace a connector incorrectly.

3) Remove the earth ground screw and ground connections.

4) Remove the four machine screws that hold the back plate in place, and set them aside. Carefully remove the back plate.

5) Remove the upper option card slot cover plate by removing the two machine screws.

6) Remove the CPU Board carefully - pull the CPU board straight out so that you do not bend the card guides or the CPU board, nor damage the internal backplane card-edge connector. See figure 2-35.

NOTE: Take the appropriate antistatic precautions when you handle the CPU board and the Analog I/O card.

7) Remove the Analog I/O card from it's antistatic bag, holding it by the edges.

8) Remove the 11-pin terminal strip plug from the 11-pin right angle terminal strip on the Analog I/O card. Make sure that the screws that hold the round standoffs and the 40-pin connector in place are secure. Tighten these screws, as needed.

9) Mount the Analog I/O card to the CPU Board by carefully inserting the three long pins of the Optional Analog connector to the three corresponding holes on the non-component side of the CPU board, and insert the 40-pin connector on the Analog I/O card into the 40-pin connector on the CPU board.

10) Verify that the standoffs are flush with the CPU board. Make sure that the 40-pin contacts are properly aligned.

11) Holding firmly to the edges of both boards to preserve the alignment, carefully flip the boards so that the component side of the CPU board faces up.

12) Insert the four screws and the attached lock washers into the round standoff holes and alternate between the screws as you tighten both screws into place snugly. Verify the alignment of the boards.

13) Reinsert the CPU Board into the CX-1200 unit by aligning the CPU board with the top and bottom card edge connectors and gently push the board straight back until the CPU board card edge connector tab seats fully into the internal backplane card-edge connector.

(continued)

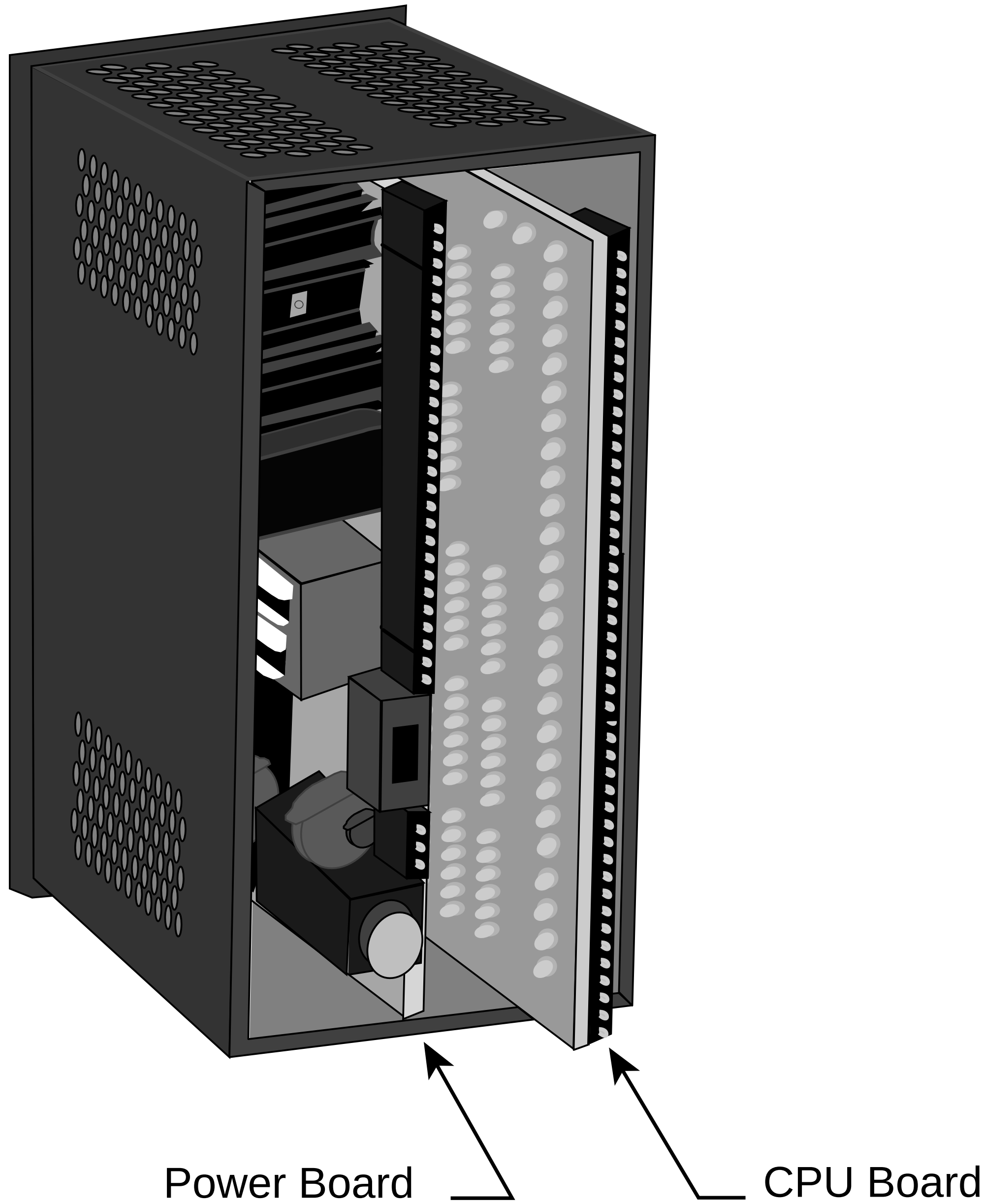


Figure 2-35 Removing the CPU Board

14) Replace the back plate, making sure that it seats properly and the connectors are all properly aligned in their slots.

15) Screw the back plate into place with the four machine screws.

16) Screw the ground screw back into place snugly. Replace the connectors. Replace the power connector.

NOTE: Be sure to follow the calibration procedure before engaging the CX-1200. Refer to *Drive Setup / Calibration: Calibration.*

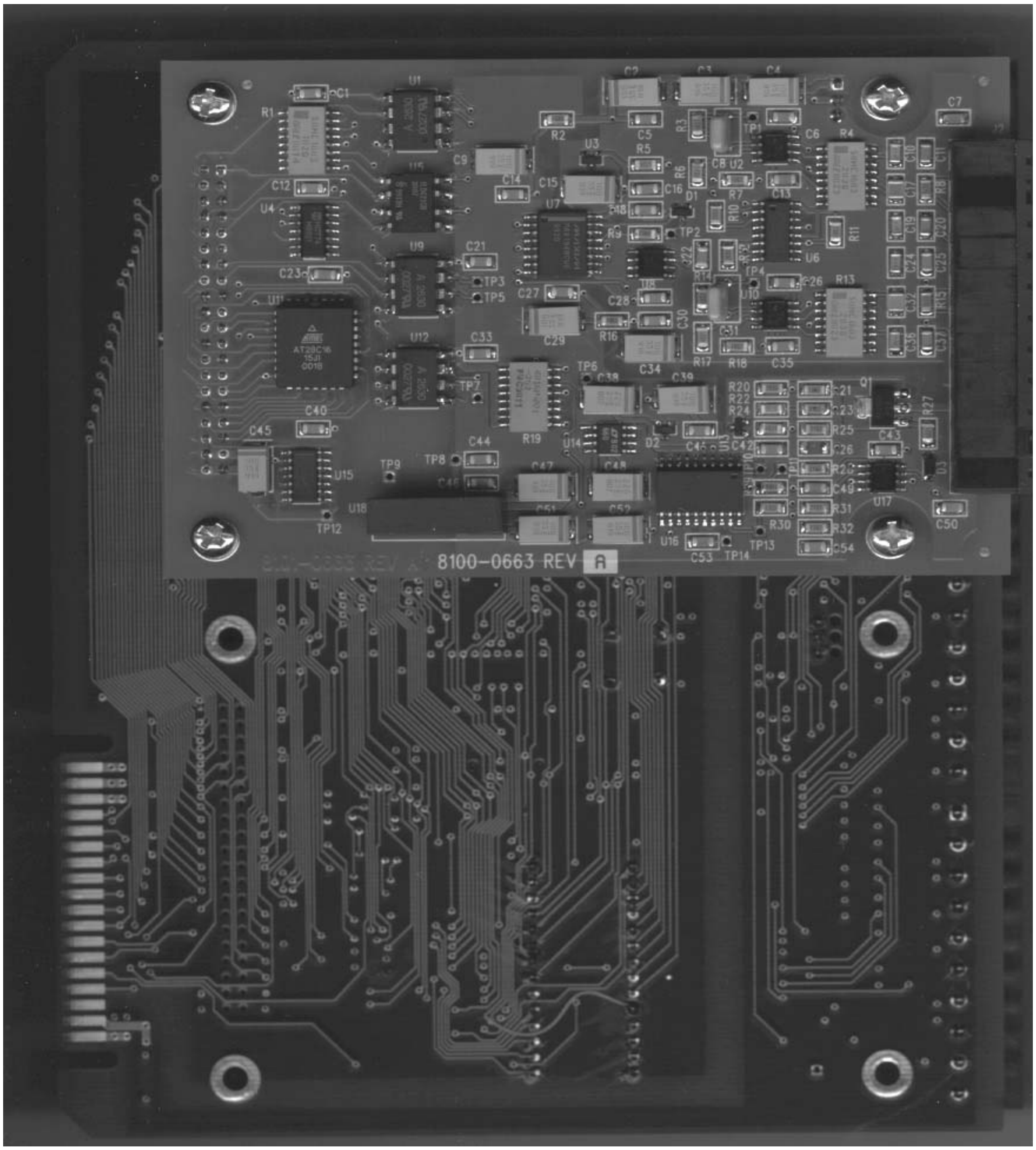


Figure 2-36 Mounting the Analog I/O Card on the CPU Board

—NOTES—

WIRING

This section contains the input and output wiring information for the CX-1200 Analog I/O Card. Please read this section prior to wiring the Analog I/O Card to ensure that you make the appropriate wiring decisions.

The CX-1200 will support one Analog I/O Card in either of the two available slots. The factory calibrated Analog I/O Card has two inputs and one output available. Both the inputs and output are calibrated for ± 12V or 0 to 20 mA signals. The Analog I/O Card is fully isolated from the CPU core. For the specifications for the Analog I/O Card, refer to *Appendices Appendix A.*

Warning

The Analog I/O Card should only be installed by a qualified technician.

Take the proper antistatic precautions.

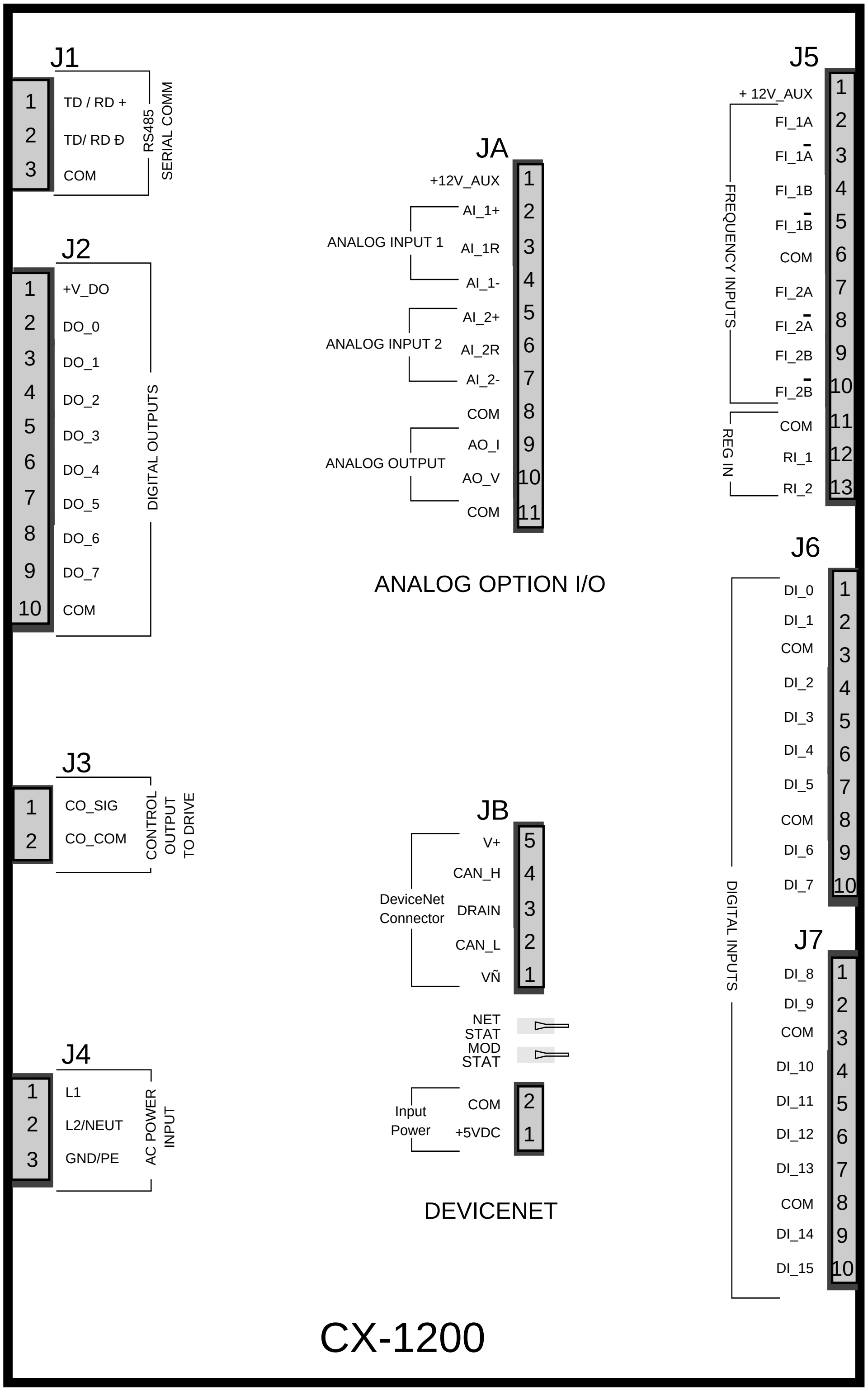


Figure 2-37 CX–1200 Analog I/O Card

INPUTS

NOTE: Refer to pages 2-9 and 2-36 before you begin wiring.

Analog Input 1:

Voltage Input Wiring
(JA, Pins 2, 4, 8)

The Analog Input 1 can be used with either ±12 VDC or 0-20 mA inputs. Figure 2-38 displays the ±12 VDC option.

For the differential inputs:
- Connect JA pin 2 to the positive differential signal source.
- Connect JA pin 4 to the negative differential signal source.
- Connect JA pin 8 to the common of the differential signal source.

For the non-differential inputs:
- Connect JA pin 2 to the signal voltage source.
- Connect JA pin 4 and JA pin 8 to the common of the signal source.

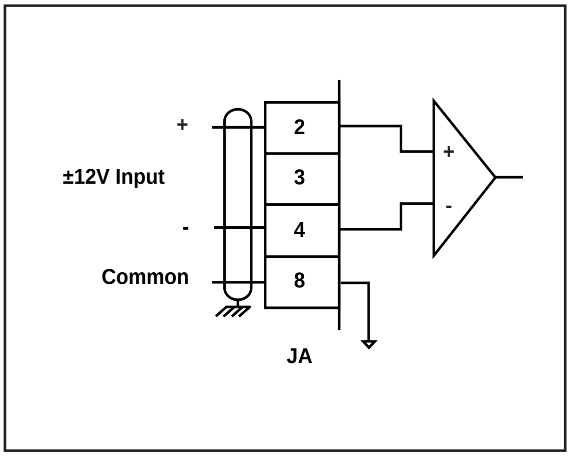


Figure 2-38 Analog Input 1: Voltage Input

Analog Input 2:

Voltage Input Wiring
(JA, Pins 5, 7, 8)

The Analog Input 2 can be used with either ±12 VDC or 0-20 mA inputs. Figure 2-39 displays the ±12 VDC option.

For the differential inputs:
- Connect JA pin 5 to the positive differential signal source.
- Connect JA pin 7 to the negative differential signal source.
- Connect JA pin 8 to the common of the differential signal source.

For the non-differential inputs:
- Connect JA pin 5 to the signal voltage source.
- Connect JA pin 7 and JA pin 8 to the common of the signal source

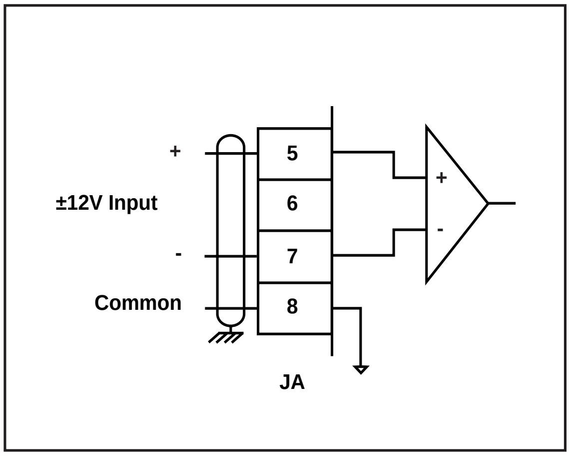


Figure 2-39 Analog Input 2: Voltage Input

Analog Input 1:
Current Input Wiring
(JA, Pins 2,3,4)

The Analog Input 1 can be used with either ±12 VDC or 0-20 mA inputs. Figure 2-40 displays the 0-20 mA option.

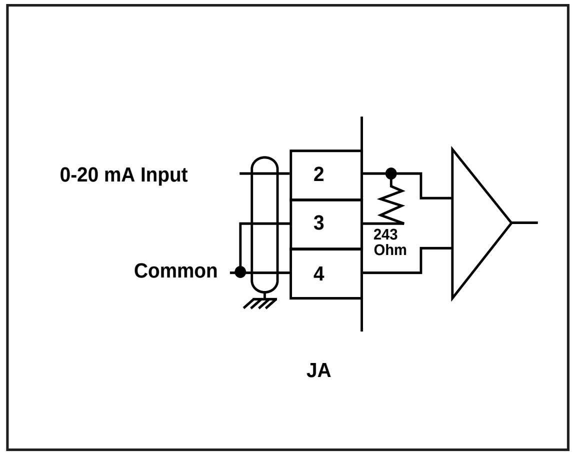


Figure 2-40 Analog Input 1: Current Input

Analog Input 2:
Current Input Wiring
(JA, Pins 5,6,7)

The Analog Input 2 can be used with either ±12 VDC or 0-20 mA inputs. Figure 2-41 displays the 0-20 mA option.

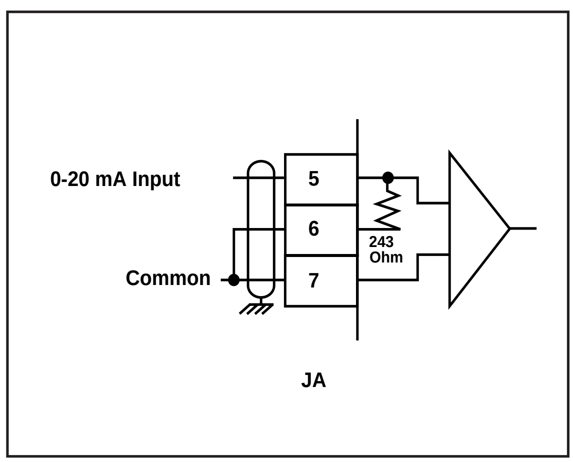


Figure 2-41 Analog Input 2: Current Input

Analog Input 1:
Potentiometer Input Wiring
(JA, Pins 1, 2, 4, 8)

The Analog Input 1 can be used with a potentiometer (e.g., dancer pot). Figure 2-42 displays this option.

* The total current from JA pin 1 and J5 pin 1 (+12V_Aux) must not exceed 150 mA.

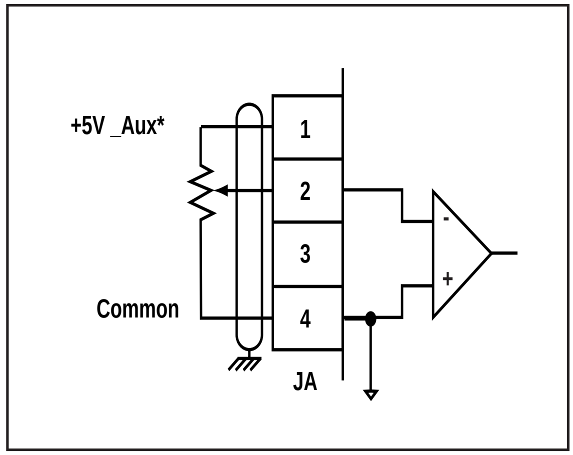


Figure 2-42 Analog Input 1: Potentiometer Input

Analog Input 2:
Potentiometer Input Wiring
(JA, Pins 1, 5, 7, 8)

The Analog Input 1 can be used with a potentiometer (e.g., dancer pot). Figure 2-43 displays this option.

* The total current from JA pin 1 and J5 pin 1 (+12V_Aux) must not exceed 150 mA

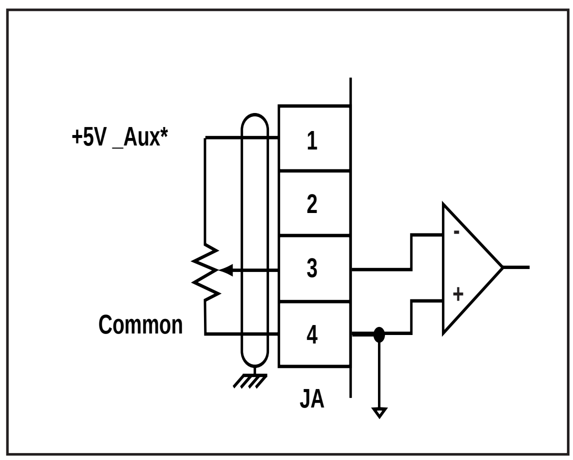


Figure 2-43 Analog Input 2: Potentiometer Input

OUTPUTS

NOTE: Refer to pages 2-9 and 2-36 before you begin wiring.

Analog Output:
Voltage Output Wiring
(JA, Pins 9, 10, 11)

The Analog Output produces either an isolated ± 12V output signal or a 0-20 mA current source analog output signal into a load resistance of 0-500 Ohms. Figure 2-44 displays the ±12V option.

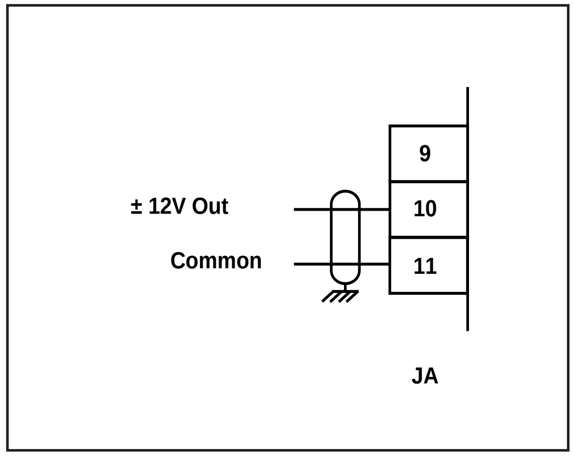


Figure 2-44 Analog Output: Voltage Output

Analog Output:
Current Output Wiring
(JA, Pins 9, 10, 11)

The Analog Output produces either an isolated ± 12V output signal or a 0-20 mA current source analog output signal into a load resistance of 0-500 Ohms. Figure 2-45 displays the 0-20 mA option.

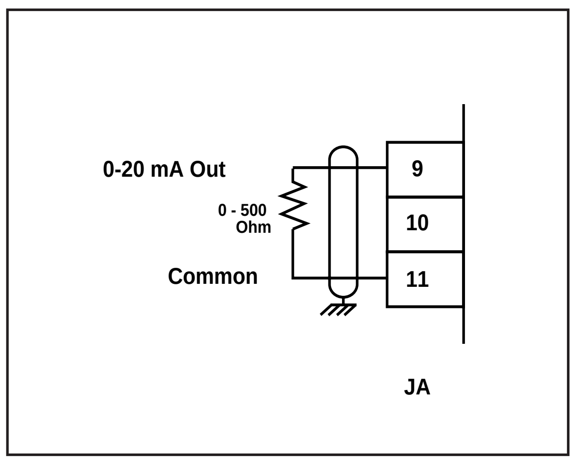


Figure 2-45 Analog Output: Current Output

DEVICENET CARD (OPTIONAL)

For the installation, wiring and operation of the optional DeviceNet card, refer to the *CX-Series DeviceNet Card Technical Manual*, # 0001-0132.

—NOTES—

LOGIC CONTROL

This section addresses the six digital inputs that control the CX-1200's operating state.
The six digital inputs (listed in by priority) are:

F-Stop
R-Stop
H-Stop
Run
Jog Forward
Jog Reverse

When the CX-1200 is powered up, it defaults to R-Stop. If either Run or Jog have been hardwired, the CX-1200 will operate in either Run or Jog instead of R-Stop. Run is hardwired by shorting Run, R-Stop and F-Stop to common. Jog Forward or Jog Reverse are hardwired by shorting Jog, R-Stop, and F-Stop to common.

Run is terminated by activating F-Stop, R-Stop, or H-Stop. The operating state changes to the input that terminated Run, provided that another input is not subsequently activated. Jog Forward or Jog Reverse are terminated by deactivating the Jog Forward or Jog Reverse inputs. Jog Forward or Jog Reverse can also be terminated by activating F-Stop, R-Stop, or H-Stop. The operating state automatically changes to R-Stop after the Jog ramp is completed. You can not enter Run from Jog with the Jog inputs active. However, you can enter Run during a deceleration from Jog after the Jog input is deactivated. You can not enter Jog Forward or Jog Reverse from Run. If two or more inputs become active at the same time, the input with the highest priority will dictate the operating state.

The sections that follow demonstrate how to use the digital inputs.

Caution

Do not use the AC line power to start or stop the system.

Use the Digital Inputs to start or stop the system.

Logic Inputs

F-Stop (Fast Stop) has priority over the other operating states. F-Stop forces the CO signal to “0” volts and monitors the feedback. When the feedback is less than the Zero Speed (CP-332), the Drive En (PLC bit 41) resets to “0”. This PLC bit is routed by the PLC program to an output that disables the drive. If the feedback does not reach Zero Speed within 1/2 second, the Drive En (PLC bit 41) automatically resets to “0”. The integral, trim and feedforward are also set to “0” and the loop is set to Open Loop (OL).

To activate F-Stop:

- Activate High (Open), Level Sensitive, Latched
- Wire to F-Stop interconnect
- Use momentary contact - does not need to be maintained to remain active

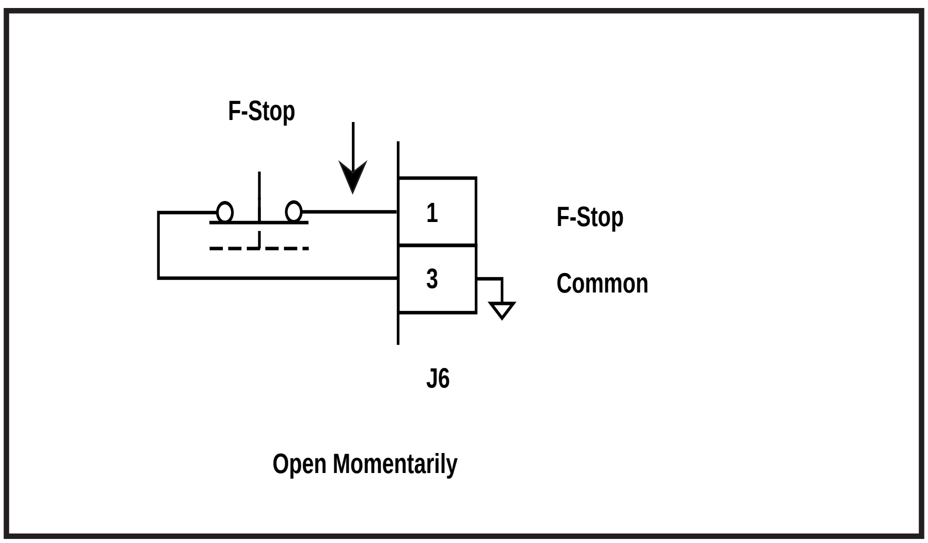


Figure 2-46 F-Stop Input

R-Stop (Ramp Stop) has the second highest operating priority. Use R-Stop to stop the drive with a deceleration ramp. The velocity command is ramped down to “0”. If the loop is “Closed”, the ramp is executed with velocity loop control (with feedforward, using Kff). If the loop is “Open”, the ramp is executed with feedforward only (using Kff). The deceleration rate for the ramp is determined by Dcl Tm RStp (CP-310) and Ref StopRmp (CP-210) or by the Dcl Rt RStp (CP-311). Once the ramp reaches “0”, the feedback is monitored. When the feedback is less than the Zero Speed (CP-332), the Drive En (PLC bit 41) resets to “0”. The PLC program routes the PLC bit to an output that is disables the drive. If the feedback does not reach the Zero Speed (CP-332) within 1/2 second, then the Drive EN PLC bit automatically resets to “0”. The integral, trim and feedforward set to “0” and the loop sets to “Open Loop” (OL).

To activate R-Stop:

- Activate High (Open), Level Sensitive, Latched
- Use momentary contact - does not need to be maintained to remain active

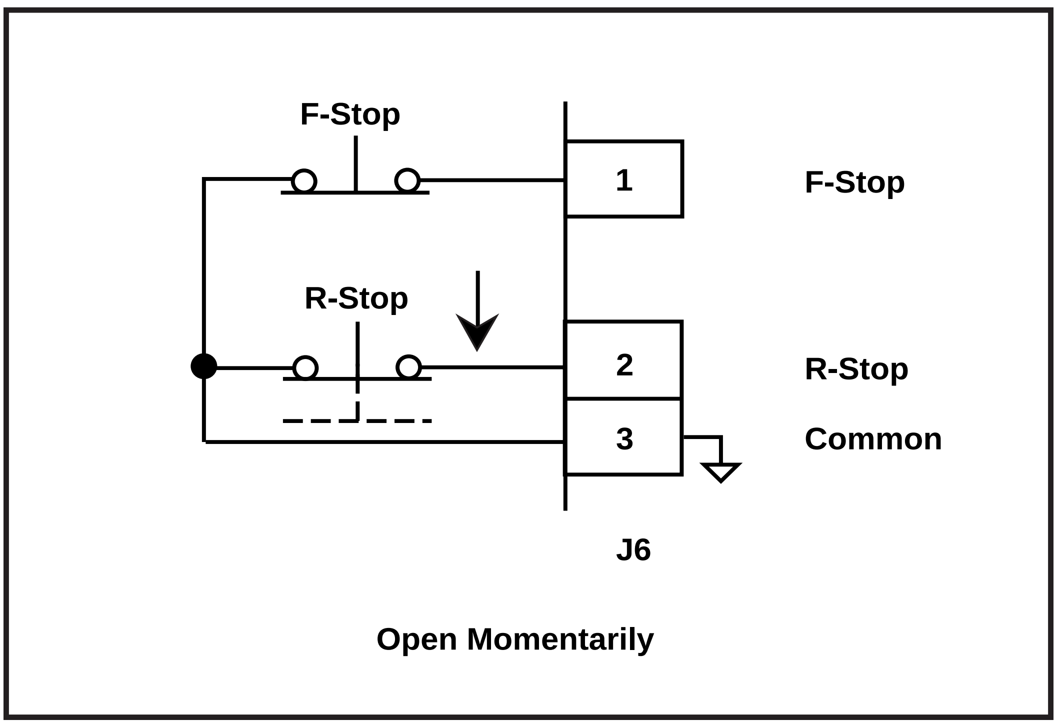


Figure 2-47 R-Stop Input

H-Stop (Stop and Hold) has the third highest operating priority. Use H-Stop to stop the drive with a deceleration ramp. The velocity command is ramped down to “0”. If the loop is “Closed”, the ramp is executed with velocity loop control (with feedforward, using Kff). If the loop is “Open”, the ramp will be executed with feedforward only (using Kff). The deceleration rate for the ramp is determined by Dcl Tm HStp (CP-312) and Ref StopRmp (CP-210) or by the Dcl Rt RStp (CP-311). H-Stop differs from R-Stop in its operation after the deceleration ramp. The operation of the “Hold” function is dictated by Hstp LoopMode (CP-230). In quadrature feedback, when the velocity command reaches “0” and the feedback is less than the Zero Speed (CP-332), then H-Stop will; hold the CO Signal to “0” volts (Open Loop), hold the feedback velocity to Zero Speed (Closed Velocity Loop) or hold the feedback position to the position where the drive stopped (Closed Zero Error or Position Loop).

To activate H–Stop:

- Activate High (Open), Level Sensitive, Latched
- Use momentary contact - does not need to be maintained to remain active

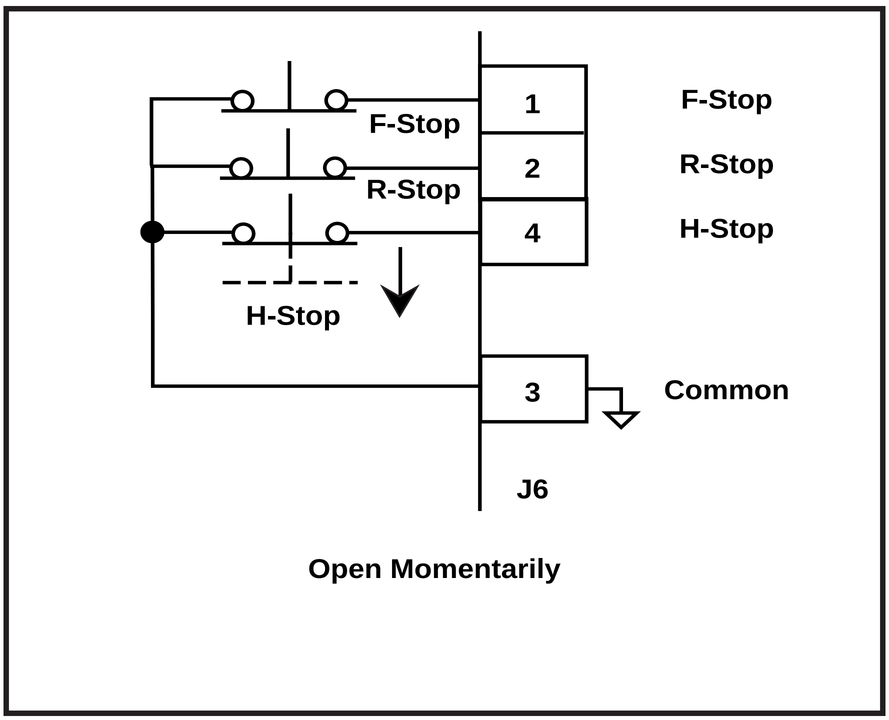


Figure 2-48   H-Stop Input

Run has the fourth highest operating priority. Run is the primary operating state. RUN Mode (CP-202) determines the mode of operation for Run, using either the master mode, the follower mode, the direct mode. The corresponding setpoint for the selected mode determines the operating speed. RUN Mode (CP-202) determines the control loop that is used during Run. At times, the selected RUN Mode is overridden. The direct mode will only operate in an open loop. The master mode will "Run" in velocity loop. Therefore, the follower mode is the only mode that can "Run" with the "velocity loop" or the "Position loop".

With the exception of the direct mode, the acceleration and deceleration ramps for the modes of operation are determined by Acl Tm RUN, (CP-301), Dcl Tm RUN (CP-303) and Ref Ramps (CP-300). The direct mode ramps are determined by Acl Tm Drct (CP-231), Dcl Tm Drct (CP-232) and Ref Ramps (CP-300).

To activate Run:

- Activate Low (closed to common), Level Sensitive, Latched
- Use momentary contact - does not need to be maintained to remain active

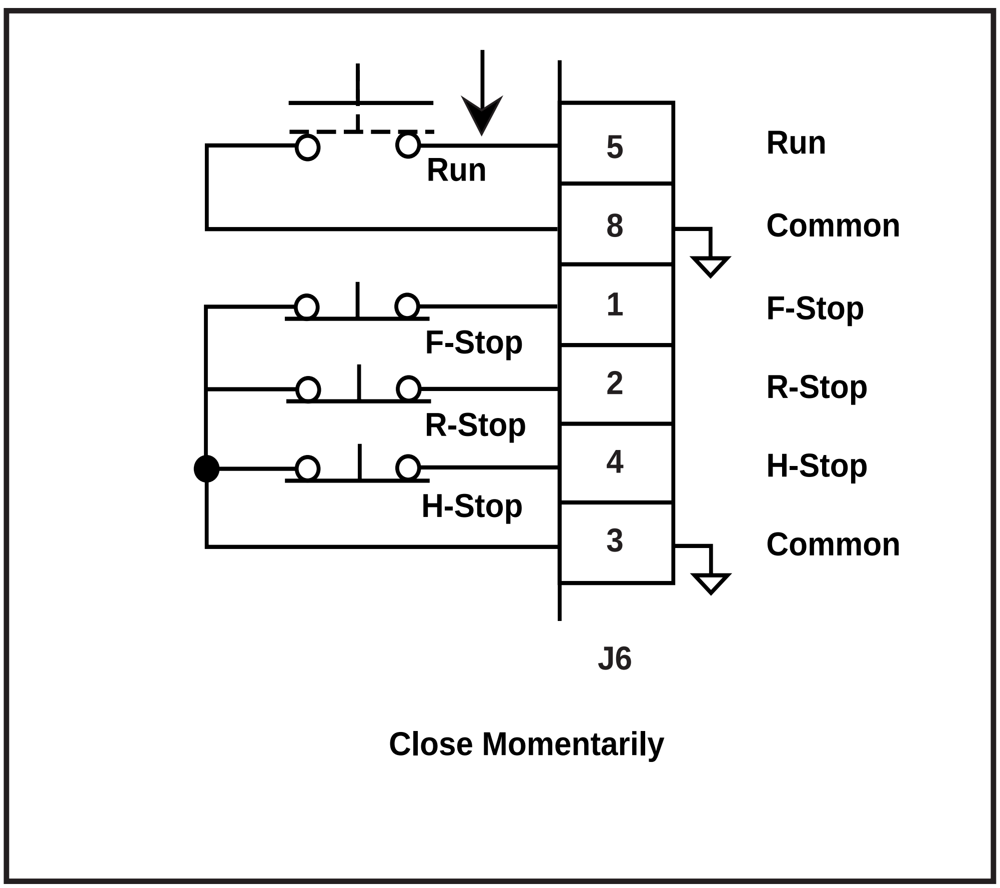


Figure 2-49 Run Input

Jog Forward has the fifth highest operating priority. Use Jog Forward to "Jog" the drive Forward at the rate indicated in Jog SP (CP-240). The acceleration and deceleration ramps are dictated by Acl Tm Jog (CP-241), Dcl Tm Jog (CP-243) and Jog SP (CP-240). After the Jog Forward input is deactivated and the ramped reference has reached "0", the CX-1200 automatically reverts to the R-Stop operating state.

To activate Jog Forward:

- Activate Low (closed to common), Level Sensitive, Not-Latched
- Use momentary contact - needs to be maintained to remain active

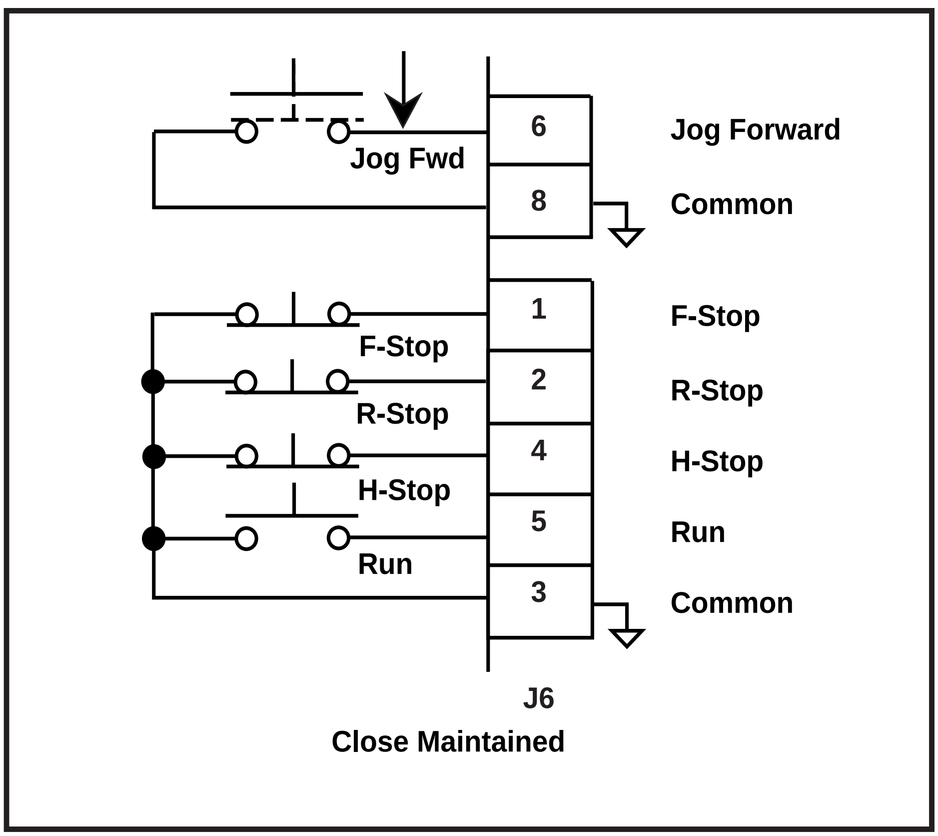


Figure 2-50 Jog Forward Input

Jog Reverse has sixth (the least) operating priority. Use Jog Reverse to "Jog" the drive Forward at the rate indicated in Jog SP (CP-240). The acceleration and deceleration ramps are dictated by Acl Tm Jog (CP-241), Dcl Tm Jog (CP-243) and Jog SP (CP-240). After the Jog Reverse input is deactivated and the ramped reference has reached "0", the CX-1200 automatically reverts to the R-Stop operating state.

To activate Jog Reverse:

- Activate Low (closed to common), Level Sensitive, Not-Latched
- Use momentary contact - needs to be maintained to remain active

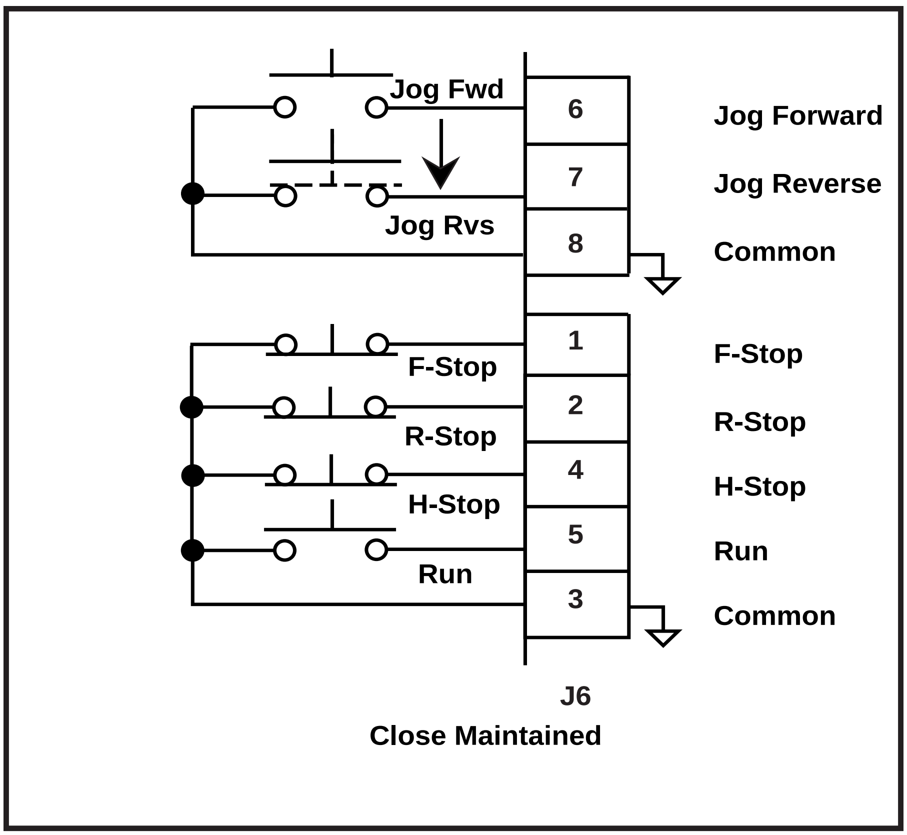


Figure 2-51 Jog Reverse Input

—NOTES—

Operator Interface

Keypad Operation
Screen Operation

Figure 3-1 The CX–1200 Front Panel

KEYPAD OPERATION

The CX–1200 operates on a system of screens that are controlled by the front keypad. Figure 3-1 shows the location of the keys and LCD screen display on the front panel. You will find detailed descriptions of the interactions of the keys and screens throughout the “Operations” section. The following is a brief summary of how the front panel functions.

LCD Screen Display	The screens are displayed on the LCD Display.
Menu Key	The Menu key accesses the main menu from a sub-menu or status screen, and a sub-menu from a parameter screen.
Status Screen Key	The Status key will immediately pop-up the status screen from any other screen. To return to the previous screen, press the Status key again.
Page Up/Down Keys	Some screens have multiple pages. The Page Up/Down keys allow you to scroll through, one page at a time.
Numeric Keys	Use the Numeric keys to enter the Parameter Code of either a Control Parameter (CP) or a Monitor Parameter (MP) or to enter a Parameter Value for a Control Parameter. Use the Enter key to activate the entry. Use the Clear key to delete the entry and clear the Parameter Value to zero.
Parameter Up/Down Keys	Each time you press the Parameter (Par) up key, the cursor and highlight bar will move up by one line. Each time you press the Parameter (Par) down key, the cursor will move down by one line. It will also automatically scroll through the lines if you hold the key down.
Code Select Key	Use the Code Select key in the Status screen and in the parameter screens to display a Parameter Code line. When the Parameter Code line appears, you can use it to access a parameter and its value. Enter a Parameter Code, then press the Enter key and the parameter and its value will be displayed. You can change a Control Parameter value by entering a new value or by scrolling with the Increment Up/Down keys. Use the Clear key to delete the entry and clear the parameter value to zero.
Help Screen Key	The Help key accesses the Help screen and gives you a brief description of the parameter or subject that is highlighted (active). The Help screen also functions as an options screen, where you can select Control Parameter data. You can access help from any screen. Press the Help key again to return to the previous screen.
Increment Scroll Up/Down	Use these keys in the parameter screens to change the active value. Each time you press the Increment Scroll Up key, the active value will increase by one increment. Each time you press the Increment Scroll Down key, the active value will decrease by one decrement. It will also automatically scroll through the increments or decrements if you hold the key down.
Clear Key	Use the Clear key to delete a value or change which you have entered. However, the Clear key will not delete the entry or change once the Enter key has been used.
Enter Key	Use the Enter key to accept a value or change which you have entered.

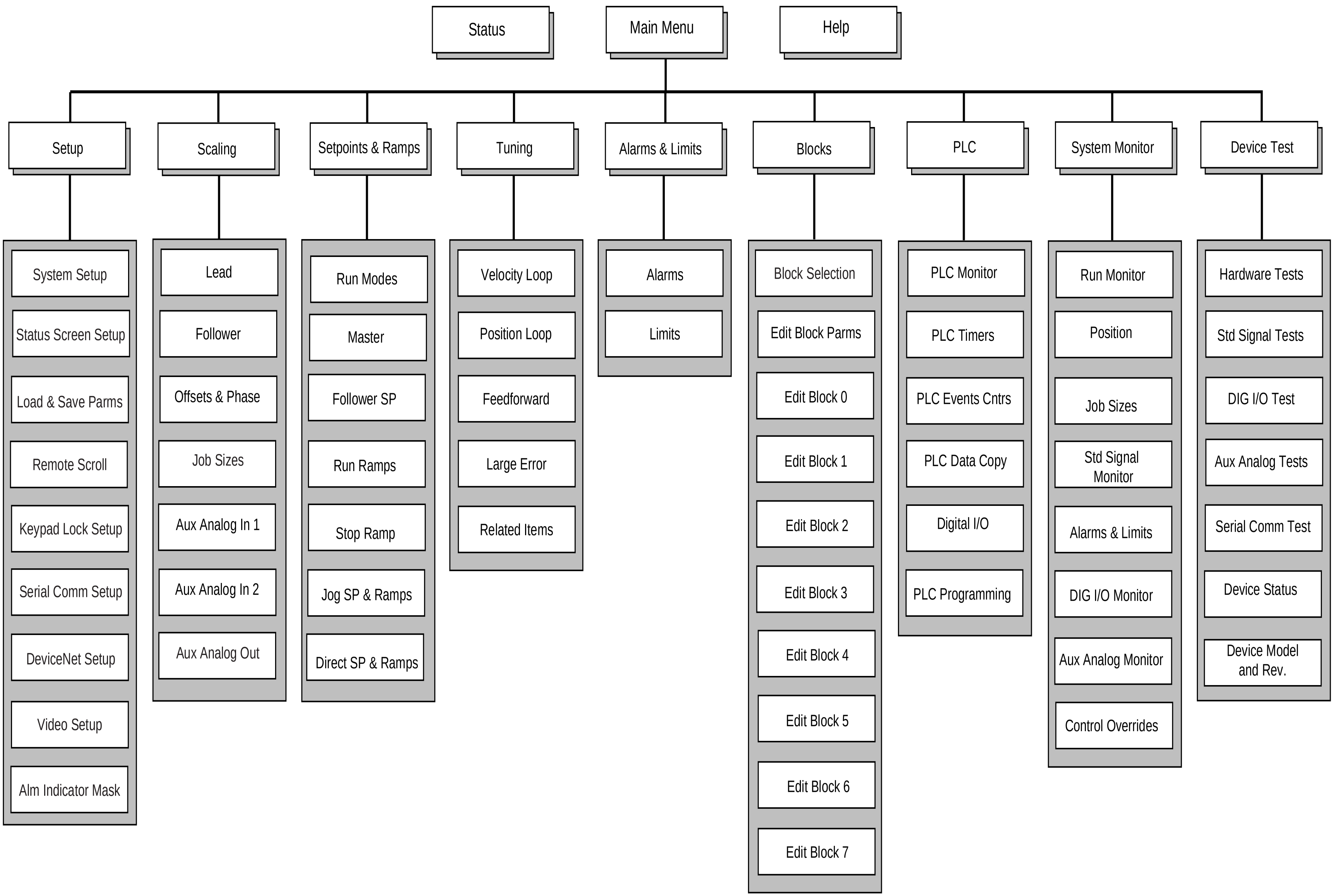


Fig 3-2 Overview of the CX–1200 Screen Matrix

SCREEN OPERATION

The CX–1200 screen matrix has three main screens. These screens are:

Status Screen
Main Menu
Help Screen

There are nine sub-menus that are accessed through the Main Menu screen. These sub-menus are:

Setup
Scaling
Setpoints and Ramps
Tuning
Alarms and Limits
Blocks
PLC
System Monitor
Device Test

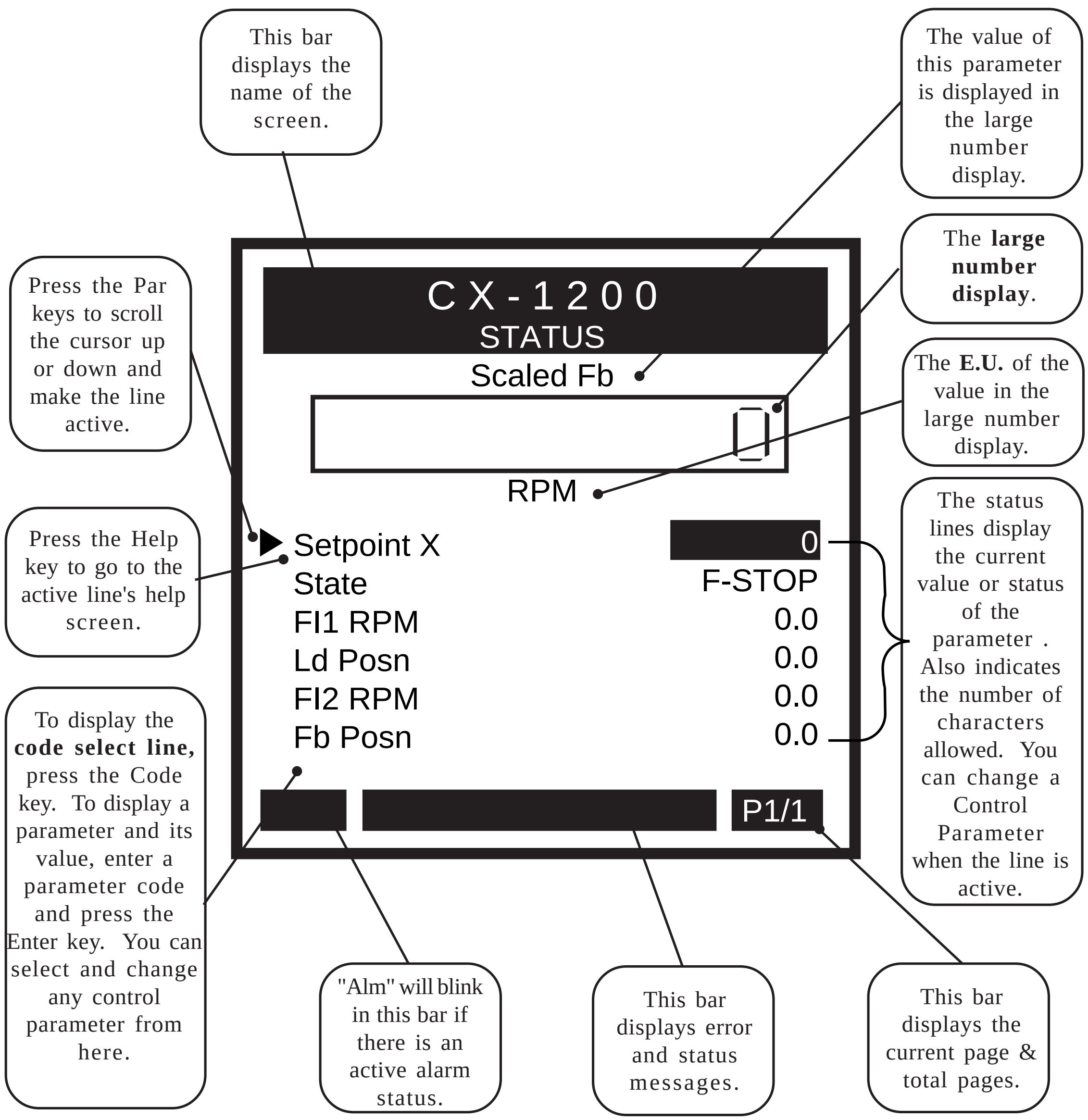
All of the parameter screens are accessed through these nine sub-menu screens. You can use the parameter screens to access the parameters. Parameters fall into two classifications; Control Parameters and Monitor Parameters. The Control Parameters allow you to enter data that is unique to you system. The Monitor Parameters allow you to monitor your system and diagnose problems.

This Screen Operation section is a basic overview of the three main screens; the Status screen, the Help screen and Main Menu screen. There is also a sample of a sub menu screen. For specific details on the parameter screens, refer to *System Setup-Control Parameters* and *System Monitoring-Monitor Parameters*. For the instructions to customize the Status screen, refer to *System Setup-Control Parameters :Setup/Status Screen Setup.*

Refer to Figure 3-2 for an overview of the CX–1200 screen matrix.

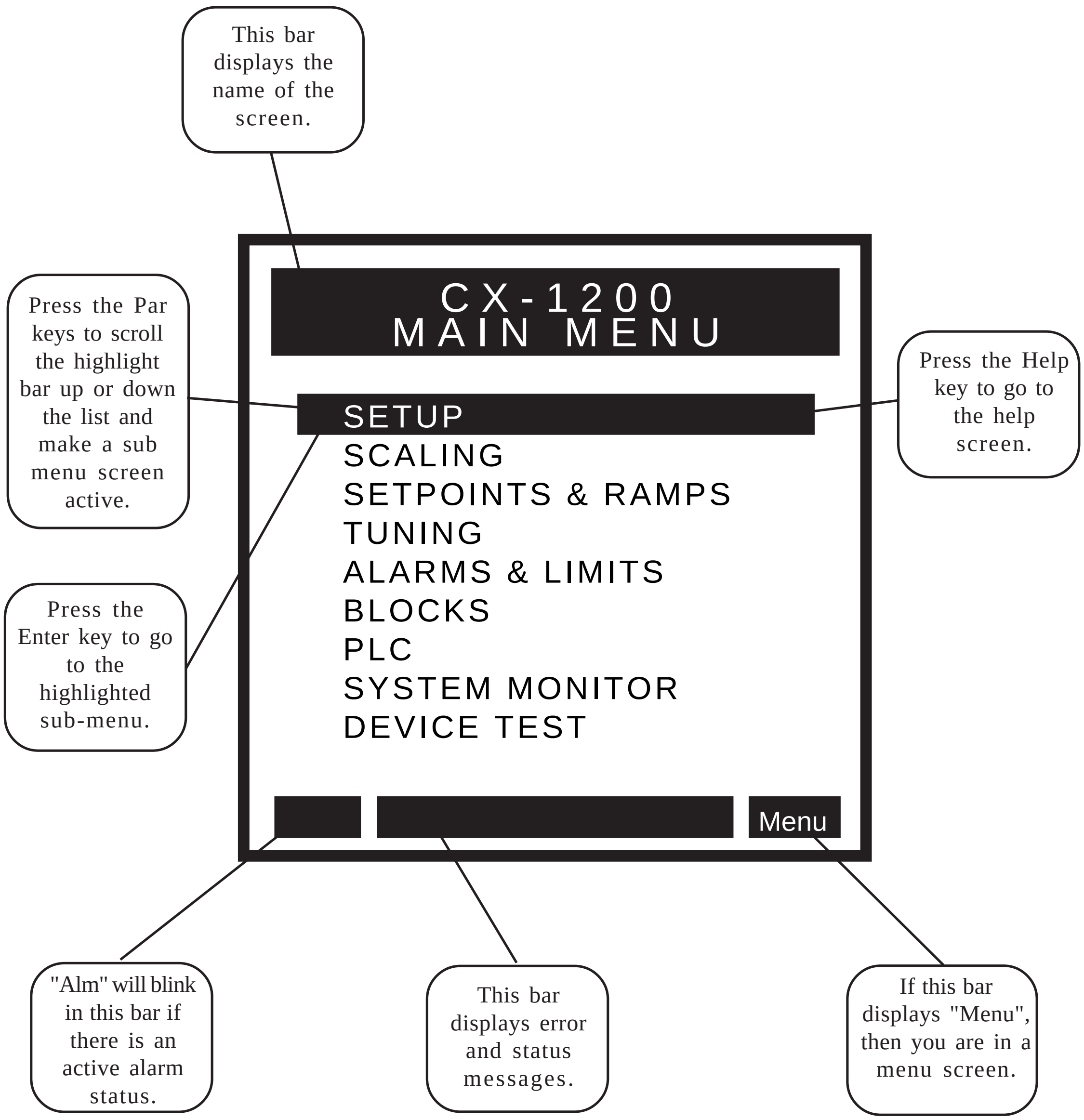
Status Screen

Press the Status key to access the Status screen. The Status screen has a **large number display** for a quick, visual reference to a frequently used parameter, as well as its value and E.U. (Scaled Feedback is the default parameter). Below the large number display, the Status screen lists six frequently used parameters. In addition to the frequently used parameters, the line at the bottom of the display, called the **code select line**, allows you to access and display any parameter and change any Control Parameter's value. The Status screen can be customized to reflect the parameters that you access most frequently. To customize the Status screen refer to *System Setup- Control Parameters: Device Configure/Status Screen Setup.*



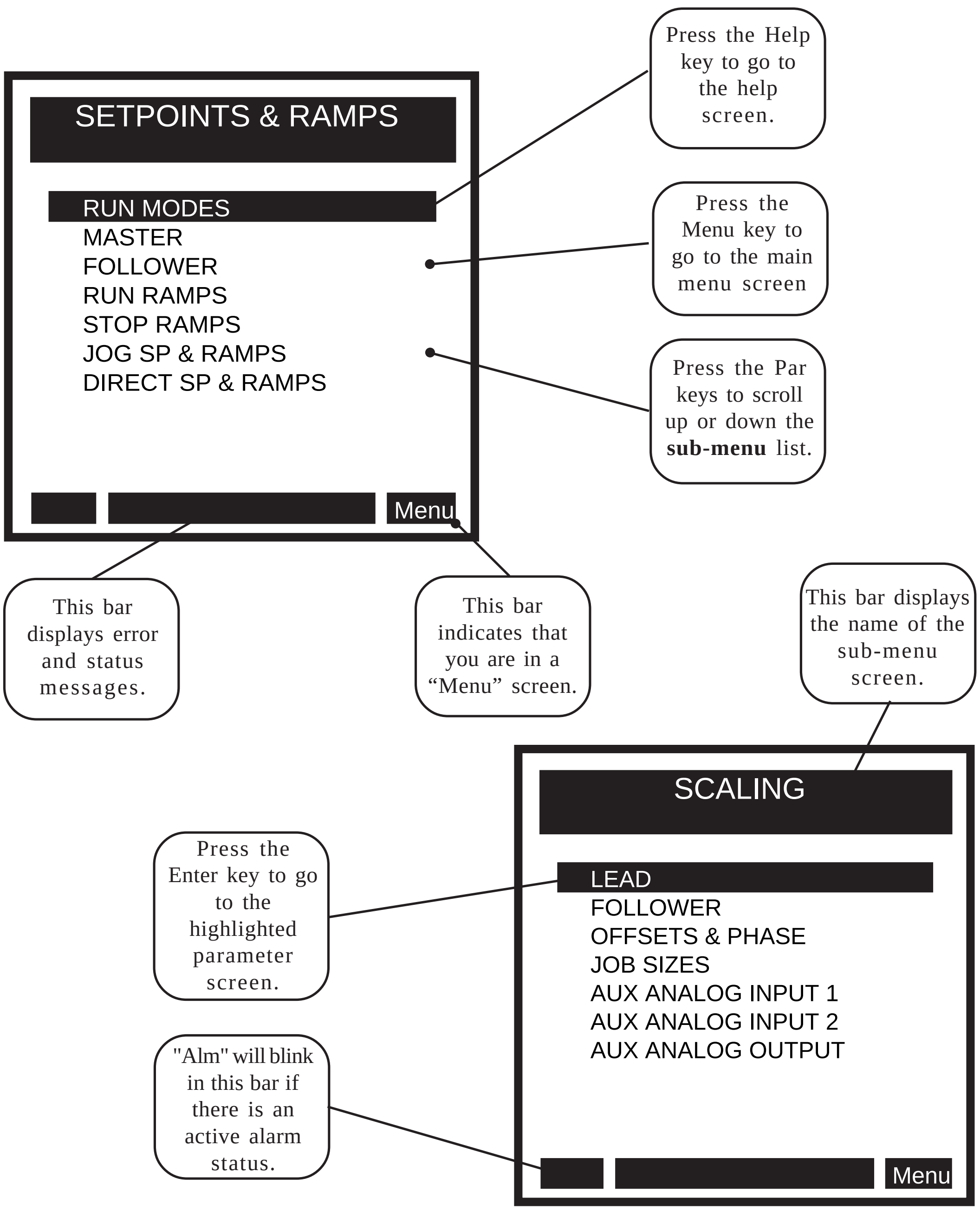
Main Menu Screen

Press the Menu key to access the Main Menu screen. The Main Menu screen displays the nine sub-menus that access all of the parameter screens.



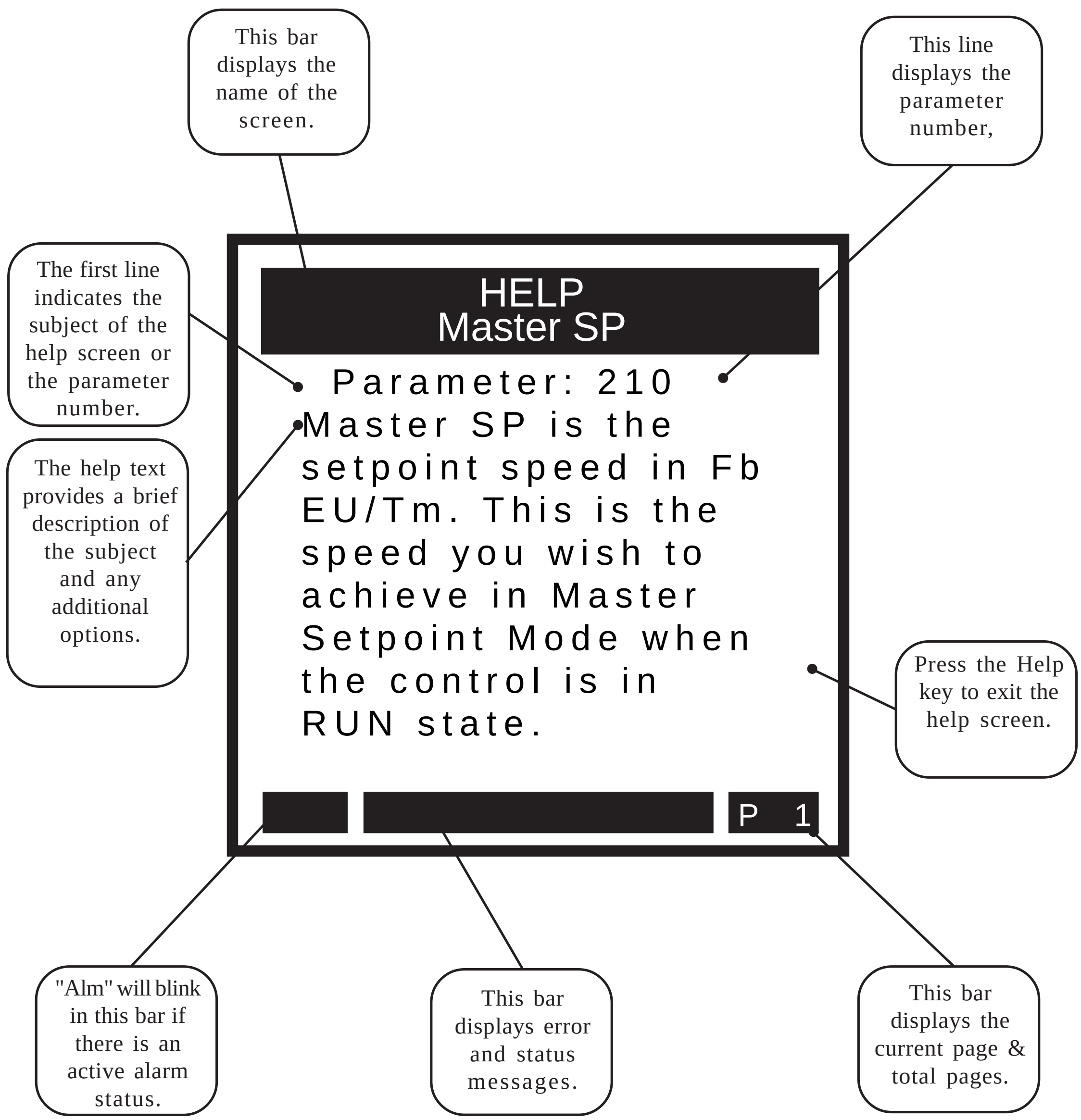
Sub-Menu Screen / Samples

Parameter screens are accessed through the sub-menu screens.



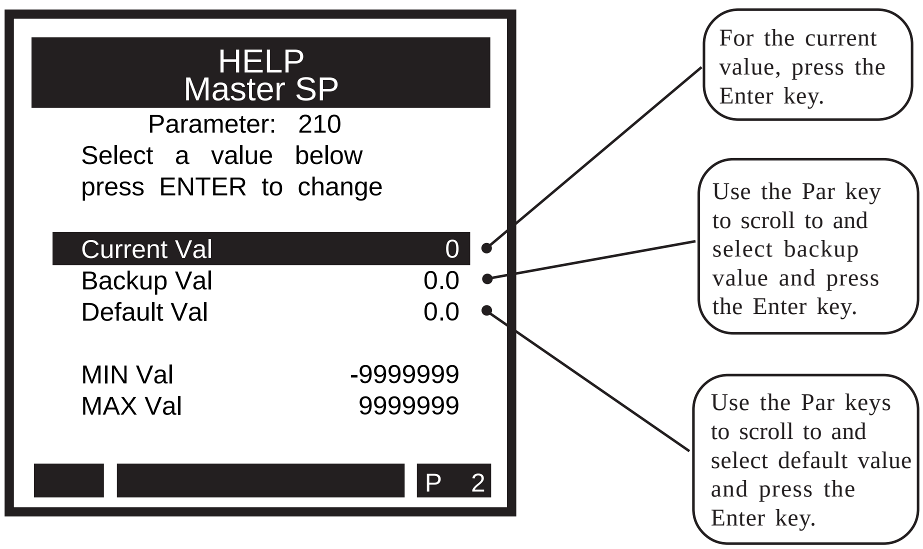
Help Screens

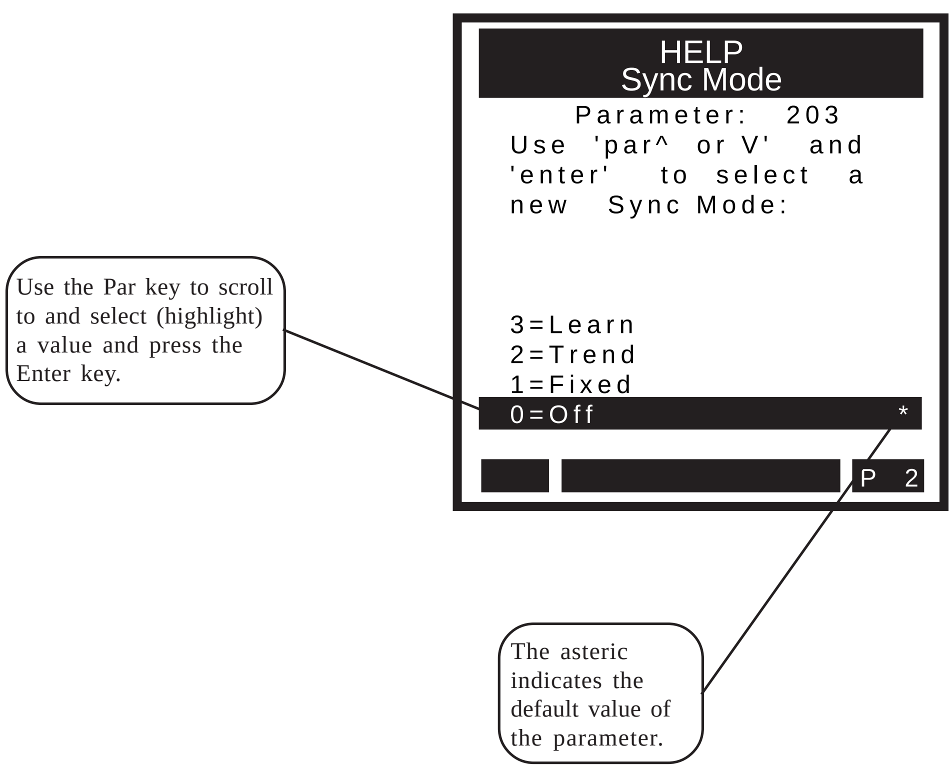
Press the Help key, to access the Help screens for an active (highlighted) Control Parameter line, an active Monitor Parameter line or an active menu line. You can access "Help" from any screen. To exit the Help screen and return to the previous screen, press the Help key again. In addition to the help information, the Help screens also function as an options screen. For more information on the help options, refer to "Help Screen / Sample Options" on the next page.



Help Screens / Sample Options

The Help screens also function as “options” screens where you can select a Control Parameter value. The last page of many Help screens (usually page 2) have parameter options that have three value lines; current value, backup value and default value. There are also Help screens that contain a list of options that you can scroll through and select. An asterisk next to an option indicates that it is the default value. See the samples below. To exit the Help screen and return to the previous screen, press the Help key again.





Drive Setup/Calibration

Calibration

CALIBRATION

This procedure is a series of steps designed to verify the motor/drive/encoder wiring and polarity setup some of the basic parameters necessary for proper operation of the CX-1200.

Before you begin this procedure, the motor and drive must be wired and configured in accordance with the manufacturer's instructions. Refer to your drive manual to assist you in making the following drive adjustments:

- Set the maximum speed adjustment on the drive to deliver 10% more speed than the expected maximum speed required for your application.
- Set the acceleration and deceleration times to their fastest settings.
- Set the IR compensation to its minimum setting.
- Set the Integral compensation to its minimum setting.

The CX-1200 must be configured and installed in accordance with the installation procedures indicated in the *Installation* section of the *CX-1200 Technical Reference Manual* and the CX-1200, including its PLC, will be programmed as factory default.

NOTE: Sync Mode {CP-203} **MUST** have OFF selected. If the CX-1200 is not at **factory default,** then reference the *Operator Interface Primer, Locating a parameter through the code select key procedure, (page 6) and check* Sync Mode {CP-203}.

Setup consists of the following:

- Freq 2 and CO Setup
- Motor/Encoder Signal Polarity Setup
- Master Mode and Feedforward Scaling
- Lead Scaling
- Follower Mode Scaling

DANGER

Motion will occur in the calibration procedure. It is possible that sudden/violent motion could result and cause damage or personal injury. Make sure that the motor is secured in place. Take all possible precautions to ensure your safety.

DANGER

Hazardous voltages.

**Can cause severe
injury, death or
damage
the equipment.**

**Make adjustments
with caution.**

Step 1 - Freq In 2 & CO Setup - Parameter Entry

The CX-1200 will display **System Setup Freq In\Page 1**.

Configure the CP’s on this screen as required.

State {MP-50}
Cnt Mode FI2 {CP-265}
PPR FI2 {CP-266}
CO Mode {CP-270}
CO Max Volts {CP-271}

NOTE: *The Help key accesses the Help screen and gives you a brief description of the parameter or subject that is highlighted (active) on the screen. Press the Help key again to return to the previous screen.*

Press the "Page Down" key to proceed to the next page.

Step 2 - Motor/Encoder Signal Polarity Setup - Parameter Entry

The CX-1200 will display **System Setup Signal Polarity\Page 2**.

Configure the CP’s on this screen as required.

State {MP-50}
RUN Mode {CP-202}
Direct SPx {CP-201}
CO Polarity {CP-272}
CO Offset {CP-273}
CO Volts {MP-37}
FI2 Hz {MP-03}

NOTE: *The Help key accesses the Help screen and gives you a brief description of the parameter or subject that is highlighted (active) on the screen. Press the Help key again to return to the previous screen.*

WARNING
Prepare the machine for motion.
Alert everyone present.

This test checks the Control Output polarity and the Encoder polarity, so a positive Control Output command causes positive Encoder feedback.

Forward:

1. Enter **RUN Mode {CP 202} = Direct**.
2. Enter **Direct SPx {CP-201} = +2.0 volts.**
3. Place the control into "Run".

Verify forward motor direction:

4. If motor is running in the forward direction , skip to step 6.
5. Rewire the motor leads for forward direction.

Verify forward sensor polarity:

6. If **FI2 Hz {MP-03}** is a positive number, skip to step 8.
7. Rewire the feedback sensor polarity.
8. Place the control into "F-Stop".

Reverse:

Enter a direct mode setpoint for the reverse direction:

9. If **CO Mode {CP-270} = Unipolar**, skip to step 16.
10. Enter **Direct SPx {CP-201} = -2.0 volts.**
11. Place the control into "Run".

Verify reverse motor direction:

12. If motor is running in the reverse direction , skip to step 14.
13. Rewire the motor leads for reverse direction, verify the motor drive is bipolar or unipolar reverseable and then recheck forward direction by returning to step 1.

Verify reverse sensor polarity:

14. If **FI2 Hz {MP-03}** is a negitive number, skip to step 16.
15. Rewire the feedback sensor polarity, and then verify the sensor polarity in the forward direction by returning to step 1.
16. Place the control into "F-Stop".
17. Enter **Direct SPx {CP-201} = 0 volts**

Press the "Page Down" key to proceed to the next page.

Step 3 - Master Mode and Feedforward Scaling - Parameter Entry

The CX-1200 will display **System Setup Master Mode\Page 3**.

Configure the CP's on this screen as required.

State {MP-50}
RUN Mode {CP-202}
Master SPx {CP-201}
Pulses FI2 {CP-267}
EU FI2 {CP-268}
Kff Auto En {CP-364}
Kff {MP-48}
FI2 Hz {MP-03}
FI2 RPM {MP-04}
Fb EU/Tm {MP-06}

NOTE: *The Help key accesses the Help screen and gives you a brief description of the parameter or subject that is highlighted (active) on the screen. Press the Help key again to return to the previous screen.*

WARNING
Prepare the machine for motion.
Alert everyone present.

In this section, the master mode is scaled for engineering units. The feedforward is also scaled using the auto feedforward feature. Master mode scaling should be completed even if your end application is not master mode.

The CX 1200 must convert the feedback frequency into engineering units (RPM, Feet/min, etc.). To do this, it must "know" the ratio between encoder lines and these units. This ratio is entered in two parts, the first part is FI2 Pulses and the second part is EU FI2 (Engineering Units for Frequency Input Number Two). For example, if feedback is coming from a one foot circumference metering wheel driving a 1000 line encoder and engineering units will be inches, then EU FI2 {CP-268} = 12.0 and FI2 Pulses {CP-267} = 1000.

1. Enter **RUN Mode {CP-202} = Master**.
2. Enter *your* **FI2 Pulses {CP-267}**.
3. Enter *your* **EU FI2 {CP-268}**.

Enter the desired master mode setpoint in engineering units:

4. Enter **Master SPx {CP-201} = Desired speed**.

Verify master mode scaling:

5. Place the CX-1200 control into "Run".
6. If the Fb EU/Tm {MP-06} is not what you expect to see with the Master SP, then recalculate your scaling terms and return to step 2.

Scale the feedforward:

7. Enter **Kff Auto En {CP-364} = ON**.
8. Wait several seconds.
9. Enter **Kff Auto En {CP-364} = OFF**.
10. Place the control into "F-Stop".

Press the "Page Down" key to proceed to the next step.

Step 4 - Lead Scaling - Parameter Entry

The CX-1200 will display **System Setup Lead\Page 4**.

Configure the CP's on this screen as required.

State {MP-50}
Cnt Mode FI1 {CP-260}
PPR FI1 {CP-261}
Pulses FI1 {CP-262}
EU FI1 {CP-263}
FI1 Hz {MP-01}
FI1 RPM {MP-02}
Ld EU/Tm {MP-05}

NOTE: *The Help key accesses the Help screen and gives you a brief description of the parameter or subject that is highlighted (active) on the screen. Press the Help key again to return to the previous screen.*

When it is in follower mode, the CX-1200 must convert the lead frequency into engineering units (RPM, Feet/min, etc.). To do this, it must "know" the ratio between encoder lines and these units. This ratio is entered in two parts, the first part is FI1 Pulses and the second part is EU FI1 (Engineering Units for Frequency Input Number One). For example, if the lead is coming from 60 tooth Quad Ring Kit on a motor armature driving a conveyor with a 2 foot diameter roll through a 30:1 reduction and engineering units are feet, then **FI1 Pulses {CP 262}** = 1800 (60*30) *and* **EU FI1 {CP 263}** = 6.283 (2*3.14...).

1. Enter *your* **FI1 Pulses {CP 262}.**
2. Enter *your* **EU FI1 {CP 263}.**

Verify the Lead Scaling:

3. Place the Lead control into "Run".
4. If the Ld EU/Tm {MP-05} does not agree with the lead engineering units expected, then recalculate your scaling terms and return to step 1.
5. Place the Lead control into "Stop".

Press the "Page Down" key to proceed to the next page.

Step 5 - Follower Mode Scaling

The CX-1200 will display **System Setup Follower Mode\Page 5**.

State {MP-50}
RUN Mode {CP-202}
Follower SPx {CP-201}
ScFbDisp EQU {CP-250}
Lg Number Units {CP-449}
Scaled Fb {MP-40}
Ld EU/Tm {MP-05}
Fb EU/Tm {MP-06}

NOTE: *The Help key accesses the Help screen and gives you a brief description of the parameter or subject that is highlighted (active) on the screen. Press the Help key again to return to the previous screen.*

WARNING
Prepare the machine for motion.
Alert everyone present.

In this section, the follower mode is scaled for engineering units. Master mode and lead scaling should be completed before proceeding with the follower mode scaling procedure.

1. Enter **RUN Mode {CP 202} = Follower**.

Set the Scaled Feedback display for the disired units:

2. Enter **ScFbDisp EQU {CP 250} = Ratio**.
3. Enter **Lg Number Units {CP 449}**.

In follower setpoint mode, the setpoint expresses the ratio between the follower and lead engineering units. For example if the lead is in centimeters, the follower is in milliliters and the setpoint is 1.25, then the follower will produce 1.25 ml per cm. Enter the follower setpoint as the ratio of follower to lead engineering units:

4. Enter *your* **Follower SPx {CP-201}**.

Verify the Follower Mode Scaling:

5. Place the CX-1200 control into “Run” and also place the lead control into "Run"..
6. If the Scaled FB {MP-40} is not what you expect to see with the Follower SP, then recalculate your scaling terms and return to step 2.
7. Place the CX-1200 control into “F-Stop” and the lead control into "Stop".

Procedure complete.

CREEP CALIBRATION

The Creep Calibration allows you to eliminate motion that may occur with an open loop stop (zero volt) Control Output. Make sure the unit is in F-Stop to start out.

1. Go to the **Setpoints & Ramps/Direct SP & Ramps/P1/1** screen and select Direct Mode by entering a 1 into the **RUN Mode (CP-202)** parameter. You can use the Help screen for CP-202 to select Direct Mode.

2. Make sure the **Direct SP (CP-230)** = 0.0 (include the decimal point).

3. Put the unit into RUN by activating the RUN input. The F-Stop, R-Stop, and H-Stop inputs must be closed in order to enter the RUN State. You should have the Drive Enable output connected to the drive enable input of your drive (or to a control relay that is connected to the Drive Enable input). If not, enable the drive by some external means.

4. If motion occurs, attempt to eliminate it (stop the motion) with the balance pot (also called zero-speed pot) or digital adjustment in your drive. If there is no pot (or digital adjustment) in the drive, or if the motion can not be stopped, attempt to use the **CO Offset (CP-273)** parameter to "offset" the creep for the drive. Be sure to record this parameter and/or make sure it gets into the backup parameter list at some point.

ANALOG CALIBRATION

The Analog Calibration allows you to calibrate the auxiliary Analog I/O, AI1, AI2, AO. The board is calibrated at the factory and the accuracy should be adequate for most applications. However, you may need to re-calibrate if your application demands more accuracy in a specific range or if you need to calibrate directly to EU with a known signal level on the inputs. The Analog Calibration screen is accessed through Main Menu/Device Tests/Aux Analog Tests/pg 3.

Analog Output (voltage):

1. Connect a voltmeter between pins 10 and 11 with the positive lead on pin 10 (pin 11 is common).
2. Set AO Mode (CP-291) to “Volts” (1).
3. Set Analog Cal Sel (CP-461) to AO (3) to Select AO for calibration.
4. Set Analog Cal Ref (CP-462) to “A” (1) to select point A.

NOTE: The old calibration data will be overwritten.

5. Set Analog Cal EN (CP-460) to “On” (1) to start calibration.
6. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want set for point A. This is generally your smallest (or negative) voltage point. A -12 volts requires about -29500 bits, -10 volts about -24500 bits, 0 volts about 0 bits. For -12 volts, start with about -29400 and use the incremental scroll key .
7. Enter the exact voltage measured by the meter into AnalogRef Val (CP-463).
8. Set Analog Cal Ref (CP-462) to “B” (2) to select point B.
9. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want use for point B. This is usually your largest (or positive) voltage point. A +12 volts requires about 30100 bits, 10 volts about 25100 bits, 0 volts about 0 bits. For 12 volts, start with about 30000 and use the incremental scroll key.
10. Enter the exact voltage measured by the meter into AnalogRef Val (CP-463).
11. Set Analog Cal EN (CP-460) to “Off” (0) to disable further calibration.

Analog Output (current):

1. Connect a current meter in series with a 250 Ohm resistor between pins 9 and 11 with the positive lead on pin 9 (pin 11 is common). Connect the meter in series with the load.

2. Set AO Mode (CP-291) to “Current” (2).

3. Set Analog Cal Sel (CP-461) to AO (3) to Select AO for calibration.

4. Set Analog Cal Ref (CP-462) to “A” (1) to select point A.

NOTE: The old calibration data will be overwritten.

5. Set Analog Cal EN (CP-460) to “On” (1) to start calibration.

6. Adjust AO Bit Set (CP-464) until the meter reads the current you want to set for point A. This is generally your smallest current point. A 4 milliamp setting requires about -14450 bits, 0.5 milliamps about -24000 bits and 1.0 milliamps about -22600. For 4 milliamps, start with about -14300 and use the incremental scroll key.

7. Enter the exact current measured by the meter into AnalogRef Val (CP-463).

8 Set Analog Cal Ref (CP-462) to “B” (2) to select point B.

9. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want to set for point B. This is usually your largest current point. A 20 milliamp setting requires about 29300 bits, 10 milliamps about 1940. For 20 milliamps, start with about 29200 and use the incremental scroll key.

10. Enter the exact current measured by the meter into AnalogRef Val (CP-463).

11. Set Analog Cal EN (CP-460) to “Off” (0) to disable further calibration.

Analog Input 1 (voltage):

1. Connect the Analog Output voltage pins to the Analog Input 1 voltage pins - pin 10 to pin 2, pin 11 to pin 4. Connect a voltmeter between pins 2 and 4 with the positive lead on pin 2 (pin 4 is at common).

2. Set AO Mode (CP-291) to “Volts” (1).

3. Set AI1 Mode (CP-280) to “Volts” (1).

4. Set Analog Cal Sel (CP-461) to “AI1” (1) to Select AI1 for calibration.

5. Set Analog Cal Ref (CP-462) to “A” (1) to select point A.

NOTE: The old calibration data will be overwritten.

6. Set Analog Cal EN (CP-460) to “On” (1) to start calibration.

7. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want set for point A. This is generally your smallest (or negative) voltage point. A -12 volts requires about -29500 bits, -10 volts about -24500 bits, 0 volts about 0 bits. For -12 volts, start with about -29400 and use the incremental scroll key.

8. Enter the exact voltage measured by the meter into AnalogRef Val (CP-463).

9. Set Analog Cal Ref (CP-462) to “B” (2) to select point B.

10. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want use for point B. This is generally your largest (or positive) voltage point. A +12 volts requires about 30100 bits, 10 volts about 25100 bits, 0 volts about 0 bits. For 12 volts, start with about 30000 and use the incremental scroll key.

11. Enter the exact voltage measured by the meter into AnalogRef Val (CP-463).

12. Set Analog Cal EN (CP-460) to “Off” (0) to disable further calibration.

Analog Input 1 (current):

1. Connect a current meter between pin 9 and pin 2 with the positive lead on pin 9. Connect pin 3 to pin 4 and pin 4 to pin 11.

2. Set AO Mode (CP-291) to “Current” (2).

3. Set AI1 Mode (CP-280) to “Current” (2).

4. Set Analog Cal Sel (CP-461) to “AI1” (1) to Select AI1 for calibration.

5. Set Analog Cal Ref (CP-462) to “A” (1) to select point A.

NOTE: The old calibration data will be overwritten.

6. Set Analog Cal EN (CP-460) to “On” (1) to start calibration.

7. Adjust AO Bit Set (CP-464) until the meter reads the current you want to set for point A. This is generally your smallest current point. A 4 milliamp setting requires about -14450 bits, 0.5 milliamps about -24000 bits and 1.0 milliamps about -22600. For 4 milliamps, start with about -14300 and use the incremental scroll key.

8. Enter the exact current measured by the meter into AnalogRef Val (CP-463).

9. Set Analog Cal Ref (CP-462) to “B” (2) to select point B.

10. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want to set for point B. This is generally your largest current point. A 20 milliamp setting requires about 29300 bits, 10 milliamps about 1940. For 20 milliamps, start with about 29200 and use the incremental scroll key.

11. Enter the exact current measured by the meter into AnalogRef Val (CP-463).

12. Set Analog Cal EN (CP-460) to “Off” (0) to disable further calibration.

Analog Input 2 (voltage):

1. Connect the Analog Output voltage pins to the Analog Input 2 voltage pins - pin 10 to pin 5, pin 11 to pin 7 Connect a voltmeter between pins 5 and 7 with the positive lead on pin 5 (pin 7 is at common).

2. Set AO Mode (CP-291) to “Volts” (1).

3. Set AI2 Mode (CP-285) to “Volts” (1).

4. Set Analog Cal Sel (CP-461) to “AI2” (2) to Select AI2 for calibration.

5. Set Analog Cal Ref (CP-462) to “A” (1) to select point A.

NOTE: The old calibration data will be overwritten.

6. Set Analog Cal EN (CP-460) to “On” (1) to start calibration.

7. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want set for point A. This is generally your smallest (or negative) voltage point. A -12 volts requires about -29500 bits, -10 volts about -24500 bits, 0 volts about 0 bits. For -12 volts, start with about -29400 and use the incremental scroll key.

8. Enter the exact voltage measured by the meter into AnalogRef Val (CP-463).

9. Set Analog Cal Ref (CP-462) to “B” (2) to select point B.

10. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want use for point B. This is generally your largest (or positive) voltage point. A +12 volts requires about 30100 bits, 10 volts about 25100 bits, 0 volts about 0 bits. For 12 volts, start with about 30000 and use the incremental scroll key.

11. Enter the exact voltage measured by the meter into AnalogRef Val (CP-463).

12. Set Analog Cal EN (CP-460) to “Off” (0) to disable further calibration.

Analog Input 2 (current):

1. Connect a current meter between pin 9 and pin 5 with the positive lead on pin 9. Connect pin 6 to pin 7 and pin 7 to pin 11.

2. Set AO Mode (CP-291) to “Current” (2).

3. Set AI2 Mode (CP-285) to “Current” (2).

4. Set Analog Cal Sel (CP-461) to “AI2” (2) to Select AI2 for calibration.

5. Set Analog Cal Ref (CP-462) to “A” (1) to select point A.

NOTE: The old calibration data will be overwritten.

6. Set Analog Cal EN (CP-460) to “On” (1) to start calibration.

7. Adjust AO Bit Set (CP-464) until the meter reads the current you want to set for point A. This is generally your smallest current point. A 4 milliamp setting requires about -14450 bits, 0.5 milliamps about -24000 bits and 1.0 milliamps about -22600. For 4 milliamps, start with about -14300 and use the incremental scroll key.

8. Enter the exact current measured by the meter into AnalogRef Val (CP-463).

9. Set Analog Cal Ref (CP-462) to “B” (2) to select point B.

10. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want to set for point B. This is generally your largest current point. A 20 milliamp setting requires about 29300 bits, 10 milliamps about 1940. For 20 milliamps, start with about 29200 and use the incremental scroll key.

11. Enter the exact current measured by the meter into AnalogRef Val (CP-463).

12. Set Analog Cal EN (CP-460) to “Off” (0) to disable further calibration.

Calibrating and Scaling AI1 Together

In some applications you may know the voltage (or current) to EU representation, but you have no idea the voltage produced by the sensor at either end point. You can 'calibrate' the signal directly in terms of EU by setting the calibration references the same as the scaling references, i.e. set AI1 RA (CP-281) equal to AnlgCal Ref A (MP-168) for this signal and set AI1 RB (CP-283) equal to Cal Ref B (MP-169) for this signal. These two points should be discretely different from each other and should be reasonable estimates for the actual voltage or current range. You would then set the EU@ AI1 RA (CP-282) and EU@ AI1 RB (CP-284) to the sensor's operating points used during the calibration process for points A and B respectively.

1. Connect the sensor to the AI1 voltage (or current) pins. Connect pins 3 and 4 together if using current mode.
2. Set AI1 Mode (CP-280) to "Volts" (1) or "Current" (2).
3. Set Analog Cal Sel (CP-461) to "AI1" (1) to Select AI1 for calibration.
4. Set Analog Cal Ref (CP-462) to "A" (1) to select point A.

NOTE: The old calibration data will be overwritten.

5. Set Analog Cal EN (CP-460) to "On" (1) to start calibration.
6. Run the sensor at the operating point for calibration point A. This is generally your smallest (or negative) voltage point (or smallest current point). Record the value of this operating point as sensor operating point A in EU.
7. Enter an estimate of the voltage (or current) that the sensor is producing at this operating point into AnalogRef Val (CP-463). Record this value as point A reference voltage (or current) along side the sensor operating point A.
8. Set Analog Cal Ref (CP-462) to "B" (2) to select point B.
9. Run the sensor at the operating point for calibration point B. This is generally your largest (or positive) voltage point (or largest current point). Record the value of this operating point as point B EU.
10. Enter an estimate of the voltage (or current) that the sensor is producing at this operating point into AnalogRef Val (CP-463). Record this value as point B reference voltage (or current) along side the sensor operating point B.
11. Set Analog Cal EN (CP-460) to "Off" (0) to disable further calibration.
12. Go to SCALING/SIGNAL SCALING/P1. Enter voltage (or current) that you recorded as the point A reference voltage (or current) into AI1 RA (CP-281). Enter the sensor operating point A (EU) that the sensor was producing during the point A calibration into EU@AI1 RA (CP-282). This could actually be a time-less unit, but is considered as EU scaling because it assumes speed representation for the velocity loop. Enter voltage (or current) that you recorded as the point B reference voltage (or current) into AI1 RB (CP-283). Enter the sensor operating point B (EU) that the sensor was producing during the point B calibration into EU@AI1 RB (CP-284).

Repeat this procedure for AI2 if necessary. Calibrate AI2 and use the corresponding AI2 parameters.

—NOTES—

System Setup/Control Parameters

INTRODUCTION TO CONTROL PARAMETERS

Parameters are divided into two classifications; Control Parameters (CP) and Monitor Parameters (MP). This section is about Control Parameters. Monitor Parameters are explained in *System Monitoring: Monitor Parameters.*

The parameters appear on the screens by a Parameter Name. The Help screens list the parameters by both their Parameter Name and by a numbered code, which is called the Parameter Code. The operational data is the Parameter Value.

		Parameter Name	Parameter Code	Parameter Value
Parameters =	Monitor Parameter	Scaled Fb	MP-40	0.0 (default)
	Control Parameter	Master SP	CP-210	0.0 (default)

Note: All Control Parameters are designated by a small indicator "dot" to the left of the Parameter Name, as it appears on a screen (unlike Monitor Parameters, which do not have a small indicator "dot" to the left of the Parameter Name).

The CX-1200 is pre-loaded at the factory with a complete set of default Control Parameter values. The majority of these default settings are suitable for most applications and do not require modification.

Control Parameters allow you to enter data that is unique to your system (e.g., encoder resolution, Lead to Follower ratios, maximum RPM, setpoints, acceleration/deceleration ramp rates) by accessing a parameter screen and entering a parameter value. Once the Control Parameters are entered and the setup for the CX-1200 is complete, the Control Parameters can be "locked out" so that they become inaccessible from the Keypad. This feature prevents an inadvertent accidental entry. For details, refer to the Keypad Lockout screen in *System Setup/Control Parameters: Setup/Keypad Lockout Setup*. A synopsis of the information is also available by referencing Keypad Lockout (MP-103) in *Appendices: Appendix C.*

The following sections demonstrate how to use the Control Parameter screens. These sections include:

Setup	Alarms and Limits
Scaling	Blocks
Setpoints and Ramps	PLC
Tuning	

—NOTES—

SETUP

The Setup screens allow you to perform a varitey of load, save and setup functions, The "Load" parameters allow you to load Control Parameter values and the PLC program from either the backup or from the factory default. The "Save" parameters allow you to save the Control Parameter values and the PLC program to a backup copy. You can customize the Status screen for your specific requirements. The Serial Communications Setup screen includes parameters that configure the serial communications port.   When Keypad Lock Input is active, Control Parameter values can not be changed. The Keypad Lockout Setup screens allow you to specify which Control Parameters will be exempt from the lockout when the Keypad Lockout Input is active.The Video Setup screen includes the parameters that control the screen operation. Display Setup contrast and adjust the pixel intensity of the screen display. The Alarm Indicator Mask screen includes the parameters that determine which alarms and which numerical comparator outcomes will cause the 'alm' to flash in the lower-left corner of the screen. The DeviceNet setup includes Control Parameters for DeviceNet network communications.

Caution: To avoid damage to your system, the CX-1200 must be calibrated and the motor drive set up before you operate your system. Refer to *Drive Setup / Calibration: Calibration*.

The Setup screens are:

- Status Screen Setup
- Load and Save Parms
- Remote Scroll Setup
- Keypad Lock Setup
- Serial Comm Setup
- DeviceNet Setup
- Video Setup
- Alm Indicator Mask

STATUS SCREEN SETUP   P1/1

You can customize the six status lines, as well as the large number display and the E.U. line on the Status screen.   To customize the large number display, enter this code of the parameter that you want displayed in Lg Number Parm (CP-440). Use Large Number Units (CP-449) to select and customize the E.U. line that appears immediately below the large number display.   For each of the status lines (CP-441 through CP-446), enter the code of the parameter that you want to appear on the corresponding line. You can enter a "0" in status lines 2 - 6 if you want them to remain blank. You can also access and change Control Parameters 441 through 446 while you are in the Status screen by using the Code key. For details on the Code key, refer to the Status screen in *Operator Interface: Screen Operation.*

Lg Number Parm

Use Large Number Parameter (CP-440) to select the parameter that displays in the Large Number Display in the Status screen (refer to the status screen in *Operator Interface: Screen Operation*. You can also use the Code key to access and change CP-440 in the Status Screen.

Lg Number Units

Use Large Number Units (CP-449) to select the E.U. text that displays immediately below the Large Number Display in the Status screen (refer to the status screen in *Operator Interface: Screen Operation*). Enter the numeric code that identifies the E.U. for the Control Parameter displayed in the Large Number Parameter (CP-440). Refer to CP-449 in *Appendices: Appendix C* for the numeric code list. The Help screen for CP-449 also contains a partial list of numeric code options. In addition, you can also scroll through the numeric code options by accessing CP-449 with the Code key while you are in the in the Status screen.

Status Line 1

Use Status Line 1 (CP-441) to select the parameter that displays on the first line, under the Large Number Display, of the Status screen (refer to the status screen in *Operator Interface: Screen Operation)*. You can also use the Code key to access and change CP-441 in the Status screen.

Status Line 2

Use Status Line 2 (CP-442) to select the parameter that displays on the second line (under the Large Number Display) of the Status screen (refer to the status screen in *Operator Interface: Screen Operation)*. If you want this line to remain blank, enter a "0" in CP-442. You can also use the Code key to access and change CP-442 in the Status screen.

Status Line 3

Use Status Line 3 (CP-443) to select the parameter that displays on the third line (under the Large Number Display) of the Status screen (refer to the status screen in *Operator Interface: Screen Operation)*. If you want this line to remain blank, enter a "0" in CP-443. You can also use the Code key to access and change CP-443 in the Status screen.

Status Line 4

Use Status Line 4 (CP-444) to select the parameter that displays on the fourth line (under the Large Number Display) of the Status screen (refer to the status screen in *Operator Interface: Screen Operation)*. If you want this line to remain blank, enter a "0" in CP-444. You can also use the "Code key to access and change CP-444 in the Status screen.

Status Line 5

Use Status Line 5 (CP-445) to select the parameter that displays on the fifth line (under the Large Number Display) of the Status screen (refer to the status screen in *Operator Interface: Screen Operation)*. If you want this line to remain blank, enter a "0" in CP-445. You can also use the "Code key to access and change CP-445 in the Status screen.

Status Line 6

Use Status Line 6 (CP-446) to select the parameter that displays sixth line (under the Large Number Display) of the Status screen (refer to the status screen in *Operator Interface: Screen Operation)*. If you want this line to remain blank, enter a "0" in CP-446. You can also use the "Code key to access and change CP-446 in the Status screen.

LOAD & SAVE PARMS   P1/1

The Load and Store Parameters screen includes four parameters. The "Load" parameters allow you to load Control Parameter values and the PLC program from either the backup or from the factory default. The "Save" parameters allow you to save the Control Parameter values and the PLC program to a backup copy. The Control Parameters are located in two sections: the Main List CPs and the Block CPs. The Main List CPs are (CP-201 through CP-494). The Block CP's are (CP-500 through CP-667). You can load and save each section separately, or you can load and save both sections together .

Load Parms

Use Load Parameters (CP-496) to retrieve (load) parameter values from either the factory or the default backup list. You can specify which parameter values to load form the back up, per the list below. It is easier to select the Load Parameters values through the Help screen, however, you can enter the corresponding number directly into the Load Parameters (CP-496). A message will flash in the error and message status bar at the bottom of the screen to indicate the completion of the operation . The Load Parameters operation will not function while the CX-1200 is in "RUN".

6 = Load Dflts BlockCP	Load Factory Defaults into CP-500 through CP-667
5 = Load Dflts Main CP	Load Factory Defaults into CP-201 through CP-494
4 = Load Dflts All Cp	Load Factory Defaults into CP-201 through CP-667
3 = Load Backup BlockCP	Load Backup into CP-500 through CP-667
2 = Load Backup Main CP	Load Backup into CP-201 through CP-494
1 = Load Backup All Cps	Load Backup into CP-201 through CP-667
0 = No Change	

Load PLC Prgm

Use Load PLC Program (CP-497) to retrieve (load) either the backup for the PLC program which you have saved or the factory default PLC program. Enter "1" to load the backup PLC program or enter "2 " to load the factory default PLC program. You can also select the one of the two values through the "Help" screen. The loaded program is compiled and a message will flash in the error and message status bar at the bottom of the screen to indicate the completion of the operation. The Load PLC Program operation will not function while the CX-1200 is in "RUN".

2 = Load Dflt PLC Prg	Load Factory Default PLC program
1 = Load Backup PLC Prg	Load Backup PLC program
0 = No Change	

Save Parms

Use Save Parameters (CP-498) to save the current parameter values to the backup.   You can specify which parameter values to save as backup, per the list below   Either enter the corresponding number directly into the Save Parameters (see list below) or select the Save Parameters values through the "Help" screen. A message (Saved2 BkUp) will flash in the error and message status bar at the bottom of the screen to indicate the completion of the operation.

3 = Save Block CP's	Save CP-500 through CP-667 to Backup
2 = Save Main CP's	Save CP-201 through CP-494 to Backup
1 = Save All CP's	Save CP-201 through CP-667 to Backup
0 = No Change	

Save PLC Prgm

Enter a "1" in Save PLC Program (CP-499) to save the current PLC program to the backup.   A message (Saved2 BkUp) will flash in the error and message status bar at the bottom of the screen to indicate the completion of the operation.

1 = Save PLC Program to Backup
0 = No Change

REMOTE SCROLL SETUP   P1/1

Rmt Scroll

In Remote Scroll (CP-400), enter the number of the Control Parameter that you want the Remote Scroll Up PLC bit (168) or the Remote Scroll Dn PLC bit (169) to increment or decrement by 1 least significant digit, at the Rmt Scroll Rate (CP-401).   To disable the function, set Rmt Scroll (CP-400) to “0” .

Rmt Scroll Rate

Remote Scroll Rate (CP-401) is the number of times per second, that the Control Parameter that you entered in Rmt Scroll (CP-400) is either incremented or decremented by 1 least significant digit , when the Remote Scroll Up PLC bit (168) or the Remote Scroll Dn PLC bit (169) is active.

KEYPAD LOCKOUT SETUP P1/2

When Keypad Lock Input is active, Control Parameter values can not be changed. The Keypad Lockout Setup screens allow you to specify which Control Parameters, or blocks of Control Parameters, will be exempt from the lockout when the Keypad Lockout Input is active. Use KyPdLk Mask (CP-480) in conjunction with the Unlock Control Parameters 481 - 488 to specify which Control Parameters are exempt from the lockout.

KyPdLk Mask

When the keypad lockout input is active (low), and Key Pad Lock Mask (CP-480) is set to either "0",“1”, “2”, “3”, or “4”, then certain groupings (see list below) of Control Parameters can be exempted (masked out) from the lockout. In addition, the individual Control Parameters that are specified in CPs 481 through 488 are also exempt. When Key Pad Lock Mask (CP-480) is set to “4”, then entire blocks of Control Parameters can be exempted in Unlock Block (CP-489). If Key Pad Lock Mask (CP-480) is set to “0”, then all of the Control Parameters are locked out and non are exempt, including CPs 418-489.

4 = UnLckBlk = Block Values of the Block Selected by Unlock Block (CP-489) and the Unlocked CP’s.
3 = Blk Vals = All BlockValues (CP-540-667) and the Unlocked CP’s are allowed to change.
2 = Setpnts = Setpoints (CP-210, 220, 230, 235, 240) and the Unlocked CP’s are allowed to change.
1 = UnlckCP = CP’s selected by the Unlock CP A - F are allowed to changed.
0 = Total Lockout (default).

Unlock CP A

Unlock Control Parameter A (CP-481) determines which Control Parameter can change, even when the keypad-lockout is active. For the Unlock Control Parameter A (CP-481) to function, KyPdLk Mask (CP-480) must be set to a value other than “0” (All Lock). Enter “0” in Unlock Control Parameter A (CP-481) to disable it from selecting any Control Parameter.

Unlock CP B (CP-482)
Unlock CP C (CP-483)
Unlock CP D (CP-484)
Unlock CP E (CP-485)
Unlock CP F (CP-486)
Unlock CP G (CP-487)
Unlock CP H (CP-488)

Control Parameters 481 - 488 are identical to each other. Refer to the description for Unlock CP A (CP-481).

KeyPad Lockout

Keypad Lockout (MP-103) displays the Keypad Lockout status. “On” indicates that the Keypad Lockout is active. When Keypad Lockout is active, Control Parameter values can not be changed. With the exception of the Control Parameters that are exempted by CP’s 480-489, the “OFF” indicates that the Keypad Lockout is not active. When the Keypad Lockout is not active, any Control Parameter can be changed.

KEYPAD LOCKOUT SETUP   P2/2

KyPdLk Mask

When the keypad Lockout input is active (low), and Key Pad Lock Mask (CP-480) is set to either "0", "1", "2", "3", or "4", then certain groupings (see list below) of Control Parameters can be exempted (masked out) from the lockout. In addition, the individual Control Parameters that are specified in CPs 481 through 488 are also exempt. When Key Pad Lock Mask (CP-480) is set to "4", then entire blocks of Control Parameters can be exempted in Unlock Block (CP-489). If Key Pad Lock Mask (CP-380) is set to "0", then all of the Control Parameters are locked out and non are exempt, including CPs 381-389.

4 = UnLckBlk = Block Values of the Block Selected by Unlock Block (CP-489) and the Unlocked CP's.
3 = Blk Vals = All BlockValues (CP-540-667) and the Unlocked CP's are allowed to change.
2 = Setpnts = Setpoints (CP-210, 220, 230, 240) and the Unlocked CP's are allowed to change.
1 = UnlckCP = CP's selected by the Unlock CP A - F are allowed to changed.
0 = Total Lockout.

UnlockBlock

Use Unlock Block (CP-489) to choose which block of Control Parameters are exempt from the lockout, even when Keypad-lockout is active. Unlock Block (CP-489) is used in conjunction with KyPdLk Mask (CP-480), which must be set to "4". Control Parameters 481 - 488 are also exempt when KyPdLk Mask (CP-480) is set to "4" . If Key Pad Lock Mask (CP-480) is set to "0", all of the Control Parameters are locked out and none are exempt, including CPs 481-489.

KeyPad Lockout

Keypad Lockout (MP-103) displays the Keypad Lockout status. The Keypad Lockout is active when "On" is displayed. When Keypad Lockout is active, Control Parameter values can not be changed. With the exception of the Control Parameters that are exempted by CP's 480-489. The Keypad Lockout is not active when "OFF" is displayed. When the Keypad Lockout is not active, any Control Parameter can be changed.

SERIAL COM SETUP   P1/1

The Serial Communications Setup screen includes parameters that configure the serial communications port. Each CX-1200 that is connected on the same communications link, must have a unique Device Address (CP-470). The baud rate, frame format and record format must be consistent with other devices are communicating with the CX-1200.

Device Address

Device Address (CP-470) assigns the serial communications address for the CX-1200. This number should be different from any other units that are on the serial link.

Baud Rate

The Baud Rate (CP-471) determines the serial communications data transfer rate (see list below) in Bits/Sec. With a 10 bit frame length, the number of Frame/Sec would be 1/10 the Baud Rate.

1 = 300 bps = 300 Baud
2 = 600 bps = 600 Baud
3 = 1200 bps = 1200 Baud
4 = 2400 bps = 2400 Baud
5 = 4800 bps = 4800 Baud
6 = 9600 bps = 9600 Baud (default)
7 = 19200 bps = 19.2k baud

Frame Format

Frame Format (CP-472) determines the parity, the number of data bits and the number of stop bits for the serial communications.

1 = N,8,1 = No Parity, 8 data bits, 1 stop bit (10 bit frame - ASCII or Binary)
2 = E,7,1 = Even Parity, 7 data bits, 1 stop bit (10 bit frame-ASCII only)

Record Format

Record Format (CP-469) determines which type of data format (see list below) will be used for the serial communication.

3 = ASCII2   2 = ASCII   1 = BINARY

CRC Enable

If CRC Enable (CP-468) is set to "ON" (1), you must append a CRC value to all serial communications messages that are received by the CX-1200 (See *Serial Communications: Using Serial Communications*). The CX-1200 checks the CRC value against the the message contents (excluding the "STX"), then calculates a CRC value and appends it to all serial communications responses. If CRC Enable (CP-468) is set to "OFF" (0), the CX-1200 will ignore any CRC value that is appended to a message and will not append a CRC value to any serial communications responses.

1 = On (Enabled)   0 = Off (Disabled)

DEVICENET SETUP   P1/2

The DeviceNet Setup screens include parameters to configure the DeviceNet option card for network communications. Page 1 of the DeviceNet Setup screens includes the Serial Number attribute of the Identity Object and the MAC ID and Baud Rate attributes from the DeviceNet Object. Page 2 is used to enter the eight Parameter Codes for the Assembly Queue. Refer to "DeviceNet Card Technical Manual" for more detailed information on DeviceNet operations.

DN MAC ID

DN MAC ID is the DeviceNet Media Access Control Identifier. The MAC ID is used to assign a unique identifier or address to each node on the network. Assign a different MAC ID to each CX-1200 device on the network from 0 to 63.

DN Baud Rate

The DN Baud Rate is the network data or transfer rate. Enter the number from the listing below that corresponds to the desired baud rate:

1 = 125k bps
2 = 250k bps
3 = 500k bps

Serial Number

Serial Number is the serial number from the DeviceNet card in this CX-1200 controller. If the card was factory installed, the Serial Number should already be entered. If the card is being field installed, enter the Serial Number from the label on the card or recorded in the DeviceNet Card Technical Manual.

DEVICENET SETUP   P2/2

The following parameters are used to identify the eight parameters for the I/O Assembly Queue.

DN Write Parm 1

Enter the number of a Control Parameter to be written to with the DeviceNet poll command in the I/O Assembly Queue.

DN Write Parm 2

Enter the number of a Control Parameter to be written to with the DeviceNet poll command in the I/O Assembly Queue.

DN Write Parm 3

Enter the number of a Control Parameter to be written to with the DeviceNet poll command in the I/O Assembly Queue.

DN Write Parm 4

Enter the number of a Control Parameter to be written to with the DeviceNet poll command in the I/O Assembly Queue.

DN Read Parm 1

Enter the number of a Control Parameter or Monitor Parameter to be read with the DeviceNet poll command in the I/O Assembly Queue.

DN Read Parm 2

Enter the number of a Control Parameter or Monitor Parameter to be read with the DeviceNet poll command in the I/O Assembly Queue.

DN Read Parm 3

Enter the number of a Control Parameter or Monitor Parameter to be read with the DeviceNet poll command in the I/O Assembly Queue.

DN Read Parm 4

Enter the number of a Control Parameter or Monitor Parameter to be read with the DeviceNet poll Command in the I/O Assembly Queue.

VIDEO SETUP   P1/1

The Video Setup screen includes the parameters that control the screen operation. Video Mode (CP-474) allows you to change the format. Contrast Value (CP-475) allows you to adjust the intensity of the pixels. If the screen appears too light, increase the value in Contrast Value. If the screen appears too dark, decrease the value. This may vary from screen to screen.

Video Mode

Video Mode (CP-474) determines how the LCD Screen Display will be displayed, per the list below:

3 = Standard w/Border
2 = Reverse Video
1 = Standard Video (default)

Contrast Value

Contrast Value (CP-475) determines the contrast for the LCD Screen Display. The higher values darken the pixels and lower values lighten the pixels.

ALARM INDICATOR MASK   P1/1

The Alarm Indicator Mask screen includes the parameters that determine which alarms and which numerical comparator outcomes will cause the 'alm' to flash in the lower-left corner of the screen. The two parameters are bit mapped for each condition. Place a '1' in the bit position corresponding to the alarms or compares that you want to activate the 'alm' indicator. In this case, a '0' in the bit masks (or disables) the condition from activating the 'alm' indicator. Refer to *Appendices: Appendix C* for the Std Alm Msk (CP-375) and CustAlm Msk (CP-376) bit map list.

Std Alm Msk

The Standard Alarm Mask (CP-375) allows you to mask out specific alarms so that they will not cause the 'alm' indicator to flash (in the lower left-hand corner of the CX-1200 screen) by entering a "0" in the corresponding bit position. You can also activate any of these alarm conditions by entering a "1" in the corresponding bit position. Refer to *Appendices: Appendix C* for the Alarm Mask (CP-375) bit map list.

CustAlm Msk

Custom Alarm Mask (CP-376) allows you to mask out the compare results so that they will not cause the 'alm' indicator to flash (in the lower left-hand corner of the CX-1200 screen) by entering a "0" in the corresponding bit position. You can also activate any of these compare conditions by entering a "1" in the corresponding bit position. Refer to *Appendices: Appendix C* for the Compare Mask (CP-376) bit map list.

—NOTES—

SCALING

This section discusses the setup procedures for scaling. The CX-1200 allows you to use Engineering Units (e.g., feet, inches, revolutions) relative to a specific time (e.g., seconds, minutes) to control and monitor your system. The scaling screens will walk you through the scaling of:

- the frequency inputs from the lead and feedback sensors
- the control output signal to the drive
- the lead and follower sync offsets & non-sync phase
- the lead and follower sync job sizes
- the Auxiliary Analog inputs (2) and output (1) signals
- the Scaled Fb (MP-40); which is the default parameter that appears in the large number display on the status screen

Caution: To avoid damage to your system, the CX-1200 must be calibrated and the motor drive set up before you operate your system. Refer to *Drive Setup / Calibration: Calibration*.

The CX-1200 scaling screens are:

- Lead
- Follower
- Offsets & Phase
- Job Sizes
- Aux Analog Input 1
- Aux Analog Input 2
- Aux Analog Output

—NOTES—

STANDARD SIGNALS

The Standard Signals screens consist of the Lead Frequency Input screen (page 1), the Feedback Frequency Input screen (page 1), and the Control Output screen (page 2).

Lead Frequency Input

The Lead Frequency Input signal is a frequency from the quadrature sensor for the lead motor. PPR FI1 (CP-261) scale the Lead Feedback signal from frequency (pulses per second, Hz) to FI1 RPM (MP-02).

Feedback Frequency Input

The Feedback Input signal is a frequency from the quadrature sensor for the follower motor. PPR FI2 (CP-266) scale the Follower Feedback signal from frequency (pulses per second, Hz) to FI2 RPM (MP-04).

Control Output

The Control Output Signal (CO_Sig) is the low voltage output signal that is the control (or command) signal input to your drive. CO_Sig typically represents a speed command since the majority of drives operate in the velocity mode.

The CO Offset (CP-273) is calibrated at the factory and generally will not need to be re-calibrated in most applications. The CO Offset is added to the control output signal in order to zero (or balance) any offset voltage that may be present in the output circuitry. It can be used to counteract a creep problem with the drive, if a drive balance pot (or digital adjustment) is not available. When operating the CO_Sig in bipolar, unipolar or bipolar absolute mode, the CO Offset should be set to zero the CO_Sig output voltage. Refer to *Drive Setup/Calibration: Creep Calibration* for more details.

LEAD / LEAD FREQUENCY   P1/1

Cnt Mode FI1

Count Mode FI1 (CP-260) identifies the type of encoder that is connected to Frequency Input 1. The "Quad x4" setting is for a quadrature encoder that gives 4 counts per pulse and also gives direction information. The Incremental selection is for a single channel encoder, which gives 1 count per pulse but does not give direction information.

2 = Incremental
1 = Quad x4 (default)

PPR FI1

Pulses Per Revolution Frequency In 1 (CP-261) is the number of pulses in one revolution of the encoder device that is connected to Frequency Input 1. The value may be called Counts, Lines, or Pulses by various encoder manufacturers. Do NOT multiply by four for quadrature encoders.

FI1 Pulses

FI1 Pulses (CP-262) is used to scale the Frequency Input 1 in EU's and EU/Tm. Enter the number of pulses that corresponds to the number of EU's that are entered in EU FI1 (CP-263).

EU FI1

EU FI1 (CP-263) is used to scale the Frequency Input 1 in EU's and EU/Tm. Enter the number of EU's that corresponds to the number of pulses that are entered in FI1 Pulses (CP-262).

LdSyncPolarity

Lead Sync Polarity (CP-264) is a selection that determines the polarity trigger direction of the Lead Sync pulses. The Lead Sync input can be programmed to trigger on signals going from a low to high voltage level (positive going) or from a high to low voltage level (negative going).

2 = Falling edge triggered (negative going)
1 = Rising edge triggered (positive going) (default)

Time Base

Time Base (CP-209) is the denominator, which represents the time (Tm) in the EU/Tm equation. The equation scales the Frequency Inputs (FI1 and FI2) to EU/Tm.

3 = per Hour
2 = per Minute (default)
1 = per Second

FI1 Hz

Frequency Input 1 Hertz (MP-01) displays the current frequency of the Frequency Input 1, in Hertz.

FI1 RPM

Frequency Input 1 RPM (MP-02) displays the current speed of the Frequency Input 1 encoder in RPM, based on PPR FI1 (CP-261).

Ld EU/Tm

Frequency Input 1 Engineering Units per Time (MP-05) displays the current speed of the Frequency Input 1 in the Engineering Units per Time (EU/Tm) relative to the Pulses FI1 (CP-262), EU FI1 (CP-263) and Time Base (CP-209). The placement of the decimal point is the same as the placement of the decimal point in EU FI1 (CP-263).

Ld Posn

Lead Position (MP-10) displays the present value of the Lead Position in Engineering Units, as specified by Pulses FI1 (CP-262) and EU FI1 (CP-263). The placement of the decimal point is the same as the placement of the decimal point in EU FI1 (CP-263).

FOLLOWER / FOLLOWER FREQUENCY P1/2

Cnt Mode FI2

Count Mode FI2 (CP-265) identifies the type of encoder that is connected to Frequency Input 2. The “Quad x4” setting is a for quadrature encoder that gives 4 counts per pulse and also gives direction information. The Incremental selection is for a single channel encoder which gives 1 count per pulse but does not give direction information.

2 = Incremental
1 = Quad x4 (default)

PPR FI2

Pulses Per Revolution FI2 (CP-266) is the number of pulses that are produced during one revolution of the encoder (or motor or any other rotating part of your machine) that is connected to Frequency Input 2. This value is only used to calculate RPM information for FI2 RPM (MP-04).

FI2 Pulses

Frequency Input 2 Pulses (CP-267) is used to scale the Frequency Input 2 in EU’s and EU/Tm. Enter the number of pulses that corresponds to the number of EU’s that are entered in EU FI2 (CP-268).

EU FI2

EU Frequency Input 2 (CP-268) is used to scale the Frequency Input 2 in EU’s and EU/Tm. Enter the number of EU's that corresponds to the number of pulses that are entered in FI2 Pulses (CP-267).

FbSyncPolarity

Feedback Sync Polarity (CP-269) is a selection that determines the polarity trigger direction of the Feedback Sync pulses. The Feedback Sync input can be programmed to trigger on signals going from a low to high voltage level (positive going) or from a high to low voltage level (negative going).

2 = Falling edge triggered (negative going)
1 = Rising edge triggered (positive going) (default)

Time Base

Time Base (CP-209) is the denominator, which represents the time (Tm) in the EU/Tm equation. The equation scales the Frequency Inputs (FI1 and FI2) to EU/Tm.

3 = per Hour
2 = per Minute (default)
1 = per Second

FI2 Hz

Frequency Input 2 Hz (MP-03) displays the current frequency of the Frequency Input 2, in Hertz.

FI2 RPM

Frequency Input 2 RPM (MP-04) displays the current speed of the Frequency Input 2 encoder in RPM, based on PPR FI2 (CP-266).

Fb EU/Tm

Frequency Input 2 Engineering Units per Time (MP-06) displays the current speed of the Frequency Input 2 in the Engineering Units per Time (EU/Tm) relative to the Pulses FI2 (CP-267), EU FI2 (CP-268) and Time Base (CP-209). The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

Fb Posn

Feedback Position (MP-20) displays the present value of the Feedback Position in Engineering Units, as specified by Pulses FI2 (CP-267) and EU FI2 (CP-268). The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

FOLLOWER / CONTROL OUTPUT   P2/2

CO Mode

Control Output Mode (CP-270) affects the range of Control Output (CO_Sig) analog signal sent out to the drive.

3 = Unipolar Reversible
2 = Bipolar (default)
1 = Unipolar

CO Max Volts

Control Output Maximum Volts (CP-271) sets the upper limit on the voltage sent to the drive. Bipolar operation assumes plus or minus this value. It should be set equal, or lower, than the input specifications of the drive.

CO Plrty

Control Output Polarity (CP-272) determines whether a positive, or negative, signal voltage will operate the drive in the forward direction, under the most basic normal operation.

2 = Negated (neg=fwd)
1 = Normal (pos=fwd) (default)

CO Offset

Control Output Offset (CP-273) adjusts for small variations in the specifications of certain IC devices on this particular controller board. Usually a very small number, it serves to true up the 0 volts end point of the output voltage scale. It is preset at the factory, and should not need field adjustments.

CO Volts

Control Output Volts (MP-37) displays the present value, in volts, of the Control Output (CO_Sig) signal to the drive. It is the combination of FeedFwd (MP-35) plus Trim Out (MP-36).

CO Bits

Control Output Bits (MP-38) displays the present value, in DAC bits, of the Control Output (CO_Sig) signal to the drive. CO Bits is the CO Volts (MP-37) expressed in DAC bits.

CO Max Bits

Control Output Maximum Bits (MP-39) reflects the maximum allowed output in units of DAC bits. The value of CO Max Volts (CP-271) determines this parameter, based on the conversion of 32767 bits = 15 VDC.

OFFSETS & PHASE P1/2

LdOfstSource

Lead Offset Source (CP-207) identifies the source of the Lead Sensor Offset, which may be used to set a distance offset to the lead position. Lead Offset Sources are:

3 = Analog Input 2
2 = Analog Input 1
1 = LdSnsrOfst (CP-341) (default)

FbOfstSource

Follower Offset Source (CP-208) identifies the source of the Follower Sensor Offset, which may be used to set a distance offset to the follower position. Follower Offset Sources are:

3 = Analog Input 2
2 = Analog Input 1
1 = FbSnsrOfst (CP-351) (default)

PhaseSource

Phase Source (CP-356) identifies the source of the Non-Sync Phase, which may be used to set a distance offset to the non-sync follower position. Phase Sources are:

3 = Analog Input 2
2 = Analog Input 1
1 = NonSyncPhase (CP-357) (default)

LdNetOfst

Lead Net Offset (MP-15) displays the resultant Net-Offset applied to the lead position after considering the LdSnsrDist (CP-340) and the LdSnsrOfst (CP-341) values. LdNetOfst (MP-15) is the final resultant offset inside a lead job size.

FbNetOfst

Follower Net Offset (MP-25) displays the resultant Net-Offset applied to the follower position after considering the FbSnsrDist (CP-350) and the FbSnsrOfst (CP-351) values. FbNetOfst (MP-25) is the final resultant offset inside a follower job size.

SyncFlgDif

Sync Flag Difference (MP-29) displays the difference, in Follower EU's, between the position of the Lead and Follower sync pulses.

OFFSETS & PHASE P2/2

Ld Posn

Lead Position (MP-10) displays the present value of the Lead Position in Engineering Units, as specified by Pulses FI1 (CP-262) and EU FI1 (CP-263). The placement of the decimal point is the same as the placement of the decimal point in EU FI1 (CP-263).

LdSnsrDist

Lead Sensor Distance (CP-340) may be used to inform the CX-1200 of the distance from the critical contact point to the Lead Sync sensor. Applied to the lead position only during sync pulse acceptance into the control algorithm.

LdSnsrOfst

Lead Sensor Offset (CP-341) may be used to set a distance offset to the lead position. This offset becomes effective immediately upon entry. Values entered will rollover at a job size, or be resolved to be within a job size.

LdNetOfst

Lead Net Offset (MP-15) displays the resultant Net-Offset applied to the lead position after considering the LdSnsrDist (CP-340) and the LdSnsrOfst (CP-341) values. LdNetOfst (MP-15) is the final resultant offset inside a lead job size.

Fb Posn

Feedback Position (MP-20) displays the present value of the Feedback Position in Engineering Units, as specified by Pulses FI2 (CP-267) and EU FI2 (CP-268). The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

FbSnsrDist

Follower Sensor Distance (CP-350) may be used to inform the CX-1200 of the distance from the critical contact point to the Follower Sync sensor. Applied to the follower position only during sync pulse acceptance into the control algorithm.

FbSnsrOfst

Follower Sensor Offset (CP-351) may be used to set a distance offset to the follower position. This offset becomes effective immediately upon entry. Values entered will rollover at a job size, or be resolved to be within a job size.

FbNetOfst

Follower Net Offset (MP-25) displays the resultant Net-Offset applied to the follower position after considering the FbSnsrDist (CP-350) and the FbSnsrOfst (CP-351) values. FbNetOfst (MP-25) is the final resultant offset inside a follower job size.

NonSyncPhase

Non-Sync Phase (CP-357) may be used to set a distance offset to the non-sync follower position. This phase offset becomes effective immediately upon entry.

SyncFlgDif

Sync Flag Difference (MP-29) displays the difference, in Follower EU's, between the position of the Lead and Follower sync pulses.

JOB SIZES   P1/1

Sync Mode

Sync Mode (CP-203) selects the algorithm to be used when RUN Mode (CP-202) is set for Follower or Inverse Follower. 0 = Non-Sync Mode the position follower only, sync pulses are ignored by the control algorithm. 1 = Fixed Mode the follower setpoint is the ratio/scale factor. 2 = Trend Mode the follower setpoint is altered by the control algorithm to allow for continuously changing job sizes. 3 = Learn Mode learns the job spaces and the scale factor, also modifies the follower setpoint.

3 = Learn
2 = Trend
1 = Fixed (default)
0 = Off

LdSyncDvd

Lead Sync Divide (CP-205) can be used to reduce the sync rate of the CX-1200 for those processes that may need the maximum sync rate of 20 pulses per second. The lead sync pulses are divided by the LdSyncDvd (CP-205) value before being submitted to the synchronization routine.

FbSyncDvd

Feedback Sync Divide (CP-206) can be used to reduce the sync rate of the CX-1200 for those processes that may need the maximum sync rate of 20 pulses per second. The follower sync pulses are divided by the FbSyncDvd (CP-206) value before being submitted to the synchronization routine.

LdSyncBand

Lead Sync Band (CP-335) sets a “dead-band” around the sync-mark position to allow for irregular sync marks. If the actual sync pulse occurs inside this “dead-band”, the CX-1200 will presume an “in-sync” status, and therefore make no sync-correction. A sync correction will be made if the sync pulse occurs outside this band. The band is defined as ± the value entered.

FbSyncBand

Feedback Sync Band (CP-336) sets a “dead-band” around the sync-mark position to allow for irregular sync marks. If the actual sync pulse occurs inside this “dead-band”, the CX-1200 will presume an “in-sync” status, and therefore make no sync-correction. A sync correction will be made if the sync pulse occurs outside this band. The band is defined as ± the value entered.

LdJbSzAct

Lead Job Size Active (MP-14) displays a running average value of the last 16 qualifying lead job sizes determined by the Lead Frequency and Lead Sync inputs. Displayed in EU’s. This is the job size currently being used by the control algorithm.

FbJbSzAct

Follower Job Size Active (MP-24) displays a running average value of the last 16 qualifying follower job sizes determined by the Follower Frequency and Follower Sync inputs. Displayed in EU’s. This is the job size currently being used by the control algorithm.

ScaleFactor

Scale Factor (MP-41) displays the calculated ratio between the LdJbSzAve (MP-13) and the FbJbSzAve (MP-23). This may be different than the scale factor actually being used by the control algorithm.

—NOTES—

AUX ANALOG SIGNALS

The Aux Analog Signals screens consist of the Input 1 screen, the Input 2 screen and the Output screen.

Input 1

The Auxiliary Analog Input 1 signal (AI1) can be used as a sensor offset to the Lead signal in Lead plus Offset applications, sensor offset to the Follower signal in Follower plus Offset applications or as the Phase signal in the Non-Sync Feedback + Phase. This is selectable through LdOfstSource (CP-207), FbOfstSource (CP-208) and Phase Source (CP-356).

Go to the Scaling/Aux Analog Input 1 screen. AI1 RA (CP-281), EU@AI1 RA (CP-282), AI1 RB (CP-283) and EU@AI1 RB (CP-284) scale the Auxiliary Analog Input 1 signal from volts or milliamps to EU.

To scale the Auxiliary Analog Input 1 signal in terms of EU, you must first determine the Engineering Units that are relevant to your application and determine how this signal is used. If used as an offset in offset applications, this signal is typically scaled to the same EU representation as the chosen Feedback. For example, your EU 'speed' representation for this signal may be in RPM, feet/minute, inches/second, or pages per second.

Once you determine the EU representation for this signal, you need to scale the input voltage (or current) by means of a linear two point method. Typically, the two points (A and B) are chosen as the endpoints of the range of operation - the minimum and maximum voltage (or current) and the minimum and maximum EU. The two points also determine the 'polarity' of the signal by defining either a positive or negative slope. Enter a reference voltage (or current) for point A into AI1 RA (CP-281). Enter the EU that corresponds to this voltage (or current) into EU@AI1 RA (CP-282). Enter a different reference voltage (or current) for point B into AI1 RB (CP-283) and the corresponding EU into EU@AI1 RB (CP-284).

For example, a pot might be used to add the sensor offset to a lead frequency. Your Lead is scaled for Feet/min. The supply voltage on the pot is +10 volts. You want the midpoint (5 volts) to represent "0" EU (Feet/min). A voltage measurement of 10 volts needs to increase the speed by 100 Feet/min and a voltage measurement of "0" volts needs to decrease the speed by 100 Feet/min. Enter "0" into AI1 RA (CP-281) and -100 into EU@AI1 RA (CP-282). Enter 10 into AI1 RB (CP-283) and 100 into EU@AI1 RB (CP-284). AI1 Mode (CP-280) should be set to volts (1).

The scaled range of the Analog Input 1 signal (e.g., 0 to 10 volts) should be similar to that at which the input was calibrated. Go to the Device Tests/Aux Analog Tests/P3 screen and select the signal with Analog Cal Sel (CP-461). Do not enable calibration. The two points for calibration should be displayed at the bottom of this screen in AnlgCal Ref A (MP-168) and AnlgCal Ref B (MP-169). Verify that the calibration range is the same range as the operating range. If not, recalibrate the input signal. Refer *to Drive Setup-Calibration: Calibration* for additional details.

There may be instances where you do know the voltage (or current) to EU representation, but you have no idea the voltage produced by the sensor at either end point. You can 'calibrate' the signal directly in terms of EU by setting the calibration references the same as the scaling references, i.e. set AI1 RA (CP-281) equal to AnlgCal Ref A (MP-168) for this signal and set AI1 RB (CP-283) equal to AnlgCal Ref B (MP-169) for this signal. These two points should be discretely different from each other and should be reasonable estimates for the actual voltage or current range. Now you can perform the calibration procedure with the sensor connected to this input. Enter you estimates for AI1 RA and AI1 RB into AnalogRef Val (CP-463) for the two points of operation/calibration. Enter the EU corresponding to these two points into EU@AI1 RA and EU@AI1 RB after the calibration is completed. Refer *Drive Setup/Calibration: Calibration* for additional details. For the formulas for the Auxiliary Analog Input 1 calculations, refer to *Appendices: Appendix B*.

Input 2

The Auxiliary Analog Input 2 signal (AI2) can be used as a offset to the Lead signal in Lead plus Offset applications, offset to the Follower signal in Follower plus Offset applications or as the Phase signal in the Non-Sync Feedback + Phase. This is selectable through LdOfstSource (CP-207), FbOfstSource (CP-208) and Phase Source (CP-356).

Go to the Scaling/Aux Analog Input 2 screen. AI2 RA (CP-286), EU@AI2 RA (CP-287), AI2 RB (CP-288) and EU@AI2 RB (CP-289) scale the Auxiliary Analog Input 2 signal from volts or milliamps to EU

To scale the Auxiliary Analog Input 2 signal in terms of EU, you must first determine the Engineering Units that are relevant to your application and determine how this signal is used. If used as an offset in offset applications, this signal is typically scaled to the same EU representation as the chosen Feedback. For example, your EU 'speed' representation for this signal may be in RPM, feet/minute, inches/second, or pages per second.

Once you determine the EU representation for this signal, you need to scale the input voltage (or current) by means of a linear two point method. Typically, the two points (A and B)are chosen as the endpoints of the range of operation - the minimum and maximum voltage (or current) and the minimum and maximum EU. The two points also determine the 'polarity' of the signal by defining either a positive or negative slope. Enter a reference voltage (or current) for point A into AI2 RA (CP-286). Enter the EU that corresponds to this voltage (or current) into EU@AI2 RA (CP-287). Enter a different reference voltage (or current) for point B into AI2 RB (CP-288) and the corresponding EU into EU@AI2 RB (CP-289).

For example, a pot might be used to add an offset to a lead frequency. Your Lead is scaled for Feet/min. The supply voltage on the pot is +10 volts. You want the midpoint (5 volts) to represent "0" EU (Feet/min). A voltage measurement of 10 volts needs to increase the speed by 100 Feet/min and a voltage measurement of "0" volts needs to decrease the speed by 100 Feet/min. Enter "0" into AI2 RA (CP-286) and -100 into EU@AI2 RA (CP-287). Enter 10 into AI2 RB (CP-288) and 100 into EU@AI2 RB (CP-289). AI2 Mode (CP-285) should be set to volts (1).

The scaled range of the Auxiliary Analog Input 2 signal (e.g., 0 to 10 volts) should be similar to that at which the input was calibrated. Go to the Device Tests/Aux Analog Tests/P3 screen and select the signal with Analog Cal Sel (CP-461). Do not enable calibration. The two points for calibration should be displayed at the bottom of this screen in AnlgCal Ref A (MP-168) and AnlgCal Ref B (MP-169). Verify that the calibration range is in the same range as the operating range. If not, recalibrate the input signal. Refer *to Drive Setup/ Calibration: Calibration for* additional details.

There may be instances where you do know the voltage (or current) to EU representation, but you have no idea the voltage produced by the sensor at either end point. You can 'calibrate' the signal directly in terms of EU by setting the calibration references the same as the scaling references, i.e. set AI2 RA (CP-286) equal to AnlgCal Ref A (MP-168) for this signal and set AI2 RB (CP-288) equal to AnlgCal Ref B (MP-169) for this signal. These two points should be discretely different from each other and should be reasonable estimates for the actual voltage or current range. Now you can perform the calibration procedure with the sensor connected to this input. Enter you estimates for AI2 RA and AI2 RB into AnalogRef Val (CP-463) for the two points of operation/calibration. Enter the EU corresponding to these two points into EU@AI2 RA and EU@AI2 RB after the calibration is completed. Refer *to Drive Setup/Calibration: Calibration* for additional details. For the formulas for the Auxiliary Analog Input 2 calculations, refer to *Appendices: Appendix B*.

AUX ANALOG INPUT 1 / ANALOG INPUT 1 P1/1

AI1 Mode

Analog Input 1 Mode (CP-280) identifies the mode of operation and the calibration that are used for the Auxiliary Board Analog Input 1 signal.

2 = Current
1 = Voltage (default)

AI1 RA

Analog Input 1 Reference A (CP-281) is used to scale the Auxiliary Board Analog Input 1 in EU. Enter the value for reference point A that corresponds to the EU that are entered in EU@AI1 RA (CP-282).

EU@AI1 RA

EU @ Analog Input 1 Reference A (CP-282) is used to scale the Auxiliary Board Analog Input 1 in EU. Enter the number of EU for point A that corresponds to the reference value that is entered in AI1 RA (CP-281).

AI1 RB

Analog Input 1 Reference B (CP-283) is used to scale the Auxiliary Board Analog Input 1 in EU. Enter the value for reference point B that corresponds to the EU that are entered in EU@AI1 RB (CP-284).

EU@AI1 RB

EU@Analog Input 1 Reference B (CP-284) is used to scale the Auxiliary Board Analg Input 1 in EU. Enter the number of EU's for point A that corresponds to the reference value that is entered in AI1 RB (CP-283).

AI1 Bits

Analog Input 1 Bits (MP-160) displays the present value in ADC bits of Auxiliary Board Analog Input 1 signal.

AI1 Signal

Analog Input 1 Signal (MP-161) displays the present value of the Auxiliary Board Analog Input 1 signal in either volts or milliamps relative to which setting (volts or current) has been entered in AI1 Mode (CP-280).

AI1 EU

Analog Input 1 EU (MP-162) displays the present value of the Auxiliary Board Analog Input 1 signal in Engineering Units (EU) as relative to the AI1 RA (CP-281), EU@AI1 RA (CP-282), AI1 RB (CP-283) and EU@AI1 RB (CP-284). The placement of the decimal point is the same as the placement of the decimal point in EU@AI1 RA (CP-282).

AUX ANALOG INPUT 2 / ANALOG INPUT 2   P1/1

AI2 Mode

Analog Input 2 Mode (CP-285) identifies the mode of operation and the calibration that are used for the Auxiliary Board Analog Input 2 signal.

2=Current
1=Voltage (default)

AI2 RA

Analog Input 2 Reference A (CP-286) is used to scale the Auxiliary Board Analog Input 2 in EU. Enter the Analog Input 2 signal value for reference point A that corresponds to the EU that are entered in EU@AI2 RA (CP-287).

EU@AI2 RA

EU @ Analog Input 2 Reference A (CP-287) is used to scale the Auxiliary Board Analog Input 2 in EU. Enter the number of EU/T's for point A that corresponds to the reference value that is entered in AI2 RA (CP-286).

AI2 RB

Analog Input 2 Reference B (CP-288) is used to scale the Auxiliary Board Analog Input 2 in EU/Tm. Enter the Analog Input 2 signal value for reference point B that corresponds to the EU's that are entered in EU@AI2 RB (CP-289).

EU@AI2 RB

EU at Analog Input 2 Reference B (CP-289) is used to scale the Auxiliary Board Analog Input 2 in EU. Enter the number of EU for point B that corresponds to the reference value that is entered in AI2 RB (CP-288).

AI2 Bits

Analog Input 2 Bits (MP-163) displays the present value in ADC bits of Auxiliary Board Analog Input 2 signal.

AI2 Signal

Analog Input 2 Signal (MP-164) displays the present value of the Auxiliary Board Analog Input 2 signal in either volts or milliamps, relative to which setting (volts or current) has been entered in AI2 Mode (CP-285).

AI2 EU

Analog Input 2 EU (MP-165) displays the present value of the Auxiliary Board Analog Input 2 signal in Engineering Units (EU) relative to the AI2 RA (CP-286), EU@AI2 RA (CP-287), AI2 RB (CP-288) and EU@AI2 RB (CP-289). The placement of the decimal point is the same as the placement of the decimal point in EU@AI2 RA (CP-286).

AUX ANALOG OUTPUT / ANALOG OUTPUT P1/1

AO Mode

Analog Output Mode (CP-291) identifies the mode of operation and calibration that are used for the Auxiliary Board Analog Output signal.

2 = Current
1 = Voltage (default)

AO RA

Analog Output Reference A (CP-292) scales the Auxiliary Board Analog Output from the units of the selected parameter to the units of the output, generally measured in volts or milliamps.

Val@AO RA

Value @ Analog Output Reference A (CP-293) scales the Auxiliary Board Analog Output from the units of the selected parameter to the units of the output; generally measured in volts or milliamps. Enter the parameter value that corresponds to AO RA (CP-292).

AO RB

Analog Output Reference B (CP-294) scales the Auxiliary Board Analog Output from the units of the selected parameter to the units of the output; generally measured in volts or milliamps. Enter the parameter value that corresponds to VAL@AO RB (CP-295).

Val@AO RB

Value at Analog Output Reference B (CP-295) scales the Auxiliary Board Analog Output from the units of the selected parameter to the units of the output, (generally measured in volts or milliampere). Enter the parameter value that corresp

AO Parameter

Analog Output Parameter (CP-290) identifies the Monitor or Control Parameter that is used for the Auxiliary Analog Output. When the Analog Output Parameter (CP-290) is set to “0”, the value of AO DIRECT (CP-365) is used as the output.

NOTE: The following Monitor and Control Parameters are not available for the Analog Output Parameter (CP-290):

MP-17 .... AnlgCal Ref A
MP-18 .... AnlgCal Ref B
MP-22 .... CO Max Bits
MP-23 ..... CO DAC Range
MP-24 .... AO Bits
MP-25 .... AO Signal
MP-26 .... DI 7..0
MP-27 .... DI 15..8
MP-29 ... KeyPad Lockout
MP-38 .... Ld EU/Tm
MP-45 .... Cntrl Loop
CP-290 .... AO Parameter

AO Direct

Analog Out Direct (CP-465) is the value output (in volts or milliamps) at the Auxiliary Analog Board's analog output when the AO Parameter (CP-290) is set to a “0”.

AO Bits

Analog Output Bits (MP-166) displays the present value, in DAC Bits, of the Auxiliary Analog Output.

AO Signal

Analog Output Signal (MP-167) displays the present value, in either volts or milliamps of the Auxiliary Analog Output, relative to AO Mode (CP-291).

—NOTES—

SETPOINTS AND RAMPS

This section discusses the setup procedures for setpoints and ramps. The setpoint determines the speed at which you want your drive to operate when the CX-1200 is in the “Run” mode. The setpoint can be a speed (ft/min), a ratio (Follower to Lead) or a setting that is relative to other factors, such as a dancer position. The CX-1200 can be run in:

- Inverse Follower Mode
- Follower Mode
- Master Mode
- Direct Mode

Use the “Run Modes” screen to select the mode of operation (e.g., Inv Follower, Follower, Master, Direct) as well as to select the Sync mode (e.g., Off, Fixed, Trend or Learn). Once you have selected the mode of operation, then use the corresponding screen (e.g., Master, Follower, Direct) to specify how that mode will operate.

Caution: To avoid damage to your system, the CX-1200 must be calibrated and the motor drive set up before you operate your system. Refer to *Drive Setup / Calibration: Calibration*.

The CX-1200 setpoint and ramps setup screens are:

- Run Modes
- Master
- Follower
- Run Ramps
- Stop Ramp
- Jog SP & Ramps
- Direct SP & Ramps

RUN MODES P1/1

There are four modes of operation; the Inverse Follower Mode, the Follower Mode, the Master Mode, and the Direct Mode. Use Run Mode (CP-202) to enter the mode of operation that you want to use when your system is in “Run”. The setpoints that correspond to these four modes of operation are; the Master Setpoint (CP-210), the Follower Setpoint (CP-220), and the Direct Setpoint (CP-230). Only one of these setpoints is active at any one time. The active setpoint is determined by the mode of operation that you select in Run Mode (CP-202). The active Setpoint will also appear as the Setpoint X (CP-201).

The Master Mode is generally used to control the *speed* of a single drive, but it can also be used to control the Master (Lead) speed of an entire process line.

The Follower Mode is generally used to control the *ratio* of one drive to another.

The Direct Mode is used for *direct* control of the value of CO Volts (MP-37) and consequently the voltage at CO Sig (J3, pin 1). The Direct Mode is generally used as a diagnostic tool. However, the Direct Mode can also be used to set the drive's operating speed directly by simulating a pot.

The result of either the Master Mode or the Follower Mode calculation is displayed in Scaled Ref (MP-30). The Scaled Ref (MP-30) is the reference speed in Engineering Units per time (EU/Tm). The Direct Mode caluclation is not displayed in Scaled Ref (MP-30) because the Direct Mode forces the CO Sig to match the Direct Setpoint (CP-230).

Run Mode

Run Mode (CP-202) sets the mode of operation and the subsequent Setpoint, that are used when your system is in “Run”. The Setpoint and mode of operation combined, determine the Reference Speed and, if applicable, the Reference Position. The modes of operation are:

4 = Inv Foll Mode
3 = Follower Mode
2 = Master Mode (default)
1 = Direct Mode

Sync Mode

Sync Mode (CP-203) selects the algorithm to be used when RUN Mode (CP-202) is set for Follower or Inverse Follower. 0 = Non-Sync Mode the position follower only, sync pulses are ignored by the control algorithm. 1 = Fixed Mode the follower setpoint is the ratio/scale factor. 2 = Trend Mode the follower setpoint is altered by the control algorithm to allow for continuously changing job sizes. 3 = Learn Mode learns the job spaces and the scale factor, also modifies the follower setpoint.

3 = Learn
2 = Trend
1 = Fixed
0 = Off (default)

MASTER/MASTER SETPOINT P1/1

The Master SP (CP-210) is the desired master speed (e.g., feet/minute) at which you want you system to operate. The ScaledRef (MP-30) is equal to the Master SP (CP-210) when the CX-1200 is in “Run”. The operating speed is determined directly by the Parameter Value that is in the Master SP (CP-210). The Master SP (CP-210) is represented in EU/Tm.

The equation that governs this mode of operating is:

Scaled Ref {MP-30} = Master SP {CP-210}

Use the Max SP Mstr (CP-211) and Min SP Mstr (CP-212) to determine the maximum and minimum value that can be entered into Master SP (CP-210). The Max SP Mstr (CP-211) and the Min SP Mstr (CP-212) define the range for positive and negative values (i.e. they are magnitude limits).

Run Mode

Run Mode (CP-202) sets the mode of operation and the subsequent Setpoint, that are used when your system is in “Run”. The Setpoint and mode of operation combined, determine the Reference Speed and, if applicable, the Reference Position. The modes of operation are:

4 = Inv Foll Mode
3 = Follower Mode
2 = Master Mode (default)
1 = Direct Mode

Master SP

Master Setpoint (CP-210) is the speed at which you want your system to operate (while in Run) when the Run Mode (CP-202) is set to "2” (Master Mode).

Min SP Mstr

Minimum Setpoint Master (CP-212) is a lower limit to the Master SP (CP-210). It will prevent lower entries in Master SP (CP-210).

Max SP Mstr

Maximum Setpoint Master (CP-211) is an upper limit to the Master SP (CP-210). It will prevent higher entries in Master SP (CP-210).

FOLLOWER

Use the Follower mode to follow an external signal at a ratio that you will most likely define. The Follower SP (CP-220) sets the ratio at which the follower will operate with respect to the Lead. The Ratio is the desired Feedback EU/Tm per Lead EU/Tm in velocity mode of operation.

$$\text{Ratio} = \frac{\text{Follower speed (feet/min. of the follower)}}{\text{Lead speed (feet/min. of the lead)}}$$

The Ratio is set by the Follower SP (CP-220), the Ratio can be considered to be equal to the Follower SP.

$$\text{ScaledRef} = \frac{\text{FI1RPM * Follower SP * EU FI2 * PPR FI2}}{\text{Time Base * Pulses FI2}}$$

When the RUN Mode (CP-202) is set to “4” (Inverse Follower), the Ratio can be considered to be equal to 1/Follower SP.

The Max SP Fol (CP-221) and Min SP Fol (CP-222) determine the maximum and minimum value that can be entered into Follower SP (CP-220). They define the range for both positive and negative values; they are magnitude limits.

FOLLOWER/FOLLOWER SETPOINT P1/1

Run Mode

Run Mode (CP-202) sets the mode of operation and the subsequent Setpoint, that are used when your system is in "Run". The Setpoint and mode of operation combined, determine the Reference Speed and, if applicable, the Reference Position. The modes of operation are:

4 = Inv Foll Mode
3 = Follower Mode
2 = Master Mode (default)
1 = Direct Mode

Sync Mode

Sync Mode (CP-203) selects the algorithm to be used when RUN Mode (CP-202) is set for Follower or Inverse Follower. 0 = Non-Sync Mode the position follower only, sync pulses are ignored by the control algorithm. 1 = Fixed Mode the follower setpoint is the ratio/scale factor. 2 = Trend Mode the follower setpoint is altered by the control algorithm to allow for continuously changing job sizes. 3 = Learn Mode learns the job spaces and the scale factor, also modifies the follower setpoint.

3 = Learn
2 = Trend
1 = Fixed
0 = Off (default)

Follower SP

Follower Setpoint (CP-220) is the speed at which you want your system to operate (while in Run) when the Run Mode (CP-202) is set to "3" (Follower Mode).

Min SP Fol

Minimum Setpoint Follower (CP-222) is a lower limit to the Master SP (CP-210). It will prevent lower entries in Master SP (CP-210).

Max SP Fol

Maximum Setpoint Master (CP-221) is an upper limit to the Follower SP (CP-220). It will prevent higher entries in Follower SP (CP-220).

RUN RAMPS

Since the ramp generator controls the rate of change of the velocity command, the velocity command is referred to as the ramped reference speed. The ramped reference speed is displayed in RampedRef (MP-31). When the ScaledRef (MP-30) speed changes, the rate of change in the RampedRef (MP-31) speed is limited by the acceleration and deceleration rates that you specify. You can specify the rates for “Run”, “R-Stop”, “H-Stop”, "Direct" and “Jog” independently.

Ramps may be used in each of the following situations:

1. The application requires slow starting and stopping to prevent product damage.

2. Minimize stress on your system during starting and stopping.

3. Minimize the overshoot of the response to step changes in the ScaledRef (MP-30).

4. Filter out high frequency components of the ScaledRef (MP-30) signal.

5. Keep the drive out of current limit (saturation) and thus maintain the linear properties of the drive. The control loop will perform better and operate more predictably.

Your drive's capacity should not be exceeded under normal operating loads. If you use acceleration rates in excess of your drive’s potential, then overshoot can occur. However, if the Lead in follower applications provides adequate ramps, you can set the Acl Tm RUN (CP-301) or Dcl Tm RUN (CP-303) to “0.5”or use Ramp Thd (CP-305). The Ramp Thd (CP-305) allows the ramp for large changes in the ScaledRef (MP-30) and bypasses the ramp for small or gradual changes. The ramp generator can be stopped in progress or bypassed through the PLC or by Cntrl Latch (CP-477).

Set the acceleration rate for the ramps by defining a reference speed for the ramps in Ref Ramps (CP-300). The acceleration rate can also be entered directly in Acl Rt RUN (CP-302), although you must also enter a valid reference speed in Ref Ramps (CP-300). This reference speed is generally the operating line speed. When you enter an acceleration time in Acl Tm RUN (CP-301), the CX-1200 automatically calculates the acceleration rate. Inversely, if you enter the acceleration rate in Acl Rt RUN (CP-302), the CX-1200 automatically calculates the acceleration time. The deceleration time and deceleration rate operate in the same way. When you enter a new reference speed, the CX-1200 automatically calculates the acceleration and deceleration times and preserves the given rates. The acceleration rate is defined by:

$$\text{acceleration rate} = \frac{\text{reference speed (EU/Tm)}}{\text{acceleration time (Seconds)}}$$

Likewise, the deceleration rate is defined by:

$$\text{deceleration rate} = \frac{\text{reference speed (EU/Tm)}}{\text{deceleration time (Seconds)}}$$

RUN RAMPS P 1/1

The Run Ramps parameters determine the acceleration and deceleration rates that are used during RUN. The Ref Ramps (CP-300) is the reference speed in EU/Tm used to define the RUN ramps. Acl Tm RUN (CP-301) is the time it would take to accelerate from “0” to the Ref Ramps (CP-300) speed. The Acl Rt RUN (CP-302) is the acceleration rate in EU/Tm/Sec. Dcl Tm RUN (CP-303) is the time it would take to decelerate from the reference speed to “0” speed. The Dcl Rt RUN (CP-304) is the deceleration rate in EU/Tm/Sec. Note that there are separate parameters that define the deceleration rates that are used for “H-Stop” and "R-Stop.

Ref Ramps

The acceleration rate for the application selected are determined by the Acl Tm RUN (CP-301) and the Ref Ramps (CP-300). The deceleration rate (from a faster speed to a slower speed) for the application selected, are determined by the Dcl Tm RUN (CP-303) and the Ref Ramps (CP-300).

Acl Tm RUN

Acceleration Time RUN (CP-301) is the time that it takes to accelerate from 0 to the Ref Ramps (CP-300). Time is consistant with Ref Ramps (CP-300) and Acl Rt RUN (CP-302).

Acl Rt RUN

Acceleration Rate RUN (CP-302) is the acceleration rate that the speed changes from 0 to the Ref Ramps (CP-300). Rate is consistant with Ref Ramps (CP-300) and Acl Tm RUN (CP-301).

Dcl Tm RUN

Deceleration Time RUN (CP-303) is the time that it takes to decelerate from Ref Ramps (CP-300) speed to 0. Time is consistant with Ref Ramps (CP-300) and Dcl Rt RUN (CP-304).

Dcl Rt RUN

Deceleration Rate RUN (CP-304) is the deceleration rate that the speed changes from Ref Ramps (CP-300) speed to 0, while operating in App Select (CP-202) 1, 2, 4 or 5. Rate is consistant with Ref Ramps (CP-300) and Dcl Tm RUN (CP-303).

Ramp Thd

When the difference between the ScaledRef (MP-30) and the RampedRef (MP-31) is greater than Ramp Thd (CP-305), the ramp will work normally. When the difference between the ScaledRef (MP-30) and the RampedRef (MP-31) is less than or equal to Ramp Thd (CP-305), the ramp will be bypassed. This avoids ramp delays for small speed changes but still allows a ramp for large speed or for large Master SP (CP-210) changes.

STOP RAMPS   P1/1

There are separate parameters that define the deceleration rate that is used for “R-Stop” and “H-Stop”. However, Ref Ramps (CP-300) functions as the reference speed for both. Dcl Tm Rstp (CP-310) is the time it would take to decelerate from the Reference Ramps speed to “0” for an “R-Stop”. Dcl Rt RStp (CP-311) is the deceleration rate for “R-Stop”. Dcl Tm HStp (CP-312) is the time it would take to decelerate from the Ref StopRmp speed to 0 for an “H-Stop”. Dcl Rt HStp (CP-313) is the deceleration rate for “H-Stop”.

Ref Ramps

The acceleration rate for the application selected are determined by the Acl Tm RUN (CP-301) and the Ref Ramps (CP-300). The deceleration rate (from a faster speed to a slower speed) for the application selected, are determined by the Dcl Tm RUN (CP-303) and the Ref Ramps (CP-300).

Dcl Tm RStp

Deceleration Time R-Stop (CP-310) is the time, in seconds, that it takes to decelerate from the Ref Ramps (CP-300) speed to 0, during R-Stop.

Dcl Rt RStp

Deceleration Rate R-Stop (CP-311) is the deceleration rate that is used for R-Stop.

Dcl Tm HStp

Deceleration Time H-Stop (CP-312) is the time, in seconds, that it takes to decelerate from the Ref Ramps (CP-300) speed to 0, during H-Stop.

Dcl Rt HStp

Deceleration Rate H-Stop (CP-313) is the deceleration rate that is used for H-Stop.

—NOTES—

JOG SP & RAMPS   P1/1

The Jog screen includes the parameters that are related to “Jog” operation. The Jog Setpoint as well as the accel and decel rates can be set in this screen. The loop type selection for the “Jog” mode of operation is also available on this screen. You can “Jog” in open loop mode, which uses Kff to generate the Control Output (CO_Sig) based on the desired Jog Setpoint. You can also “Jog” in closed velocity loop which uses Kff and the PID loop to generate the Control Output (CO_Sig) based on the desired Jog Setpoint. The closed loop operation requires Feedback, but should result in more accurate operating speed and better speed regulation.

There are also parameters to define the ramps used for “Jog”. The Jog SP (CP-240) in EU/Tm functions as the reference speed. The Acl Tm Jog (CP-241) is the that time it will take to accelerate from “0” speed to the Jog SP. The Acl Rt Jog (CP-242) is the acceleration rate for “Jog”. Dcl Tm Jog (CP-243) is the time it should take to decelerate from the Jog SP to “0” speed. The Dcl Rt Jog (CP-244) is the deceleration rate used when the Jog SP is changed to a lower value as well as when both the Jog Forward and the Jog Reverse Inputs are deactivated and the speed is decreased to “0” speed before the state is changed to “R-Stop”.

Jog SP

Jog Setpoint (CP-240) is the speed, in EU/Tm, at which Jog ramps when it is activated. The Jog ramp rates are referenced to this speed.

Acl Tm Jog

Acceleration Time Jog (CP-241) is the time, in seconds, to accelerate from 0 to the Jog SP (CP-240).

Acl Rt Jog

Acceleration Rate Jog (CP-242) is the rate, in EU/Tm per second, that it takes to accelerate when Jog is activated.

Dcl Tm Jog

Deceleration Time Jog (CP-243) is the time, in seconds, that it takes to decelerate from Jog SP (CP-240) to 0, when the Jog Input is deactivated or when switching between “Jog Fwd” and “Jog Rvs”.

Dcl Rt Jog

Deceleration Rate Jog (CP-244) is the rate, in EU/Tm per second, that is used when the Jog input is deactivated or when switching between “Jog Fwd” and “Jog Rvs”.

Jog Loop Mode

Jog Loop Mode (CP-245) identifies the type of control loop (see list below) that is used during Jog.

1 = Velocity Loop (default)
0 = Open Loop

DIRECT SP & RAMPS   P1/1

Direct Setpoint Mode puts a voltage on the Control Output (CO_Sig). The Direct SP (CP-230) sets this voltage directly. Run Mode (CP-202) must be set to "1" (Direct) and the CX-1200 must be in "Run".

Restrictions to the polarity of the output signal can be done with the CO mode (CP-270) on page 2 of the Scaling / Follower screen.

Direct Setpoint Mode is used to directly control the voltage on the Control Output (CO_Sig), which connects to the drive. It is typically used as a diagnostic tool, but could be as a pot replacement for indirectly setting the operating speed of the drive. When using Direct Setpoint Mode, the Control Output (CO_Sig) voltage will be fixed at the value you enter into the Direct SP (CP-230). It is an open loop operation and there is no attempt at controlling the Feedback speed. There is only one format available to Direct mode operation. There are separate ramp parameters associated with Direct Mode.

The defining equation for Direct Setpoint Mode:

CO Volts (MP-37) volts = Direct SP (CP-230) volts

Run Mode

Run Mode (CP-202) sets the mode of operation and the subsequent Setpoint, that are used when your system is in "Run". The Setpoint and mode of operation combined, determine the Reference Speed and, if applicable, the Reference Position. The modes of operation are:

4 = Inv Foll Mode
3 = Follower Mode
2 = Master Mode (default)
1 = Direct Mode

Direct SP

Direct Setpoint (CP-230) is active only in Direct Mode (CP202=0). It sends a voltage value directly to the Control Output (CO_Sig) terminal. Run/Stop commands are recognized, but no other control function is active. All encoder signals are ignored.

Acl Tm Drct

Acceleration Time Direct (CP-231) is the time, in seconds, that it takes to accelerate from 0 to the CO Max Volts (CP-271) voltage, while operating in the Direct Mode.

Dcl Tm Drct

Deceleration Time Direct (CP-232) is the time, in seconds, that it takes to decelerate from the CO Max Volts (CP-271) voltage to 0 volts, while operating in the Direct Mode.

CO Volts

Control Output Volts (MP-37) displays the present value, in volts, of the Control Output (CO_Sig) signal to the drive. It is the combination of FeedFwd (MP-35) plus Trim Out (MP-36).

—NOTES—

TUNING

Tuning includes setting the PID, Feedforward and Large Error Recovery tuning parameters.

Caution: To avoid damage to your system, the CX-1200 must be calibrated and the motor drive set up before you operate your system. Refer to *Drive Setup / Calibration: Calibration.*

The CX-1200 Tuning parameters are found in the following screens:

- Velocity Loop
- Position Loop
- Feedforward
- Large Error
- Related Items

—NOTES—

VELOCITY LOOP   P1/2

The Velocity Loop screen includes parameters for the loop-type selection, the PID parameters for the Velocity Loop (Kp, Ki, Kd), and four tuning monitor parameters

Cntrl Loop

Control Loop (MP-49) displays the present operating mode of the CX-1200.   Only one type of loop can be active at a time. These modes are automatically selected depending on the present system State (MP-50).

3 = Psn Hld (H-Stop Position Loop)
2 = Position Loop
1 = Velocity Loop
0 = Open Loop

Kp VL

Kp Velocity Loop (CP-320) is the proportional gain constant for the PID velocity loop. An increase in Kp VL (CP-320) creates a quicker response and a smaller error.   However, a value that is too large will cause instability.   If the integral term is used, (i.e., Ki VL not equal to zero) then a nonzero Kp VL can actually improve the loop response and decrease the overshoot to some extent.

Ki VL

Ki Velocity Loop (CP-321) is the integral constant for the PID loop. Integral action provides for zero steady state error. Increase Ki VL (CP-321) for a faster convergence to zero error.   However, a value that is too large will cause instability.

Kd VL

Kd Velocity Loop (CP-322) is the derivative constant for the PID loop. Derivative action attempts to damp out overshoot. Its effect is highly dependent on Kp VL and Ki VL, but, generally, too large a value causes instability.

FeedFwd

Feedforward (MP-35) displays the estimated voltage command to the drive required achieve the commanded RampedRef (MP-31). It is usually the major portion of the CO Volts (MP-37) signal.

Intgrl

Integral (MP-34) displays the value of the integral term (i.e., integrated error times the Ki constant) of the PID compensator. Intgrl (MP-34) is displayed in Volts. Intgrl (MP-34) is a conditioned error signal that serves to adjust the CO Volts (MP-37) to help achieve the desired speed. It is part of the PID error correction algorithm.

Trim Out

Trim Out (MP-36) displays the value of the output of the PID compensator. Trim Out is displayed in Volts. Trim Out is the sum of the conditioned error signals that, combined with the FeedFwd (MP-35), become the CO Volts (MP-37). Trim Out is the combination of all three terms of the PID error correction algorithm.

CO Volts

Control Output Volts (MP-37) displays the present value, in volts, of the Control Output (CO_Sig) signal to the drive. It is the combination of FeedFwd (MP-35) plus Trim Out (MP-36).

VelError

Velocity Error (MP-32) displays the difference between the RampedRef (MP-31) and Fb EU/Tm (MP-6).
Displayed in EU/Tm.

VELOCITY LOOP P2/2

The Velocity Loop screen includes parameters for the loop-type selection, the PID parameters for the Velocity Loop (Kp, Ki, Kd), and four tuning monitor parameters

Trim Authority
The trim contribution to the DAC output is limited to positive and negative Trim Authority (CP-333).

Integral Limit

The integral contribution to the trim term is limited to the positive and negative Integral Limit (CP-334). Integral Limit (CP-334) can decrease the effects of integral windup or it can limit the maximum effect of the integral term.

DerivThd VL

Derivative Threshold Velocity Loop (CP-323) is the minimum speed error that is required before the derivative term in the PID velocity algorithm gains influence. Increase the DerivThd VL (CP-323) to prevent the derivative term from acting on signal noise.

POSITION LOOP   P1/2

The Position Loop screen includes parameters for the loop-type selection, the PID parameters for the Position Loop (Kp, Ki, Kd), and four tuning monitor parameters

Cntrl Loop

Control Loop (MP-49) displays the present operating mode of the CX-1200. Only one type of loop can be active at a time. These modes are automatically selected depending on the present system State (MP-50).

3 = Psn Hld (H-Stop Position Loop)
2 = Position Loop
1 = Velocity Loop
0 = Open Loop

Kp PL

Kp PL (CP-325) is the proportional gain constant for the PID position loop. Increasing Kp PL (CP-325) will have a quicker the response and a smaller position error. However, a value that is too large could result in overshoot and instability. You can eliminate most or all of the error in the position loop with the proportional term (Kp PL). Use an integral only if Kp PL (CP-325) alone can not eliminate the error to your specification.

Ki PL

Ki PL (CP-326) is the integral constant for the PID position loop. Integral action provides for zero steady state error. Increase Ki PL (CP-326) for a faster convergence to zero error. However, a value that is too large will cause instability. Use Ki PL (CP-326) first to eliminate the error to your specification. If this produces unacceptable results, then decrease Kp PL (CP-325) and introduce the integral by gradually increasing Ki PL (CP-326).

Kd PL

Kd PL (CP-327) is the derivative constant for the PID position loop. Derivative action damps out overshoots, however, its effect is limited and is highly dependent on Kp PL (CP- 325), Ki PL (CP- 326) and the given process dynamics. A value that is too large can cause instability.

FeedFwd

Feedforward (MP-35) displays the estimated voltage command to the drive required achieve the commanded RampedRef (MP-31). It is usually the major portion of the CO Volts (MP-37) signal.

Intgrl

Integral (MP-34) displays the value of the integral term (i.e., integrated error times the Ki constant) of the PID compensator. Intgrl (MP-34) is displayed in Volts. Intgrl (MP-34) is a conditioned error signal that serves to adjust the CO Volts (MP-37) to help achieve the desired speed. It is part of the PID error correction algorithm.

Trim Out

Trim Out (MP-36) displays the value of the output of the PID compensator. Trim Out is displayed in Volts. Trim Out is the sum of the conditioned error signals that, combined with the FeedFwd (MP-35), become the CO Volts (MP-37). Trim Out is the combination of all three terms of the PID error correction algorithm.

CO Volts

Control Output Volts (MP-37) displays the present value, in volts, of the Control Output (CO_Sig) signal to the drive. It is the combination of FeedFwd (MP-35) plus Trim Out (MP-36).

PosnErr

Position Error (MP-33) displays the value, in engineering units, of the accumulated position error between the lead (FI1) and the feedback (FI2) input signals. The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

POSITION LOOP P2/2

The Position Loop screen includes parameters for the loop-type selection, the PID parameters for the Position Loop (Kp, Ki, Kd), and four tuning monitor parameters

Trim Authority

The trim contribution to the DAC output is limited to positive and negative Trim Authority (CP-333).

Integral Limit

The integral contribution to the trim term is limited to the positive and negative Integral Limit (CP-334). Integral Limit (CP-334) can decrease the effects of integral windup or it can limit the maximum effect of the integral term.

DerivThd PL

Derivative Threshold PL (CP-328) is the minimum speed error that is required before the derivative term in the PID algorithm gains influence. Increase the DerivThd PL (CP-328) to prevent the derivative term from acting on signal noise.

FEEDFORWARD P1/1

Kff Auto En

Kff Automatic Enable (CP-364) enables the CX-1200 automatic adjustment of Kff (MP-48) at the specified KffAdjUpdt (CP-363) interval in RUN with the loop closed.

1 = ON = Enabled

KffAdjUpdt

Kff Adjust Update (CP-363) sets the sampling period for the Kff calculation when it is enabled. KffAdjUpdt (CP-363) is the time interval between each new Kff calculation and the automatic store to the Kff parameters depending on whether Kff Auto En (CP-364) is enabled.

6 = 10 Min Update
5 = 1 Min Update
4 = 10 Sec Update
3 = 1 Sec Update (default)
2 = 500 mSec Update
1 = 250 mSec Update

Max Fb

Maximum Feedback (CP-329) and CO Max Volts (CP-271) are used to calculate a rough approximation for Kff (MP-48). When a new Max FB (CP-329) value is entered, then Kff reflects a new value also.

Kff

Kff (MP-48) is the feedforward gain for the follower. It translates a follower EU/Time into an approximate voltage output, which is then error-trimmed +/- to effect the desired speed. A reasonable accurate feedforward can minimize the need for error trim action, thus improving the response of the control loop. It is automatically adjusted for any change entered into CO Max Volts (CP-271), or Max Fb (CP-329). It is also adjusted automatically during feedforward Kff Auto En (CP-364) mode.

FeedFwd

Feedforward (MP-35) displays the estimated voltage command to the drive required achieve the commanded RampedRef (MP-31). It is usually the major portion of the CO Volts (MP-37) signal.

Intgrl

Integral (MP-34) displays the value of the integral term (i.e., integrated error times the Ki constant) of the PID compensator. Intgrl (MP-34) is displayed in Volts. Intgrl (MP-34) is a conditioned error signal that serves to adjust the CO Volts (MP-37) to help achieve the desired speed. It is part of the PID error correction algorithm.

Trim Out

Trim Out (MP-36) displays the value of the output of the PID compensator. Trim Out is displayed in Volts. Trim Out is the sum of the conditioned error signals that, combined with the FeedFwd (MP-35), become the CO Volts (MP-37). Trim Out is the combination of all three terms of the PID error correction algorithm.

CO Volts

Control Output Volts (MP-37) displays the present value, in volts, of the Control Output (CO_Sig) signal to the drive. It is the combination of FeedFwd (MP-35) plus Trim Out (MP-36).

LARGE ERROR

The Large Position Error Recovery Algorithm (LPERA) is included in the CX-1200 to provide a way to *gracefully* recover from sudden occurrences of "large position error" while the controller is running the position loop. Under normal operation, without this special algorithm, the CX-1200 would recover the the position error via PID compensation. This would result in a very aggressive recovery, since the PID has no limits other than the control output voltage, and is most likely tuned fairly *tight* in order to *hold* position.

LARGE ERROR P1/1

State

State (MP-50) displays the present system operating state of the CX-1200 (see list below). Only one operating state may be active at a time. To access either the "Run" or the "Jog" operating state, the F-Stop, R-Stop and H-Stop inputs must be closed.

9 = Not Defined
8 = Diagnostics
7 = Not Defined
6 = Not Defined
5 = Jog
4 = Not Defined
3 = Run
2 = H-Stop
1 = R-Stop
0 = F-Stop

Cntrl Loop

Control Loop (MP-49) displays the present operating mode of the CX-1200. Only one type of loop can be active at a time. These modes are automatically selected depending on the present system State (MP-50).

3 = Psn Hld (H-Stop Position Loop)
2 = Position Loop
1 = Velocity Loop
0 = Open Loop

OverSpdAllow

Over Speed Allowance (CP-369) sets a limit for the maximum speed ratio allowed while the CX-1200 is recovering position error using the 'Large Position Error Correction' algorithm. This limits how much faster than the lead, the follower is allowed to go. Example: a value of 50% would allow the follower to go 1.5 times the lead speed in order to recover the position error.

LgErrGain

Large Error Gain (CP-368) sets the rate of position error recovery while the CX-1200 is utilizing the 'Large Position Error Correction' algorithm. Larger gain will result in faster recovery.

LgErrThld

Large Error Threshold (CP-367) sets a threshold for the magnitude of Posn Err (MP-33) allowed before the CX-1200 will utilize its special 'Large Position Error Correction' algorithm. The CX-1200 will enter the LPECA when the magnitude of the position error is greater than the value entered for LgErrThld (CP-367). The CX-1200 will return to its normal position loop when the magnitude of the position error is less than or equal to 1/4 the value entered for LgErrThld (CP-367).

Ld Posn

Lead Position (MP-10) displays the present value of the Lead Position in Engineering Units, as specified by Pulses FI1 (CP-262) and EU FI1 (CP-263). The placement of the decimal point is the same as the placement of the decimal point in EU FI1 (CP-263).

Fb Posn

Feedback Position (MP-20) displays the present value of the Feedback Position in Engineering Units, as specified by Pulses FI2 (CP-267) and EU FI2 (CP-268). The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

PosnErr

Position Error (MP-33) displays the value, in engineering units, of the accumulated position error between the lead (FI1) and the feedback (FI2) input signals. The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

RELATED ITEMS   P1/1

Loop Update

Loop Update (CP-360) is the time interval between the Control Output (CO_Sig) calculations. This interval sets the sampling rate of the PID control loop.

3 = 100 mSec Update
2 = 10 mSec Update
1 = 1 mSec Update (default)

Sync Logic

Sync Logic (CP-204) allows selection of the direction taken when making a sync-correction. Closest makes the correction in the direction of the closest lead sync mark. Forward always makes the correction in the forward direction toward the lead sync mark. And Back always makes the correction back to the lagging lead sync mark.

3 = Backward
2 = Forward
1 = Closest (default)

InPosnBand

In Position Band (CP-337) sets a limit on the magnitude of the PosnErr (MP-33) allowed before the CX-1200 will use the Sync Logic (CP-204) setting to resolve the position error. If the magnitude of the Position Error is greater than the In Position Band value the CX-1200 will follow the Sync Logic setting to resolve the position error.

LdSyncBand

Lead Sync Band (CP-335) sets a “dead-band” around the sync-mark position to allow for irregular sync marks. If the actual sync pulse occurs inside this “dead-band”, the CX-1200 will presume an “in-sync” status, and therefore make no sync-correction. A sync correction will be made if the sync pulse occurs outside this band. The band is defined as ± the value entered.

FbSyncBand

Feedback Sync Band (CP-336) sets a “dead-band” around the sync-mark position to allow for irregular sync marks. If the actual sync pulse occurs inside this “dead-band”, the CX-1200 will presume an “in-sync” status, and therefore make no sync-correction. A sync correction will be made if the sync pulse occurs outside this band. The band is defined as ± the value entered.

Sig Fltr Sel

Signal Filter Select (CP-361) selects the signal to route through a low pass filter. The effect is visible on the speed value. Only one filter routine is available, and should be used on the most erratic input signal. While the damped signal will permit smoother control action, note that it will introduce a small delay in response to the original signal variations.

4 = Analog In 2
3 = Frequency In 2
2 = Analog In 1
1 = Frequency In 1
0 = Not Used (default)

SigFltrTmConst

Signal Filter Time Constant (CP-362) sets the time constant in milliseconds for the signal filter.

—NOTES—

ALARMS AND LIMITS

Alarms and Limits includes setting alarms and various operating limits.

Caution: To avoid damage to your system, the CX-1200 must be calibrated and the motor drive set up before you operate your system. Refer to *Setup / Calibration: Calibration*.

The CX-1200 Alarms and Limits parameters are found in the following screens:

- Alarms
- Limits

ALARMS

There are several monitored alarms built-in to the CX-1200. These alarms are included in the PLC Bit-Map and can be used together or separately to activate an output or any other function that is available to the PLC. To customize the alarms for your system, modify the PLC program to include the alarm bit. In the PLC, Fb@0Spd (Bit 54) and RR@0Spd (Bit 53) are defaulted to DO-O, which functions as a indicator for a “stop” condition. The PLC program defaults the HiSpdAlm (Bit 29) and LoSpdAlm (Bit 28) to Digital Output 1 (DO-1) to serve as an Over/Under-Speed indicator. The remaining alarms are not included in the default PLC program.

The PLC Bits that are influenced by the alarm Control Parameters are:

PLC Bit Name	Description
53 RR@0Spd	Ramped Reference < Zero Speed (CP-332) EU/Tm
54 Fb@0 Spd	Fb EU/Tm <= Zero Speed (CP-332) EU/Tm
55 MxFbSpd	Fb EU/Tm >= Max Fb Alm (CP-371) EU/Tm
56 MaxAclDcl	FB Accel/Decel > Max Acl/Dcl (CP-372) EU/Sec^2
57 DrvNoResp	Drive/Motor NOT responding for No Resp Time (CP-373)

Since the CX-1200 uses the Fb@0Spd (PLC Bit 54) for internal control, it is critical that you enter a valid value for Zero Speed (CP-332). “F-Stop”, “H-Stop” and “R-Stop” use the Fb@0Spd (PLC Bit 54) to determine when to force the DrvEnable (PLC Bit 51) to “0” (Off). If the feedback does not reach zero speed as indicated by Fb@0Spd (PLC Bit 54) within 1/2 second, then the DrvEnable (PLC Bit 51) is reset to “0” (Off).

The CX-1200 has an internal 1/2 second timer that functions with “R-Stop” “H-Stop” and “F-Stop”. During “R-Stop” or “H-Stop” the timer engages only when the “R-Stop” or “H-Stop” ramp is completed. However, during “F-Stop” the timer engages immediately. If the feedback slows to zero speed before 1/2 second expires, the DrvEnable (PLC Bit 51) will immediately reset to “0” for “R-Stop” and “F-Stop”. For “H-Stop”, the DrvEnable bit will remain enabled if the feedback is from a quadrature encoder and if it is supposed to stop with the loop closed.

Use Max Fb Alm (CP-371) to determine the state of the MxFbSpd (PLC Bit 55). The CX-1200 sets MxFbSpd (PLC Bit 55) to “1” when Fb EU/Tm (MP-06) is greater than Max Fb Alm (CP-371). Otherwise the CX-1200 resets MxFbSpd (PLC Bit 55) to “0”.

The change in the feedback speed is constantly being compared to Max Acl/Dcl (CP-372). If the magnitude of the change in feedback speed is greater than Max Acl/Dcl, then set the MxAclDcl (PLC Bit 55) to “1”. Otherwise the CX-1200 resets the bit to “0”.

If the CX-1200 is in “Run” and the CO Volts (MP-37) is greater than 1/8 the CO Max Volts (CP-271), the RampedRef (MP-31) is greater than the Zero Speed (CP-332) and the feedback speed is less than Zero Speed (CP-332) in excess of the time specified in NO Resp Time (CP-373), then the CX-1200 sets DrvNoResp (bit 57) to “1”. Otherwise, the CX-1200 resets DrvNoResp (bit 57) to “0”.

Any number of problems is can be indicated when the CX-1200 sets DrvNoResp (bit 57) to “1”. For example, it can indicate that neither the drive nor the motor is responding to a nonzero voltage input when the CX-1200 has a nonzero speed reference while in “Run”. If this occurs when the motor is turning, it may indicate a loss of feedback. The encoder or encoder wiring could be at fault. If this occurs and Fb EU/Tm (MP-06) displays a nonzero value, then check the feedback scaling and the value for Zero Speed (CP-332). If the motor is not moving, the drive may not be enabled. Check the enable logic and wiring. If the motor is not moving, it could also indicate that the CO_Sig signal is not getting to the drive. Check the CO_Sig wiring. In addition, there could be physical restrictions to motion or there could be a malfunction in the motor or the drive.

To further customize the alarms there are Control Parameters that you can use to make comparisons, which are reflected in the PLC. The four Control Parameters that compare the value of a user-selected Monitor Parameter to a user-entered Control Parameter value are:

Cmpr1 Val (CP-388)
Cmpr2 Val (CP-389)
Cmpr3 Val (CP-390)
Cmpr4 Val (CP-391)

There are also four Control Parameters that establish the type of comparison between the Monitor Parameter and corresponding Control Parameter. These four Control Parameters are:

Cmpr1 Parm (CP-380)
Cmpr2 Parm (CP-381)
Cmpr3 Parm (CP-382)
Cmpr4 Parm (CP-383)

In addition, there are four Control Parameters that establish the constant value (or threshold) that acts as the trigger point of comparison between the Monitor Parameter and corresponding comparison type. These four Control Parameters are:

Cmpr1 Type (CP-384)
Cmpr2 Type (CP-385)
Cmpr3 Type (CP-386)
Cmpr4 Type (CP-387

Enter the parameter number of the Monitor Parameter that you need for comparison, into one of the four "Cmprl Parm" Control Parameters listed above. Enter the comparison type into the corresponding "Cmpr1 Type " parameter.

For a "less than" comparison, use the '>=' compare type and use the compliment of the Cmpr Out PLC Bit in your PLC program.
For a "less than" or "equal to" comparison, use the '>' compare type with the NOT of the Cmpr PLC Bit in your PLC program.
NOTE: The compare type also determines if the comparison is performed with the signed value or with the magnitudes of the values (absolute values).

Enter the constant value (or threshold) that you want as the trigger point of the comparison into the corresponding "Cmpr1 Val" parameter.

There are four PLC bits that establish the "truth" of the comparison between the three corresponding parameters: Cmpr Parm, Cmpr1 Type and Cmpr Val. These four Control Parameters are:

Cmpr1 Out (Bit 60)
Cmpr2 Out (Bit 61)
Cmpr3 Out (Bit 62)
Cmpr4 Out (Bit 63)

The result of each comparison is reflected in the corresponding PLC Bit; "1" displayed in the corresponding bit indicates that the result of the corresponding comparison is "true". Otherwise, the bit is cleared ("0").

ALARMS STANDARD P1/3

Zero Speed
When the magnitude of the Fb EU/Tm (MP-06) is less than or equal to Zero Speed (CP-332), the Fb @ 0Spd bit (54) in the PLC is set to “1”. This value, as well as the PLC Fb @ 0Spd bit condition, is used in other transparent internal calculations that are based on feedback information.

Max Fb Alm
Maximum Feedback Alarm (CP-371) signals an over-speed condition. When the magnitude of the Fb EU/Tm (MP-39) is greater than or equal to Max Fb Alm (CP-371), then the MaxFb Spd bit (55) in the PLC is set to “1”. You can output this alarm for indication or action, or you can use the alarm logically in the PLC.

Min Fb Alm
Minimum Feedback Alarm (CP-370) signals an under-speed condition. When the magnitude of the Fb EU/Tm (MP-06) is less than or equal to MinFb Alm (CP-370), then the LoSpdAlm bit (28) in the PLC is set to “1”. You can output this alarm for indication or action, or you can use the alarm logically in the PLC.

Max Acl/Dcl
When either the feedback acceleration or the deceleration is greater than or equal to Maximum Accel/Decel (CP-372), then the MaxAclDcl bit (56) in the PLC is set to “1” . You can output this alarm for indication or action, or you can use the alarm logically in the PLC.

NO Resp Time
When the CO_Sig output signal is greater than 1/16 CO Max Volts (CP-271) and the Fb EU/Tm (MP-06) is less than Zero Speed (CP-332) for longer than the No Response Time (CP-373), then the DrvNoRsp bit (57) is set to “1”. If this scenario occurs, it is generally an indication that the feedback has been lost. It can also indicate that the drive is not enabled (or faulted out), that the CO_Sig output signal is not getting to the drive or that there may be a physical obstruction preventing motion.

Posn Alarm
Position Alarm (CP-374) sets a threshold for the magnitude of position error above which the Position Alarm PLC bit is set = 1. In other words...if the magnitude of PosErr (CP-33) is greater than or equal to the value set for Posn Alarm (CP-374), then the Position Alarm PLC bit (65) will be set.

ALARMS CUSTOM P2/3

Cmpr1 Parm

Enter a Monitor Parameter code in Compare 1 Parameter (CP-380) that will act on the value in Cmpr1 Val (CP-392), by using the comparison type that you entered in Cmp1 Type (CP-386). If the comparison that is established by these three parameters is "true", then the PLC sets the Cmpr1 Out bit (60) in the PLC to "1", which can be used to trigger a user defined indicator.

NOTE: See *Appendices: Appendix C* for the Monitor Parameters that are not available for the Compare 1 Parameter (CP-380).

Cmpr1 Type

Use Cmpr1 Type (CP-384) to establish the type of comparison (see list below) that will compare the Monitor Parameter that you entered in Cmpr1 Parm (CP-380) to the value that you entered in Cmpr1 Val (CP-388). If you require a comparison that is not listed, then set the Cmpr1 Out bit in the PLC to "Ld Not". This programs the comparison type to become a "Not" statement For example, to program "Magnitude Less Than" (<) use "NOT" Magnitude greater than or equal to (>=).

6 = 'mag =' if Magnitude of parm selected by Cmpr1 Parm = Cmpr1 Val, Cmpr1 Out = 1
5 = 'mag >=' if Magnitude of parm selected by Cmpr1 Parm >= Cmpr1 Val, Cmpr1 Out = 1
4 = 'mag >' if Magnitude of parm selected by Cmpr1 Parm > Cmpr1 Val, Cmpr1 Out = 1
3 = '=' if value of parm selected by Cmpr1 Parm = Cmpr1 Val, Cmpr1 Out = 1
2 = '>=' if value of parm selected by Cmpr1 Parm >= Cmpr1 Val, Cmpr1 Out = 1
1 = '>' if value of parm selected by Cmpr1 Parm > Cmpr1 Val, Cmpr1 Out = 1

Cmpr1 Val

Enter a value in Cmpr1 Val (CP-388) that will be compared to the Monitor Parameter in Cmpr1 Parm (CP-380), using the comparison type that you entered in Cmpr1 Type (CP-384). If the comparison that is established by these three parameters is "true", then the PLC sets the Cmpr1 Out bit (60) in the PLC to "1" .

Cmpr2 Parm

Enter a Monitor Parameter code in Compare 2 Parameter (CP-381) that will act on the value in Cmpr2 Val (CP-393), by using the comparison type that you entered in Cmp2 Type (CP-387). If the comparison that is established by these three parameters is "true", then the PLC sets the Cmpr2 Out bit (61) in the PLC to "1", which can be used to trigger a user defined indicator.

NOTE: See *Appendices: Appendix C* for the Monitor Parameters that are not available for the Compare 2 Parameter (CP-381).

Cmpr2 Type

Use Cmpr2 Type (CP-385) to establish the type of comparison (see list below) that will compare the Monitor Parameter that you entered in Cmpr2 Parm, (CP-381) to the value that you entered in Cmpr2 Val (CP-389). If you require a comparison that is not listed, then set the Cmpr2 Out bit in the PLC to "Ld Not". This programs the comparison type to become a "Not" statement For example, to program "Magnitude Less Than " (<) use "NOT " Magnitude greater than or equal to (>=).

6 = 'mag =' if Magnitude of parm selected by Cmpr2 Parm) = Cmpr2 Val, Cmpr2 Out = 1
5 = 'mag >=' if Magnitude of parm selected by Cmpr2 Parm) >= Cmpr2 Val, Cmpr2 Out = 1
4 = 'mag >' if Magnitude of parm selected by Cmpr2 Parm) > Cmpr2 Val, Cmpr2 Out = 1
3 = '=' if value of parm selected by Cmpr2 Parm) = Cmpr2 Val, Cmpr2 Out = 1
2 = '>=' if value of parm selected by Cmpr2 Parm) >= Cmpr2 Val, Cmpr2 Out = 1
1 = '>' if value of parm selected by Cmpr2 Parm) > Cmpr2 Val, Cmpr2 Out = 1

Cmpr2 Val

Enter a value in Cmpr2 Val (CP-389) that will compared to the Monitor Parameter in Cmpr2 Parm (CP-381), using the comparison type that you entered in Cmpr2 Type (CP-385). If the comparison that is established by these three parameters is "true", then the PLC sets the Cmpr2 Out bit (61) in the PLC screen to "1".

ALARMS CUSTOM P3/3

Cmpr3 Parm

Enter a Monitor Parameter in Compare 3 Parameter (CP-382) that will act on the value in Cmpr3 Val (CP-394), by using the comparison type that you entered in Cmp3 Type (CP-388). If the comparison that is established by these three parameters is “true”, then the PLC sets the Cmpr3 Out bit (62) in the PLC to “1” , which can be used to trigger a user defined indicator.

NOTE: See *Appendices: Appendix C* for the Monitor Parameters that are not available for the Compare 3 Parameter (CP-382).

Cmpr3 Type

Use Cmpr3 Type (CP-386) to establish the type of comparison (see list below) that will compare the Monitor Parameter that you entered in Cmpr3 Parm (CP-382) to the value that you entered in Cmpr3 Val (CP-390). If you require a comparison that is not listed, then set the Cmpr3 Out bit in the PLC to “Ld Not”. This programs the comparison type to become a “Not” statement For example, to program “Magnitude Less Than” (<) use “NOT” Magnitude greater than or equal to(>=).

6 = ‘mag =’	if Magnitude of parm selected by Cmpr3 Parm) = Cmpr3 Val, Cmpr3 Out = 1
5 = ‘mag >=’	if Magnitude of parm selected by Cmpr3 Parm) >= Cmpr3 Val, Cmpr3 Out = 1
4 = ‘mag >’	if Magnitude of parm selected by Cmpr3 Parm) > Cmpr3 Val, Cmpr3 Out = 1
3 = ‘=’	if value of parm selected by Cmpr3 Parm) = Cmpr3 Val, Cmpr3 Out = 1
2 = ‘>=’	if value of parm selected by Cmpr3 Parm) >= Cmpr3 Val, Cmpr3 Out = 1
1 = ‘>’	if value of parm selected by Cmpr3 Parm) > Cmpr3 Val, Cmpr3 Out = 1

Cmpr3 Val

Enter a value in Cmpr3 Val (CP-390) that will be compared to the Monitor Parameter in Cmpr3 Parm (CP-382), using the comparison type that you entered in Cmpr3 Type (CP-386). If the comparison that is established by these three parameters is “true”, then the PLC sets the Cmpr3 Out bit (62) in the PLC to “1”.

Cmpr4 Parm

Enter a Monitor Parameter in Compare 4 Parameter (CP-383) that will act on the value in Cmpr4 Val (CP-395), by using the comparison type that you entered in Cmpr4 Type (CP-389). If the comparison that is established by these three parameters is “true”, then the PLC sets the Cmpr4 Out bit (63) in the PLC Programming screen to “1”, which can be used to trigger a user defined indicator.

NOTE: See *Appendices: Appendix C* for the Monitor Parameters that are not available for the Compare 4 Parameter (CP-383).

Cmpr4 Type

Use Cmpr4 Type (CP-387) to establish the type of comparison (see list below) that will compare the Monitor Parameter that you entered in Cmpr4 Parm (CP-383) to the value that you entered in Cmpr4 Val (CP-391). If you require a comparison that is not listed, then set the Cmpr4 Out bit in the PLC to “Ld Not”. This programs the comparison type to become a “Not” statement For example, to program “Magnitude Less Then ” (<) use “NOT ” Magnitude greater than or equal to (>=).

6 = ‘mag =’	if Magnitude of parm selected by Cmpr4 Parm) = Cmpr4 Val, Cmpr4 Out = 1
5 = ‘mag >=’	if Magnitude of parm selected by Cmpr4 Parm) >= Cmpr4 Val, Cmpr4 Out = 1
4 = ‘mag >’	if Magnitude of parm selected by Cmpr4 Parm) > Cmpr4 Val, Cmpr4 Out = 1
3 = ‘=’	if value of parm selected by Cmpr4 Parm) = Cmpr4 Val, Cmpr4 Out = 1
2 = ‘>=’	if value of parm selected by Cmpr4 Parm) >= Cmpr4 Val, Cmpr4 Out = 1
1 = ‘>’	if value of parm selected by Cmpr4 Parm) > Cmpr4 Val, Cmpr4 Out = 1

Cmpr4 Val

Enter a value in Cmpr4 Val (CP-391) that will be compared to the Monitor Parameter in Cmpr4 Parm (CP-383), using the boundary type that you entered in Cmpr4 Type (CP-387). If the comparison that is established by these three parameters is “true”, then the PLC sets the Cmpr4 Out bit (63) in the PLC to “1” .

—NOTES—

LIMITS P1/2

The Limits screen includes the parameters that limit certain operating conditions. Some appear on other screens that are more relevant to their function.

Max Spd Lmt

The Maximum Speed Limit (CP-330) is the maximum positive and negative limit applied to the ScaledRef (MP-30) while operating in "Run" mode.

Min Spd Lmt

The Minimum Speed Limit (CP-331) is the minimum positive and negative limit applied to the ScaledRef (MP-30) while operating in "Run" mode. The ramp accelerates to the Min Spd Lmt (CP-331) if the reference speed is less than the Min Spd Lmt (CP-331).

Zero Speed

When the magnitude of the Fb EU/Tm (MP-06) is less than or equal to Zero Speed (CP-332), the Fb @ 0Spd bit (54) in the PLC is set to "1". This value, as well as the PLC Fb @ 0Spd bit condition, is used in other transparent internal calculations that are based on feedback information.

Trim Authority

The trim contribution to the DAC output is limited to positive and negative Trim Authority (CP-333).

Integral Limit

The integral contribution to the trim term is limited to the positive and negative Integral Limit (CP-334). Integral Limit (CP-334) can decrease the effects of integral windup or it can limit the maximum effect of the integral term.

LIMITS   P2/2

The Limits screen includes the parameters that limit certain operating conditions. Some appear on other screens that are more relevant to their function.

TrendJSChg%

Trend Job Size Change % (CP-347) sets a limit for the maximum allowable change to the Lead and Follower Job Size Average values (MP-14, MP-24) that will be accepted by the CX-1200 control algorithm. This limit is applied to each job size average independently before they are used by the CX-1200 control loop.

NonSyncErrRecEn

NonSync Error Recovery Enable(CP-348) may be used to enable or disable position error recovery upon transition into RUN state when Sync Mode (CP-203) is set for non-Sync. If disabled the CX-1200 will perform a position reset, resolving the position error to zero, upon entry into RUN state when in non-Sync follower mode.

1 = Enabled (position error will be recovered)
0 = OFF = Disabled (default)

Ld Posn

Lead Position (MP-10) displays the present value of the Lead Position in Engineering Units, as specified by Pulses FI1 (CP-262) and EU FI1 (CP-263). The placement of the decimal point is the same as the placement of the decimal point in EU FI1 (CP-263).

Fb Posn

Feedback Position (MP-20) displays the present value of the Feedback Position in Engineering Units, as specified by Pulses FI2 (CP-267) and EU FI2 (CP-268). The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

PosnErr

Position Error (MP-33) displays the value, in engineering units, of the accumulated position error between the lead (FI1) and the feedback (FI2) input signals. The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

—NOTES—

BLOCK SETUP

The blocks are used as a quick access to a group of Control Parameters whose values will need to be changed over the course of your system's operation. For example, the Blocks could be used to switch between speed setpoints and ratio setpoints. You can assign up to sixteen Control Parameters to the blocks. There are eight blocks that allow you to assign eight values to each of the sixteen Control Parameters. The blocks can be set up so that the active block (the block currently in use) can be selected through a switch.

Caution: To avoid damage to your system, the CX-1200 must be calibrated and the motor drive set up before you operate your system. Refer to *Drive Setup / Calibration: Calibration*.

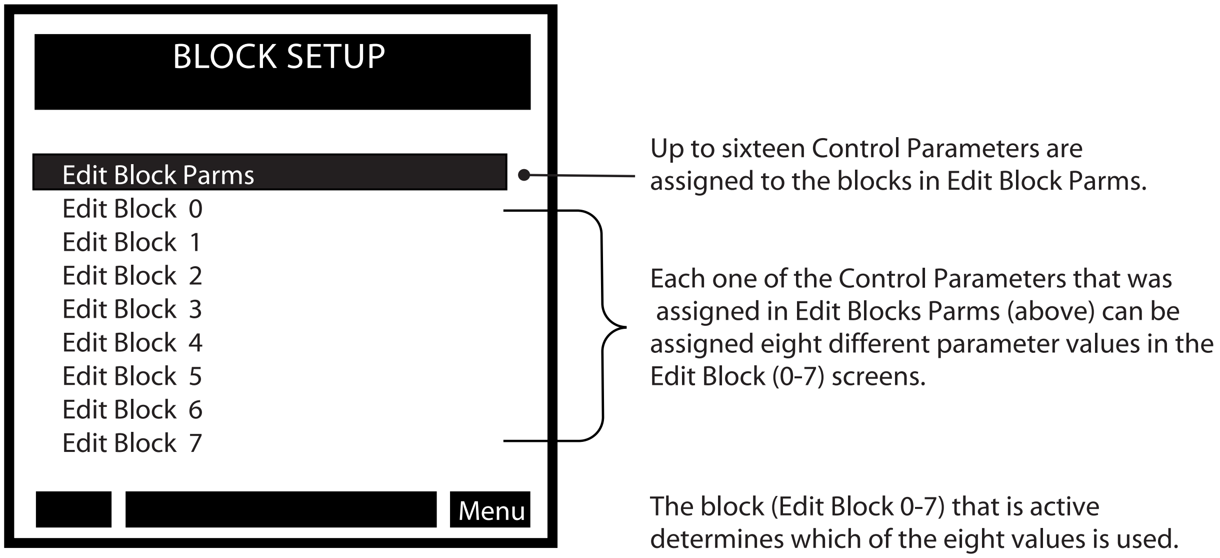
The Block Setup screens are:

- Edit Block Parms
- Edit Blk 0
- Edit Blk 1
- Edit Blk 2
- Edit Blk 3
- Edit Blk 4
- Edit Blk 5
- Edit Blk 6
- Edit Blk 7

—NOTES—

Block Setup

Use the blocks to assign eight different values to a single Control Parameter. Up to sixteen Control Parameters can each be assigned to each of the eight different blocks.



You can use either the PLC or the Keypad to change the active block.

To use the PLC to change the active block:
There are 3 PLC bits that are associated with the block selection: Block Select A, Block Select B and Block Select C. Make bits active by setting the bit equal to “1”. Select the active block in a binary (octal). The following table represents the PLC Bit logic:

BlkSel C	BlkSel B	BlkSel A	Active Block
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	0	0	4
1	0	1	5
1	1	0	6
1	1	1	7

To use the Keypad to change the active block:
Transfer control to the keypad by entering “2” (kypd) in Blk Sel Source (CP-478). To make a block active, enter the block's number in Keypad Blk Sel (CP-479). The active block is displayed in Active Block (MP-51).

DANGER
When you change the active block, the new values are loaded and can operate the system immediately. This can cause abrupt operation.

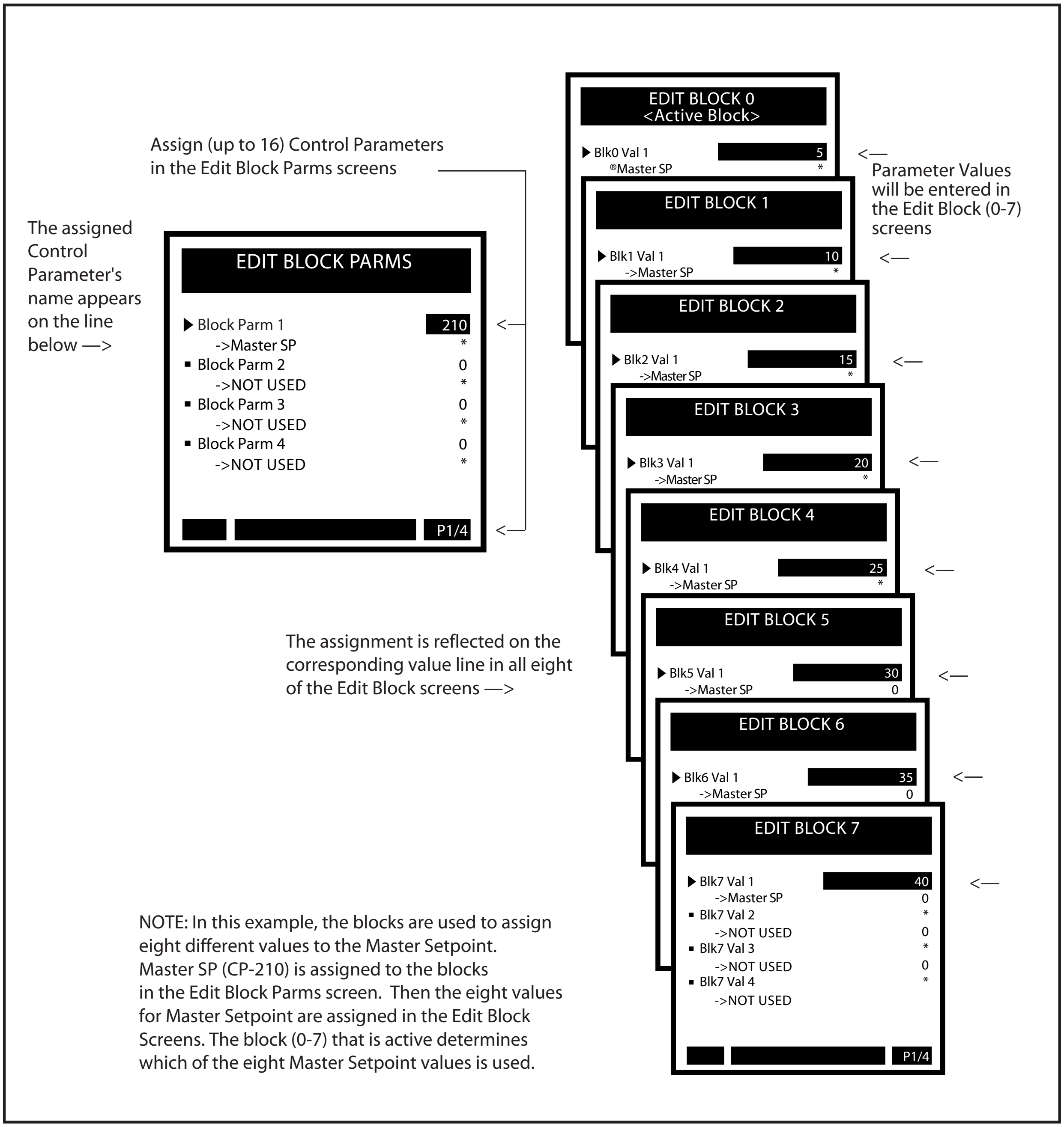
For more information on selecting and monitoring the active block, refer to *System Monitoring (MP) / System Monitor / Control Overrides*.

EDIT BLOCK PARMS

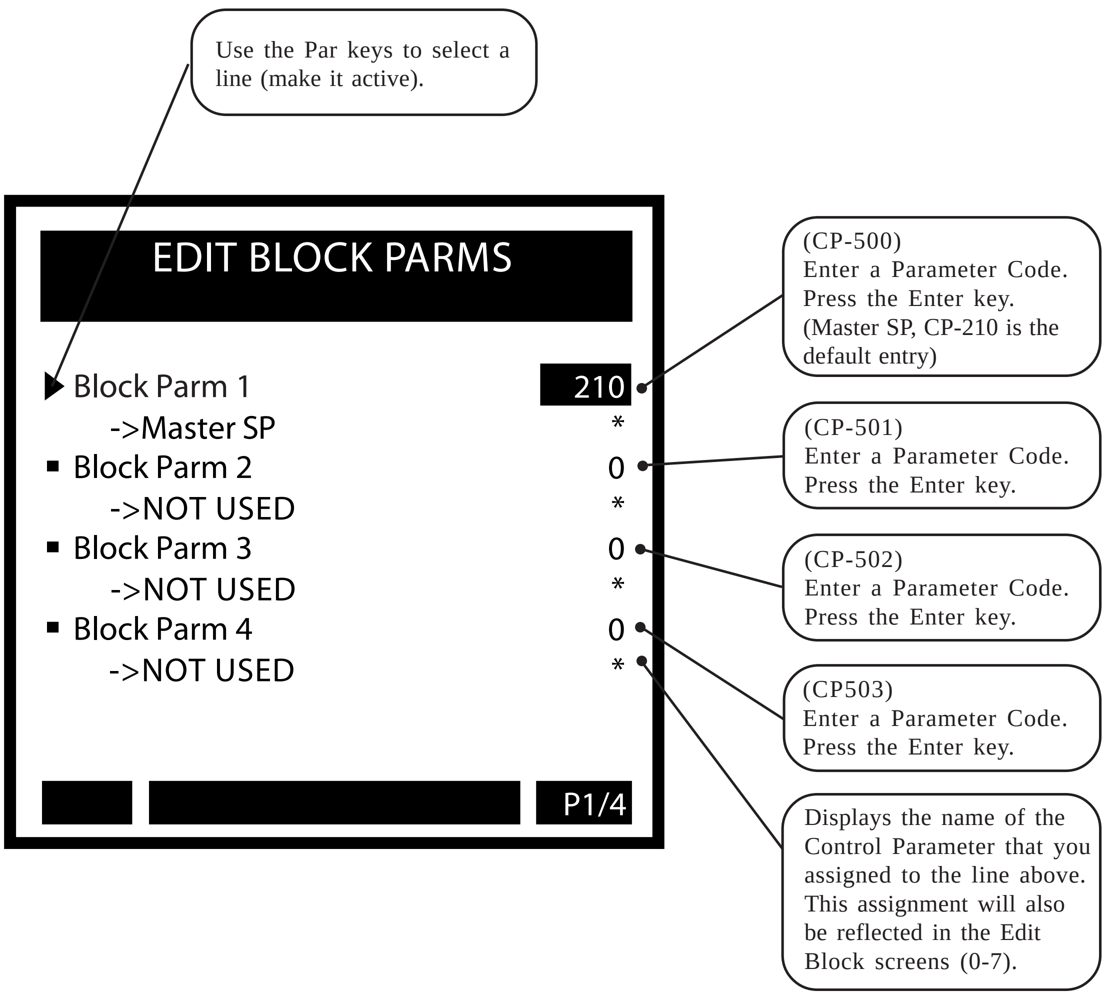
Block Parm 1 - Block Parm 16

The Edit Block Parms screens (pages 1-4) contain sixteen lines (Block Parm 1- 16) that allow you to assign sixteen Control Parameters to Block Parms 1 through Block Parms 16 (CP-500 to CP-515). In turn, these Control Parameter assignments are reflected in corresponding lines in the Edit Blocks (0-7) screens (where the Control Parameter values are selected). When you enter a Parameter Code for a specific Control Parameter in a Block Parameter line (Block Parm 1-16) , the parameter's name will appear immediately below that Block Parameter line. Enter a “0” in the Block Parameter line(s) that you do not want to assigned Control Parameter. The line immediately below will display “Not Used”. Master SP (CP-210) is the default Control Parameter that is assigned to Block Parm 1. You can not assign Monitor Parameters to Edit Block Params.

The graphic matrix below displays the interaction between the Edit Block Parms screens and the Edit Block 0-7 screens:



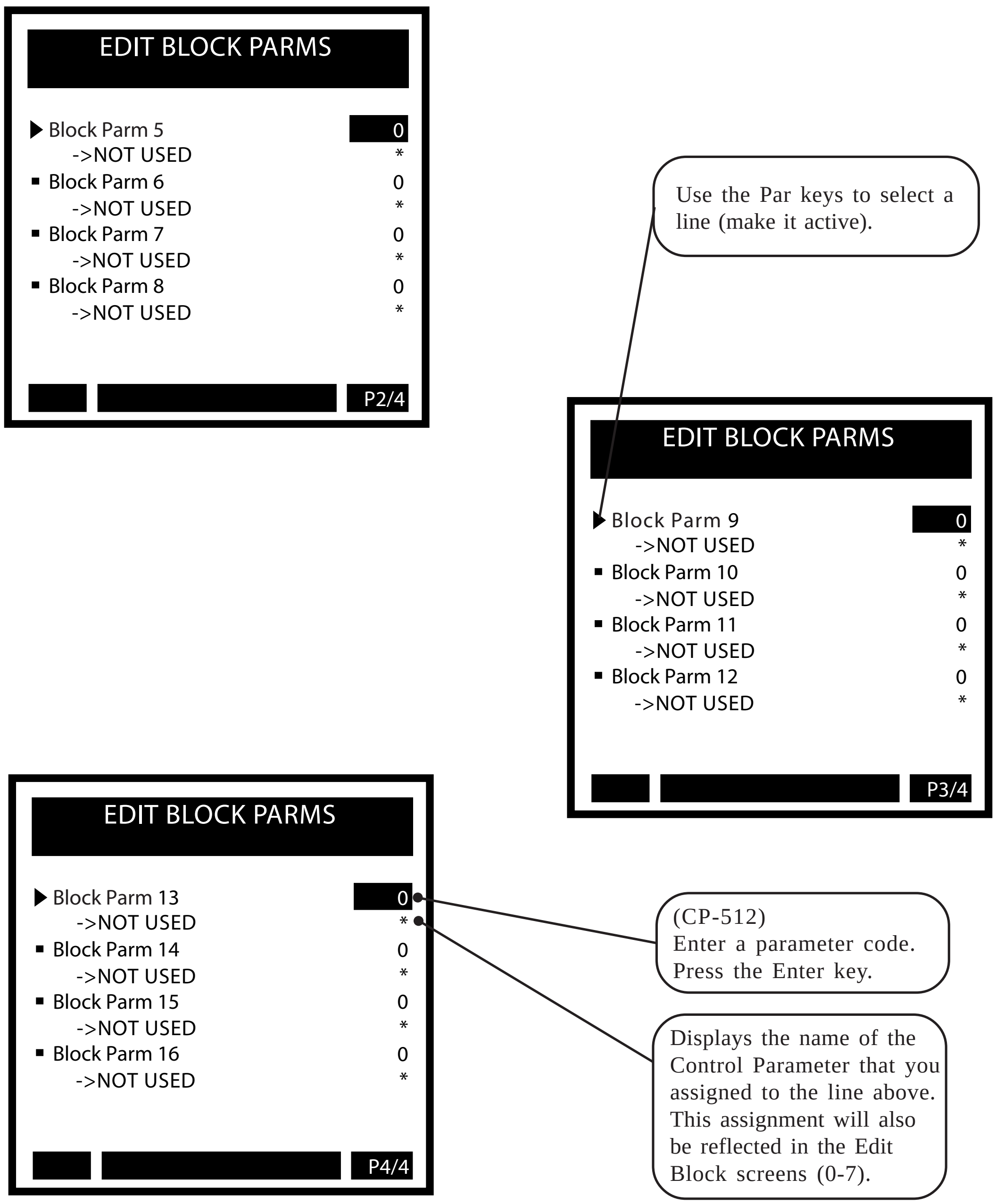
The Edit Block Parms screens are accessed through
—> Main Menu / Block Setup <—



Use the Page keys to scroll through pages 2 through 4 of the Edit Block Parms screens. These screens are similar to each other and to the page one screen that is displayed on the previous page. Enter Control Parameter codes in these screens, as noted below.

If you enter a Control Parameter code that is already in use, then the “Not Allowed“ messages will flash briefly in the error message bar. If you enter a code that does not exist, the “Not Used” designation (or Parameter Name if the line is in use) beneath the Block Parm line will change to “Not Defined”. However, if you enter a code that does not exist and the code number is higher than “350“, then the error message “Max Error” will flash briefly in the error message bar.

If you accidently enter too many digits for a code (e.g., 1022), the error message “Field Full” will flash briefly.

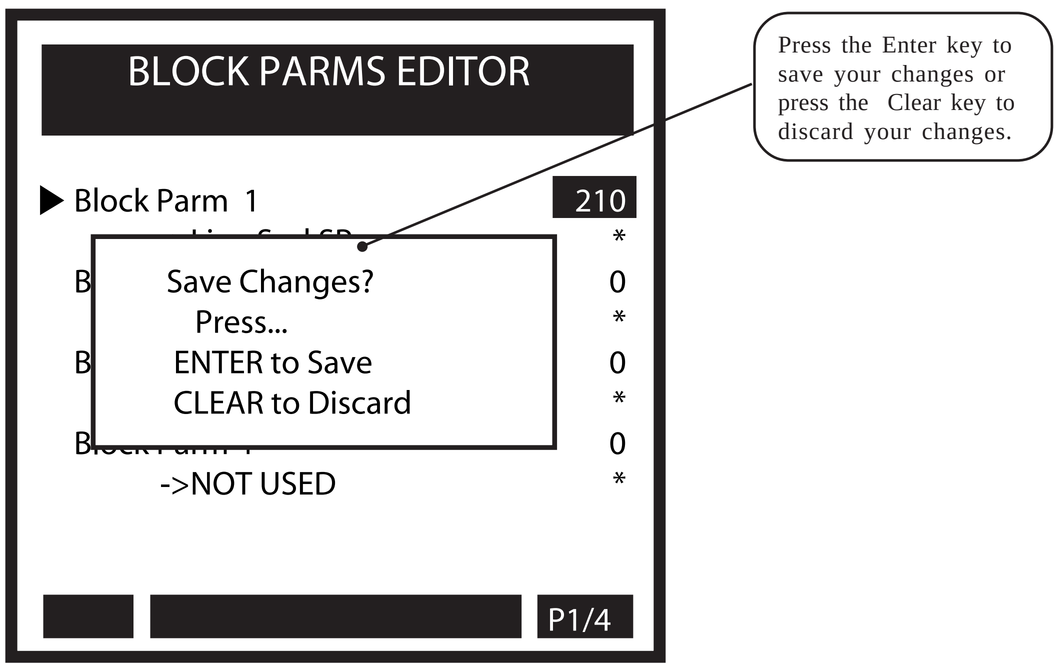


Edit Block Parms / Save

Press the Menu key from any of the Edit Block Parms screens to exit. If you have made changes in any of the screens, a dialog box will pop up and give you the opportunity to either save or to discard your changes.

If you have entered Control Parameters that can not be used in the blocks, then the code for each Control Parameter that can not be used are highlighted, one by one, and the error message “Invalid Parm” will flash five times in the error bar. Change all Control Parameter codes that are highlighted and exit Edit Block Parms again. You can not save changes unless all fo the“Invalid Parm” codes have been changed. Control Parameters that can be used are in the range of CP-202 through CP-206 and CP-209 through CP-249.

If you have entered a combination of 16 Control Parameters that create more internal variables than the CX-1200 can execute, then the error message“Parm Mem Lmt” will flash twice in the error bar. Any new Control Parameter codes that you entered will default back to “zero”. Although this scenario is rare, it can occur. Either use different Control Parameters or use fewer Control Parameters.



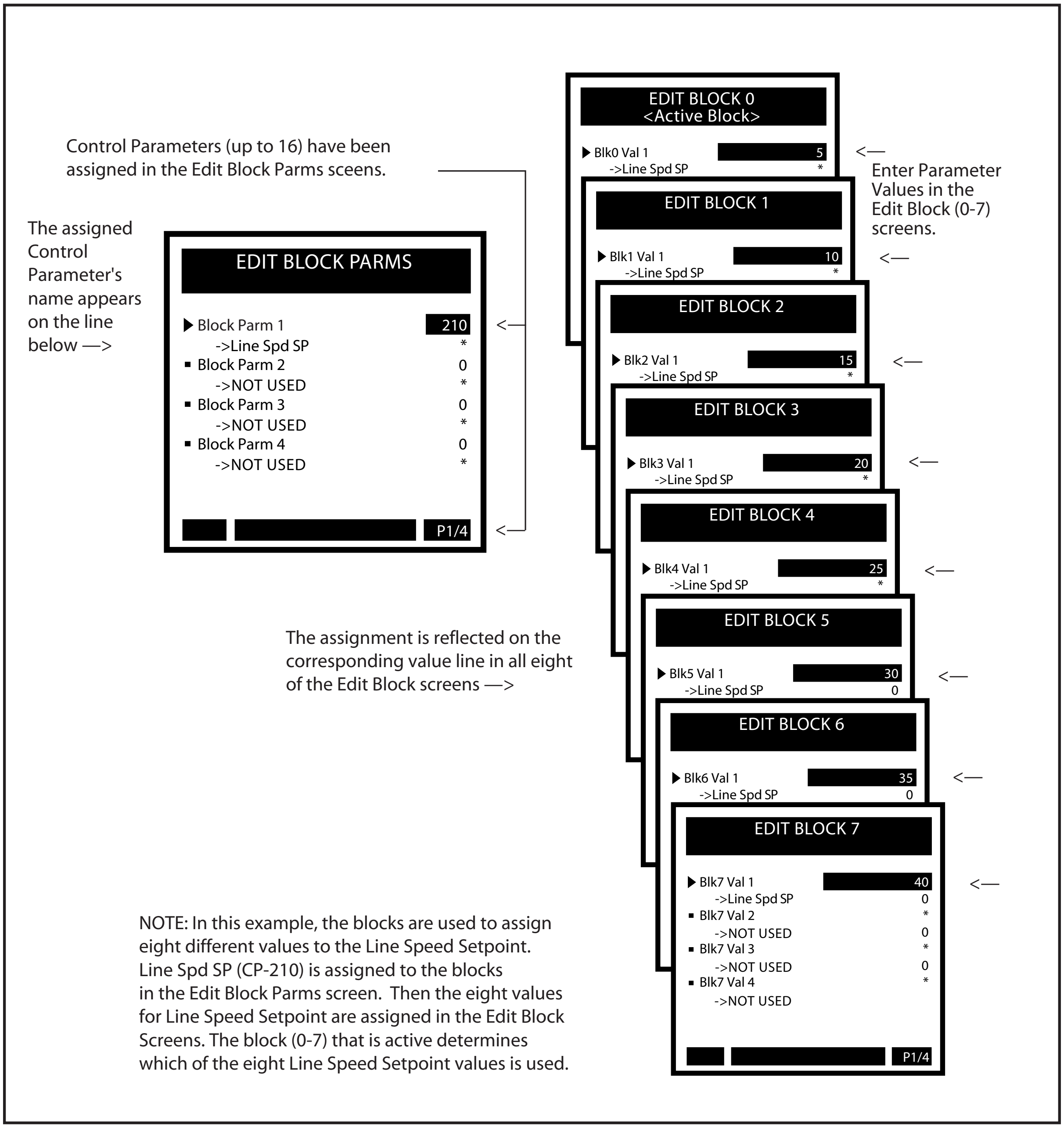
EDIT BLOCK 0 THROUGH 7

Blk0 Val 1 - Blk7 Val 16

Use the Block Values (CP-540 to CP-667) to assign Parameter Values to the Control Parameters that were designated by name in the Edit Block Parms screens (CP-500 to CP-515). Edit Blocks 0-7 allow you to assign up to eight different values to a single Control Parameter by entering a different Parameter Value in each of the Edit Block screens (0-7). The graphic matrix below displays the interaction between the Edit Block Parms screens and the Edit Block 0-7 screens.

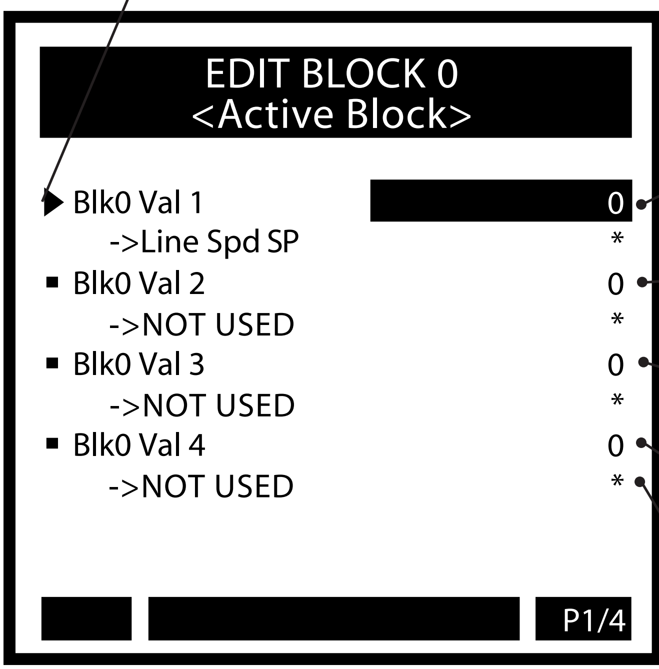
The block of Control Parameters and corresponding values that is in current use, is called the “active” block. The active block is selected in either the Keypad Block Select (CP-479) or in the PLC (in combination with the Digital inputs). The active block is monitored by Active Block (MP-51). For more information on selecting and monitoring the active block, refer to *System Monitoring (MP) / System Monitor / Control Overrides*.

The default setting in the Val 1 line for Blocks 0-7 (Page 1), is Master Setpoint. This line can be reassigned in the Edit Block Parms screens.



The Edit Block 0-7 screens are accessed through
—> Main Menu / Block Setup <—

Use the Par keys to select a line (make it active).



(CP-540)
Enter a parameter value.
Press the Enter key.

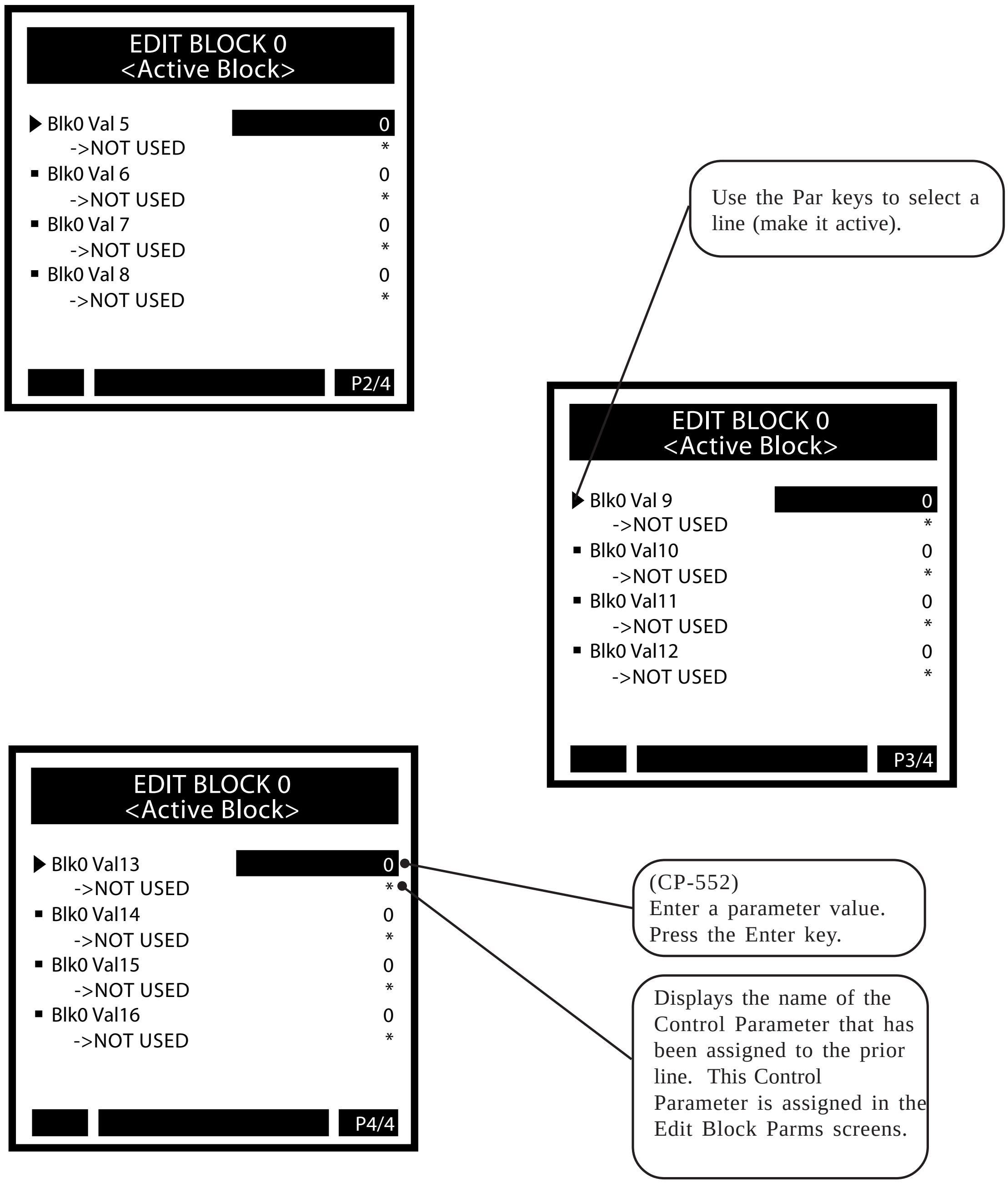
(CP-541)
Enter a parameter value.
Press the Enter key.

(CP-542)
Enter a parameter value.
Press the Enter key.

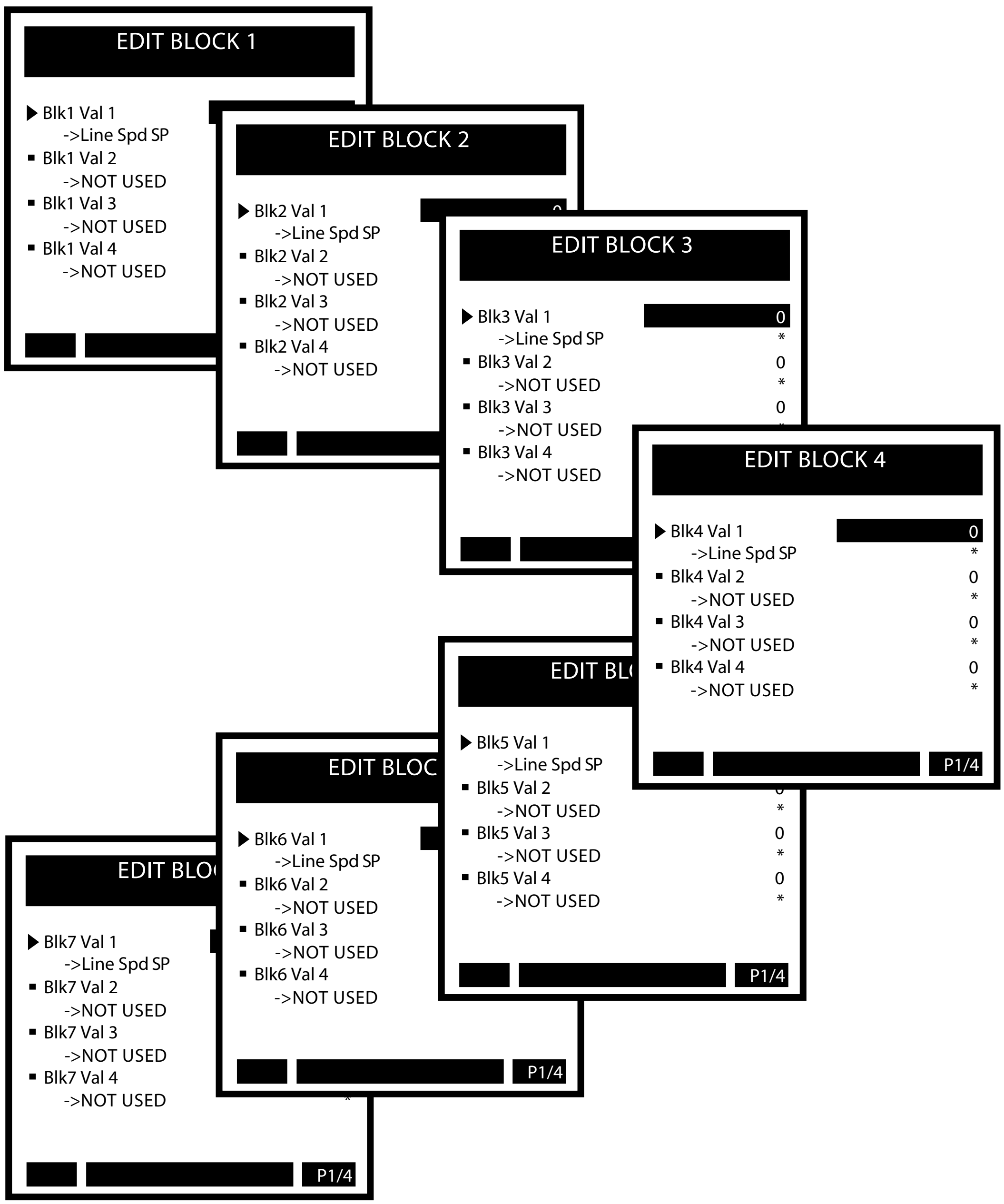
(CP-543)
Enter a parameter value.
Press the Enter key.

Displays the name of the Control Parameter that has been assigned to the prior line. This Control Parameter is assigned in the Edit Block Parms screens.

Use the Page keys to go scroll through pages 2 through 4 of the Block 0 Data Edit screens. The setup for these screens is identical to the page one screen that is displayed on the previous page. Enter the relevant information in these screens.



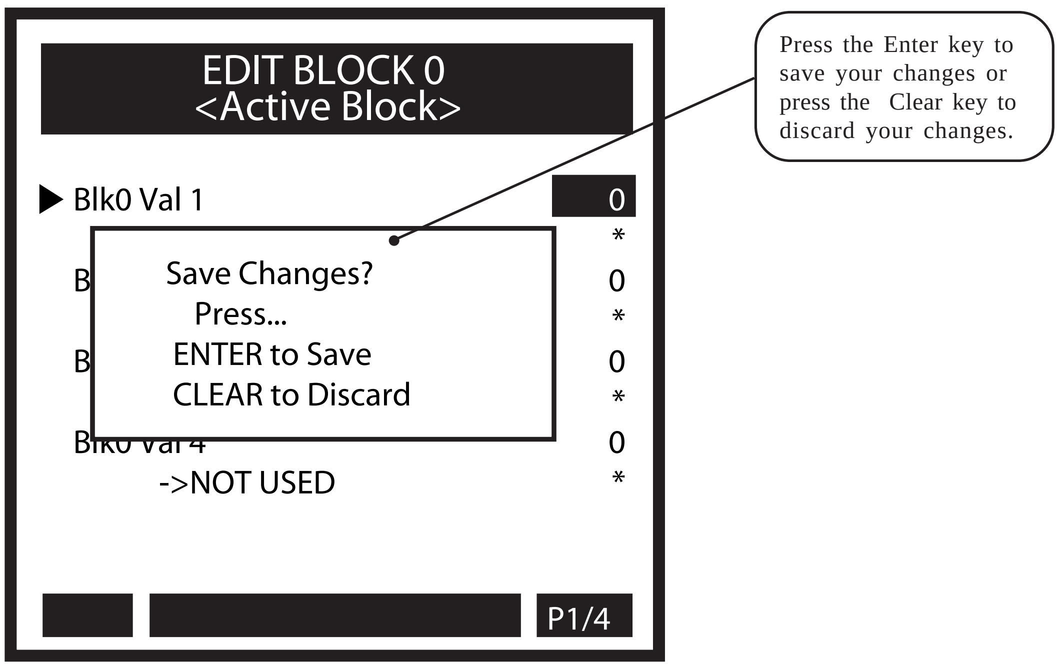
Use the Par keys to go scroll through the Block Setup menu and access the additional Edit Block screens (1-7). The set up for these screens is identical to the Block 0 Edit Block screens that are displayed on the previous pages. Enter the relevant Control Parameter values in these screens.



Edit Block / Save

Press the Menu key from any of the Edit Block screens to exit. If you have made changes in any of the screens (pages 1-4), a dialog box will popup and give you the opportunity to either save or to discard your changes.

NOTE: Once you have exited the Edit Block screen, if you change the value of a Control Parameter in any other screen (that is not a block screen) and that change can create problems with that Control Parameter when the block is put into use, then the error message “Invalid Blk” will flash briefly in the error message bar. Generally this scenario would only happen if a math error or an undefined operation were created in the block which houses the Control Parameter that changed. For example, If you change the value of a scaling parameter which is also used in a block and the affect that the change has on the block would create an overflow (e.g., a setpoint is too large in relationship to CP-208) then the block would become unusable or an “invalid block.”



PROGRAMMABLE LOGIC CONTROLLER (PLC)

This section discusses the setup procedures for the PLC (Programmable Logic Controller). The CX-1200 provides a basic PLC to compliment the motion control operation with I/O flexibility. The PLC allows you to redirect or redefine the eight digital outputs and eight (of the 16) digital inputs. You can also use the PLC to initiate a number of internal functions, or to test the state of status indicators. The PLC includes four timers, four event counters, four latches, and four numerical comparators. The alarms are generated by the PLC. The CX-1200 provides an editor for changing the PLC program without the need of a portable computer or proprietary pendant. The program is presented as a text-based list of commands (instructions) and operands (I/O, contacts, coils).

Caution: To avoid damage to your system, the CX-1200 must be calibrated and the motor drive set up before you operate your system. Refer to *Drive Setup / Calibration: Calibration*.

The PLC screens are:

- PLC Monitor
- PLC Timers
- PLC Event Counters
- PLC Position Counters
- PLC Data Copy
- PLC Digital I/O
- PLC Programming

—NOTES—

PLC

The PLC adds functionality to the CX-1200. There are default settings for the PLC, which are generally sufficient for most applications, and whose operations are transparent to the user. There are also PLC screens which allow the user additional access to the PLC in order to expand on the CX-1200's functionality. The PLC has a "scan time" of 2 milliseconds. The scan is divided into two parts:

- The state of the status indicators is determined (this includes the alarms and the results of the Custom alarms) and the PLC-dedicated digital inputs are captured.
- The PLC program is executed and the digital outputs are updated with the results.

Since there is only one copy of the PLC bit map in memory when the PLC program executes, it uses the most current state of the PLC bits. Therefore, if a rung changes the state of a PLC bit value, the new value is then used in subsequent rungs. Though this rule is not violated in the case of the latches, the state of the latches is not determined until after the PLC program has completed. This means that the set and reset PLC bits can change, but only their state at the end of the PLC program will determine the state of the Latch throughout the entire next scan. Likewise, the event counters are not incremented/decremented until after the PLC porgram is completed, and their associated outputs will not change state during the execution of the program.

The PLC program performs the logic on the PLC bits as dictated by the user-entered program. The state of these PLC bits is determined before hand via internal calculations. These bits are PLC bit 2 through PLC bit 99. These bits are consider status information that are set or reset based on their function, current data and the state (or change thereof) of other PLC bits. These bits should never be operands of an OUT command, and therefore the state of these 'status' bits should remain constant throughout the execution of the PLC program.

The scan is summarized as follows:

1. The digital output (from last scan) are output to the actual outputs, the digital inputs are captured as a group and saved for later use.

2. Status bits are setup - state, block select, RUN mode, loop type, event counter maintenance, alarms, compares, set/reset latches.

   The Timers are maintained (status bits set/reset if necessary). This ends the first 1 millisecond part of the scan.

3. The digital inputs (stamped at top of 2 millisecond boundary) are copied to PLC bits (while OR'ing in the DI Set (CP-403), and performing One-shot operation on the DI 1 Shot bits, (CP-402), set PLC Bit Set (CP-407) bit, reset PLC Bit Clear (CP-408) bit.

4. Execute the PLC program. This performs only the logic as given by the program. No functions called out by setting a bit to "1" in the execution of the program will get executed at this time. Counters are not incremented at this time, and therefore, the counter outputs remain unchanged during the execution. The state of the latches are not determined at this time.

5. The digital out PLC bits are saved, but not sent to the actual outputs at this time. The saved digital output data is output at the top of the next 2 millisecond boundary. This maintains a fixed time interval between the reading of the digital inputs and the writing of the digital outputs.

6. Misc. functions: Block Select A,B,C decoded to select current block, PLC bits FrzIngrl, OpenLoop, FrzRamp, Negate SR are OR'ed in with the Cntrl Latch (CP-340). The result will be used in the next Scaled and Ramped Reference determination, or Control Loop calculation.

   The Data Trace enable is maintained.

   The Timers are maintained (status bits set/reset if necessary). This ends the 2^{nd} 1 millisecond part of the scan.

The PLC mimics the operation of Relay Logic. In this context, the relay "Coils" can be either energized (ON) or inactive (OFF). Likewise, the relay contacts, whether "open" or "closed", assume only one of the two states at any given time. Therefore, relays are binary devices. The state of a coil or contact can be represented as a "1" (ON") or a "0" (OFF). This is the basis for the PLC; it treats everything as binary entities with each assigned a particular function and it realizes only one state at any given time. The virtual "contacts" and "coils" that are available to the PLC program are defined in the PLC bit map. The PLC bit map assigns the function of the contacts and coils to a bit (single binary digit) memory location. The PLC program has access to the PLC bit map to logically combine the "contacts" (status) bits to activate (or deactivate), a "coil" bit. For example; the Block Selection default program routes the Digital Inputs DI_8, DI_9 and DI_10 to the Blk Sel A, B, C PLC Bits (coils) respectively. Note that the Digital Inputs are active low - so a closed contact to common (which would be "0" voltage on the input) would produce a "1 " (true = active) in the corresponding Bit in the PLC bit map. Refer to the PLC Program Operands in *Appendices: Appendix L.*

The status bits can be based on a binary condition (e.g., the DrvEnable /PLC bit 51) or they can be based on the result of a comparison between two nonbinary numbers (e.g., the MaxFI1Hz /PLC Bit 49). The MaxFI1Hz bit (49) is set (active = normally-open contact closed) when the value of the Feedback signal is greater than the value that you entered into Max Fb Alm (CP-371). Most of the numerical comparisons that are associated with the PLC status bits involve one (or more) Control Parameters. Some of the Control Parameters are used to setup the PLC operation. In addition, there are Monitor Parameters to monitor the state of the PLC bits.

The PLC uses a stack-based environment for moving bit data and computing boolean expressions. Your PLC program must conform to this format. Each rung of your ladder-logic program would be programmed as a group of commands (along with their operands) starting with a "LOAD" (or "LD NOT") command and ending with an "OUT" command. The stack allows you to enter a complicated logical combination (rung) without having to separate it into smaller groups (rungs) with temporary coils.

These are the commands:

LOAD
LD NOT (Load Not)
AND
AND NOT
OR
OR NOT
XOR (Exclusive OR)
XOR NOT
NOT
OUT
<END>

There are three parts to the stack: the Result Register (R); a bit mapped location named “S0” (bit location “0”); and a bit mapped location named “S1” (bit location “1”). When the stack is lifted with the “LOAD” and “LOAD NOT” commands, the contents of “S0” is copied to “S1” (the contents of “S1” is overwritten) and the contents of the Result Register (R), is copied to “S0” and the contents of the operand (or the complement of) is copied to the Result Register, “R”. When the Stack is dropped as in the “AND 0”, the “OR 0”, the “AND NOT 0” and the “OR NOT 0” commands, then the contents of “S0” (or its complement) is “AND’ed” or “OR’ed” with the Result Register (R) and the result is left in (R). The contents of “S1” is copied to “S0” (the contents of “S0” is overwritten), and the contents of “S1” remains the same. The following example shows the stack before and after the “LOAD” and “AND 0” commands.

Location 08 (DI_8): 1

Before “LOAD 8 DI_8”:	After “LOAD 8 DI_8”:
S1: 0	S1: 1
S0: 1	S0: 0
R: 0	R: 1

Before “AND 0 S0”:	After “AND 0 S0”:
S1: 1	S1: 1
S0: 0	S0: 1
R: 1	R: 0

For commands other than “LOAD” and “LD NOT” with an operand other than “0” (S0), there is no stack movement. For example; the “AND 9 DI_9” results in an “AND”s of the contents of Bit Location 09 (DI_9) with the Result Register (R) and the result of the operation stays in the Result Register (R). There is no stack movement and “S0” and “S1” remain the same. The “LOAD” and “LD NOT ”commands always lift the stack. The stack drops only when the operand is “0” (S0) for the “AND”, “OR”, “XOR”, “AND NOT”, “OR NOT ” and “XOR NOT ” commands.

THE COMMANDS

1. LOAD
This starts a new Rung (group of commands). The stack is lifted and the contents of the operand bit is loaded into the Result Register (R).

2. LD NOT
Same as “LOAD” but the Result Register is complemented after the load. This is used for starting the rung with a normally-closed contact.

3. AND
The contents (the bit value) of the operand bit is AND’ed with the Result Register (R). The operand is unaffected. The result is retained in the Result Register. If the operand is “0” (i.e., the “S0” register), then the stack is dropped.

4. AND NOT
The complement of the operand bit is AND’ed with the Result Register (R). The operand is unaffected. The result is retained in the Result Register. If the operand is “0” (i.e., the "S0" register), then the stack is dropped. This is typically used to “AND” in a normally-closed contact.

5. OR
The contents (the bit value) of the operand bit is OR’ed with the Result Register (R). The operand is unaffected. The result is retained in the Result Register. If the operand is “0” (i.e., the "S0" register), then the stack is dropped.

6. OR NOT
The complement of the operand bit is OR’ed with the Result Register. The operand is unaffected. The result is retained in the Result Register. If the operand is “0” (i.e., the "S0" register), then the stack is dropped. This is typically used to “OR” in a normally-closed contact.

7. XOR
The contents (the bit value) of the operand bit is Exclusively OR’ed with the Result Register. The operand is unaffected. The result is retained in the Result Register. If the operand is “0” (i.e., the "S0" register), then the stack is dropped.

8. XOR NOT
The complement of the operand bit is Exclusively OR’ed with the Result Register. The operand is unaffected. The result is retained in the Result Register. If the operand is “0” (i.e., the "S0" register), then the stack is dropped. This is typically used to XOR in a normally-closed contact.

9. NOT
The contents of the Result Register is complemented. The operand is ignored but must be included in the program - use one of the temporary coil locations or the NOP Opnd (171). This is typically used to complement the result before an “OUT” command. This could be the case if the rung is controlling an active-high output.

10. NOP
This is a No Operation Command. The command is ignored by the compiler. This can be used to temporarily remove a command.

11. OUT
This copies the contents of the Result Register (R), into the operand location. This terminates the rung.

12. <End>
This ends the PLC program. It signals the compiler that there are no more valid commands to follow. Every program must be terminated with an “<END>”. The operand is ignored but it must be included in the program. Use the NOP Opnd (171).

The OPERANDS

The operands are divided into two main areas: the status bits (contacts); and the function bits (coils). The status bits range from bit 2 through bit 95. Do not use these bits as operands for the “OUT” command, as the results could be unpredictable. The function bits range from bit 100 to bit 219. These are used in conjunction with the “OUT” command to activate the indicated function. Activation of the indicated function occurs when the “OUT” command moves a “1” into the bit location (the Result Register contains a “1” just prior the “OUT” command). All of the bits that are not defined, are “Reserved” for future expansion. Refer to *Appendices: Appendix L* for a complete list of the PLC Program Operands.

Descriptions of the groups of operands and discussion of the associated Control Parameters follow:

Bit 0 is the top of the stack, S0 (first entry point).
Bit 1 is the bottom of the stack, S1, (lowest level).
Bit 2 is fixed at the value of 0.
Bit 3 is fixed at the value of 1.
Bit 4 is set to a 1 for the first PLC scan after power-up.

Bits 8 through 15 reflect the values captured on the Digital Inputs 8 through 15, respectively. DI Set (CP-403) can be used to set one or all of these bits even when the corresponding input is not active. This is typically used to test your program without having to actuate the input. DI 1 shot (CP-402) can be used to set one or more of the Inputs (DI_8 through DI_15) to automatically generate a one shot in the PLC bit location (bit 8-15) from an open to closed transition on the input.

Bits 16 through 19 are the output of the latches. This would be the equivalent of the normally-open contact of a latching relay.

Bits 24 through 27 are the outputs of the timers. The running time for each timer is compared against the Timer Delay and Timer On-time CP's (CP-410, CP-417) to determine if these output bits should be active (1).

Bits 28 and 29 are alarm conditions.

Bits 30 and 31 are basic status indicator bits.

Bits 32 through 36 are the outputs of the event counters. When the count for each counter reaches the Trigger Count (CP-420, CP-422, CP-424, CP-426, CP-428), the corresponding counter output will be active (1).

Bit 37 indicates that the AC voltage for the control is below specification.

Bits 40 through 42 reflect the value of RUN Mode (CP-202).

Bits 43 through 46 reflect the value of Sync Mode (CP-204).

Bit 49 is a basic status indicator bit.

Bits 50 through 57 are basic status indicator bits. Bit 50 (COSign) indicates the sign of the Control Output (CO_Sig). If CO Polarity is set to NEG (2), Bit 50 operates opposite of the actual voltage convention - if the voltage is negative, this is consider normal for CO Polarity set to NEG and the Bit 50 will be "0".

Bits 58 and 59 are alarm conditions.

Bits 60 through 63 indicate if the corresponding compare result is true (1) or not ("0").

Bits 65 is the Out of Position status.

Bits 66 through 69 reflect the sync pulse status.

Bit 70 has the value of one (1) for ½ second and zero (0) for ½ second continuously. This represents a one second square wave (1 Hz).

Bits 72 through 77 and 79 indicate the system operating state of the controller. Only one of these bits can be active at a time. These bits are monitor (status) bits only. Do Not use these bits as operands for the "OUT" command. You can not request a state change with these bits.

Bits 80 through 87 indicate the active block. Only one of these bits can be active at a time. These bits are for monitoring status only. Do not use these bits as operands for the "OUT" command. You can not request a new block with these bits. You can do this only through the Blk Sel A,B,C bits.

Bit 89 indicates a reverse direction command to the drive from the control. This bit may be used to assist in direction changes when using unipolar reversible drive.

Bits 100 through 107 are used to activate the Digital Outputs 0-7 respectively. The outputs are active low. Therefore, when the “OUT” command moves a 1 into one of these bits, the corresponding output will become active and pull the connected device to common, sinking current as dictated.

Bits 108 through 115 are used for temporary storage. They can be used to store the intermediate results of relatively complicated rungs. They could be referred to as virtual “Control Relays” and they can be used in the logic of several rungs

Bits 116 through 123 are used to set and reset the latches.

Bits 124 through 127 are used to enable the timers.

Bit 128 is used to reset Timer 4 since it retains its state when the Tmr4 En bit (PLC bit 127) is “0”.

Bits 130 through 133 are used to increment the corresponding counters. Bit 134 is used to decrement the Counter 4 count. The count is incremented on the transition from a “0” to a 1 in the increment or decrement bit.

Bits 135 through 137 are used to reset the corresponding counters. These are level activated; as long as the reset bit remains active (1), the count will remain at “0”

Bit 138 is used to preset the Counter 4 count to the Cntr4 Preset value (CP-429). This is also a level activated function - as long as the reset bit is active, the count will remain at the preset value for Counter 4 even if transitions occur on the increment (or decrement) bits.

Bits 140 through 142 are used to select the active block. This is accomplished in a binary (octal) fashion.

The following table represents the logic:

PLC Bit 142 BlkSel C	PLC Bit 141 BlkSel B	PLC Bit 140 BlkSel A	Active Block
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	0	0	4
1	0	1	5
1	1	0	6
1	1	1	7

Bit 148 is used to reset the integral term of the PID.

Bit 149 is used to control some control loop and ramp operations.

Bit 151 is used to may be used to disable Large Error Recovery.

Bits 152 through 154 are used to reset the position counters and the error. The error is the critical value that drives the zero-error and the position control loops. The counters are preset with the FI1PsnPrst and FI2PsnPrst values when the corresponding bits are active (level).

Bits 157 through 158 are used to control some control loop and ramp operations.

Bit 159 is used to negate the Scaled Reference signal. The Negate SR bit is used to reverse the direction of the commanded speed, the Scaled Reference.

Bits 160 and 161 may be used to initiate a “Data Copy” operation where a value is transferred from one parameter to another. See the definitions of CP’s 396 thru 399.

Bit 164 is used to negate the Control Ouput (CO_Sig) signal. The Negate CO bit is ignored when operating in Unipolar mode. You can not reverse the polarity of the output in this case.

Bit 167 may be used to start the "Data Trace" data collection. Refer to the section in Serial Communications Binary protocol for further information regarding the "Data Trace."

Bits 168 and 169 are used as the "Remote" scroll up and scroll down controls. The parameter that will be incremented or decremented is selected by Remote Scroll (CP-400). The Rmt Scroll Rate (CP-401) determines the rate at which the select parameter is incremented or decremented when the corresponding bit is active.

Bits 172 and 173 may be used to disable the Lead or Follower Sync.

Bit 174 may be used to initiate a Re-Learn process in one of the sync follower modes. For any other mode of operation, the Re-Learn bit will cause the position information to be reset to zero and the job space information to be reset to the maximum job space until the CX-1200 Re-Learns the job space information.

Bit 180 may be used to request a change in system state (MP-50 State) to F-Stop state. This is separate from but may be used in addition to the dedicated F-Stop input.

Bit 187 may be used to put the CX-1200 control loop into open loop.

Bit 200 is used to indicate when the CX-1200 is in "open loop" control. When in "open loop" the bit will be set to one (1).

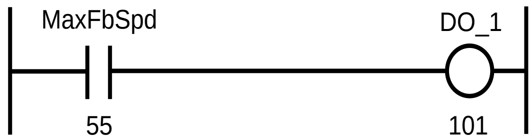
Bits 201 through 203 indicate the operating control loop of the CX-1200. Only one of these bits can be active at a time. These bits are monitor (status) bits only. Do Not use these bits as operands for the "OUT" command. You can not request a state change with these bits.

PROGRAMMING   EXAMPLES

The Basic Rung - Moving Bit Data

Since the PLC is based on bit data, a bit value is moved from one location to another. The most basic rung (a normally open contact energizing a coil) is implemented in the PLC program by moving bit data.

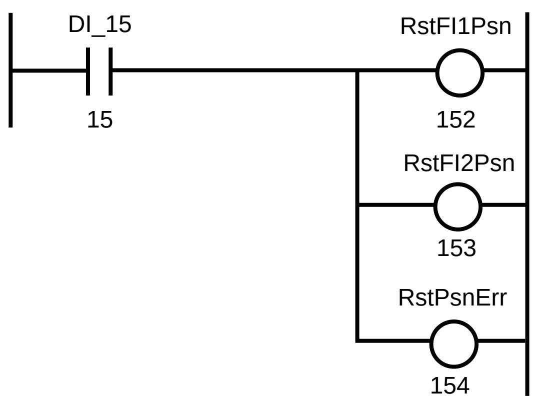
```
LOAD    55     MaxFbSpd
OUT     101    DO_1
```



The value of MaxFbSpd bit (contact) is loaded into the Result Register (R) with the “LOAD 55 MaxFbSpd” command and copied to the Digital Output DO_1 bit location (coil) with the “OUT” command. When the MaxFbSpd bit is set (1), the DO_1 bit will get set also. As a result, the actual DO_1 pin will be active - pulled low to sink current and possibly energize an external-relay coil. All rungs (groups of commands) must start with a “LOAD” or “LD NOT” command and end with an “OUT” command. “LD NOT” starts the rung with a normally-closed contact.

Since the “OUT” command does not change the value of the Result Register (R), you can move the result of a rung to more than one Bit location without starting a new rung.

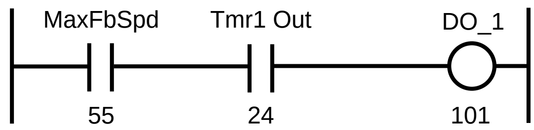
```
LOAD    15     DI_15
OUT     152    RstFl1Psn
OUT     153    RstFl2Psn
OUT     154    RstPsnErr
```



Series and Parallel Contacts - Operating on Bit Data

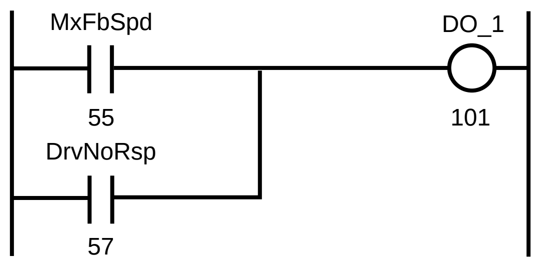
Often it is necessary to combine the state of more than one PLC bit (contact) to determine if another bit (coil) should be energized. The series connection of two contacts represents the “ANDing” of the states; both contacts need to be closed in order for energy to flow. The “AND” command is used to “AND” two PLC bits (contacts) together. The following example shows how to program a simple series connected rung.

LOAD	55	MaxFbSpd
AND	24	Tmr1 Out
OUT	101	DO_1



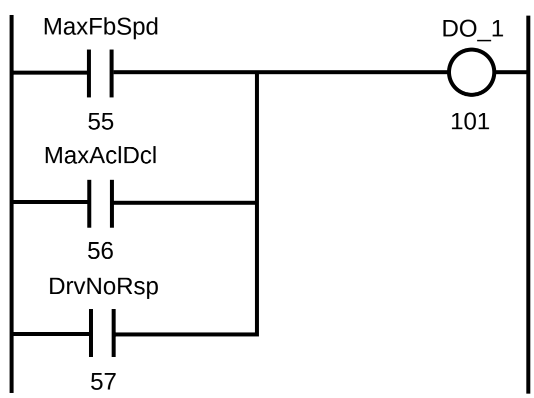
Similarly, the “OR” command is used to “OR” two PLC bits (contacts) together. This implements the ladder logic of parallel connected contacts as the following example illustrates.

LOAD	55	MxFbSpd
OR	57	DrvNoRsp
OUT	101	DO_1



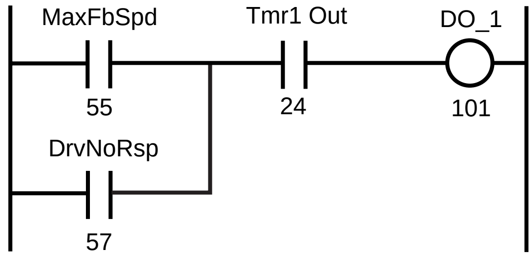
This can be expanded to include more bits.

LOAD	55	MaxFbSpd
OR	56	MaxAclDcl
OR	57	DrvNoRsp
OUT	101	DO_1

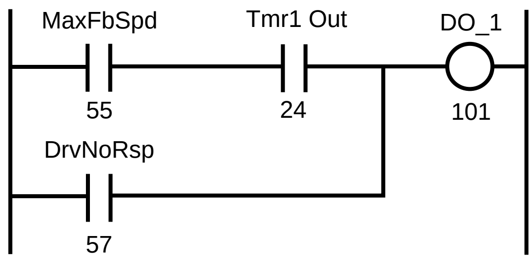


You can combine “AND’s” and “OR’s” to implement both the series and parallel connections.

```
LOAD    55    MaxFbSpd
OR      57    DrvNoRsp
AND     24    Tmr1 Out
OUT    101    DO_1
```




```
LOAD    55    MaxFbSpd
AND     24    Tmr1 Out
OR      57    DrvNoRsp
OUT    101    DO_1
```



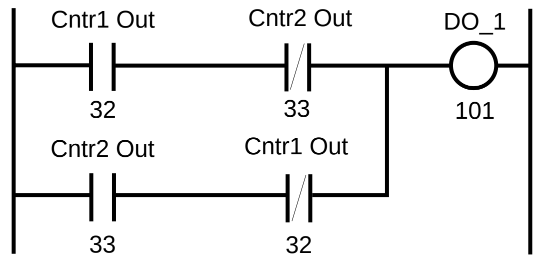
The order of the program commands effect the outcome. The result of each command is placed in the Result Register (R), which is then used in the next operation.

The exclusive “OR” command (“XOR”, “XOR NOT”) can be used to act on one of two true conditions, but not if both are true at the same time. The truth table for the “XOR” and “XOR NOT” is given by (1 = true):

R	Operand	XOR	XOR NOT
0	0	0	1
0	1	1	0
1	0	1	0
1	1	0	1

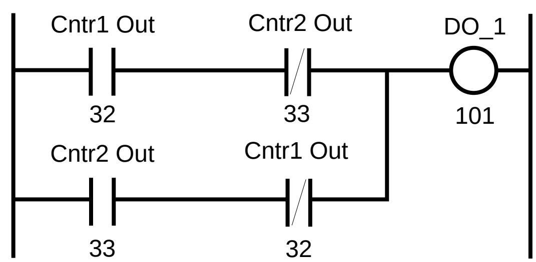
The following example implements an exclusive “OR” between Cntr1 Out and Cntr2 Out using ladder logic. The program commands use standard “AND” and “OR” logic.

LOAD	32	Cntr1 Out
AND NOT	33	Cntr2 Out
LOAD	33	Cntr2 Out
AND NOT	32	Cntr1 Out
OR	0	S0
OUT	101	DO_1



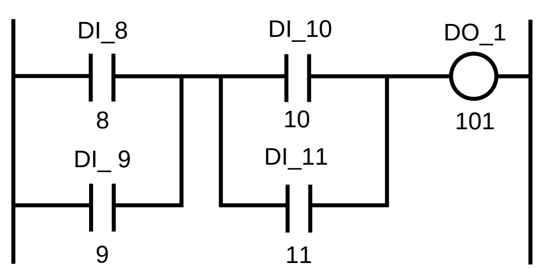
This programming can be greatly simplified with the “XOR” command as follows.

LOAD	32	Cntr1 Out
XOR	33	Cntr2 Out
OUT	101	DO_1



The “AND/OR” programming of the exclusive “OR” function above illustrates more complicated logic than we have seen thus far. It involves not only the use of normally-closed contacts, but the use of a second “LOAD” command to start the second branch, or sub-rung. If you understand the stack movement, the programming should seem quite obvious. Consider the following example:

LOAD	8	DI_8
OR	9	DI_9
LOAD	10	DI_10
OR	11	DI_11
AND	0	S0
OUT	101	DO_1



Assume the values of the Digital Input Bits DI_8, 9, 10, 11 are 1,0,0,0 respectively. The "S1" and "S0" Bits are "0" to start. The Result Register is also "0" to start.
The stack movement proceeds as follows:

Before "LOAD 8 DI_8":

S1: 0
S0: 0
R: 0

After "LOAD 8 DI_8" (stack is lifted)

S1: 0
S0: 0
R: 1

After "OR 9 DI_9":

S1: 0
S0: 0
R: 1

After "LOAD 10 DI_10" (stack is lifted):

S1: 0
S0: 1
R: 0

After "OR 11 DI_11":

S1: 0
S0: 1
R: 0

After "AND 0 S0" (stack falls):

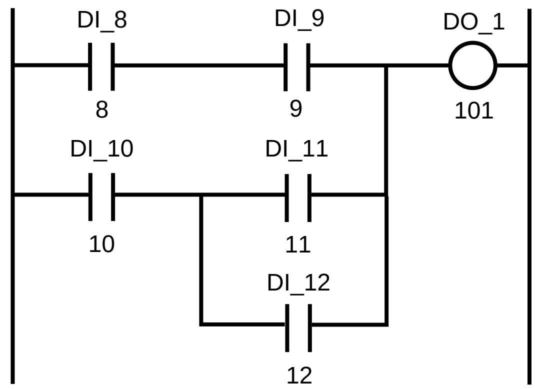
S1: 0
S0: 0
R: 0

After "OUT 101 D0_1":

S1: 0
S0: 0
R: 0

Another example:

LOAD	8	DI_8
AND	9	DI_9
LOAD	10	DI_10
LOAD	11	DI_11
OR	12	DI_12
AND	0	S0
OR	0	S0
OUT	101	DO_1



Assume DI_8,9,10,11,12 have values of 1,1,0,1,1

Before "LOAD 8 DI_8":
S1: 0
S0: 0
R: 0

After "LOAD 8 DI_8" (stack is lifted)
S1: 0
S0: 0
R: 1

After "AND   9 DI_9":
S1: 0
S0: 0
R: 1

After "LOAD 10 DI_10" (stack is lifted):
S1: 0
S0: 1
R: 0

After "LOAD 11 DI_11" (stack is lifted):
S1: 1
S0: 0
R: 1

After "OR   12 DI_12":
S1: 1
S0: 0
R: 1

After “AND 0 S0” (stack falls):

S1: 1 (S1 remains the same after the shift down)
S0: 1
R: 0

After “OR 0 S0” (stack falls):

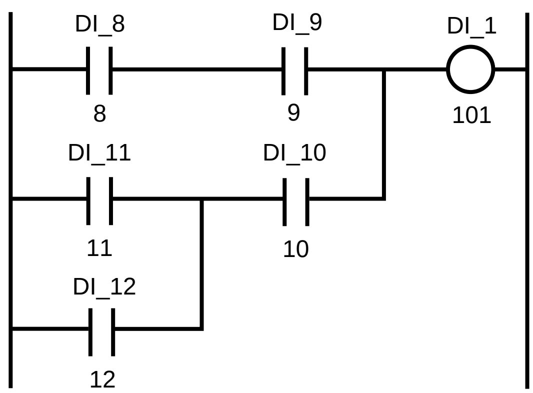
S1: 1
S0: 1
R: 1

After “OUT 101 D0_1”:

S1: 1
S0: 1
R: 1

The ladder diagram can be constructed differently to simplify the programming.

LOAD	8	DI_8
AND	9	DI_9
LOAD	11	DI_11
OR	12	DI_12
AND	10	DI_10
OR	0	S0
OUT	101	DO_1



In fact, most rungs can be simplified to require only one additional “LOAD” (other than the opening “LOAD”) and one operation with the “S0” register (i.e., the “S1” register would not be needed).

<u>The Latches</u>

There are four latches that are available with the PLC. Each has two inputs and one output. The output reflects the state of the latch, either “1” (ON) or “0” (Off). When the set input is “1” (true), the state of the latch (the output) will be “1” (On). When the reset input is “1” (true), then the state of the Latch will be “O” (Off). The set and reset inputs need only be true for one scan. The latch will retain its state (while the power is “On”) until the opposite input becomes true. If both inputs are “1” (true) at the same time, the state of the latch will be “0” (Off).

The set inputs (act as coils) are labelled:

Lch1 Set (PLC Bit 116)
Lch2 Set (PLC Bit 117)
Lch3 Set (PLC Bit 118)
Lch4 Set (PLC Bit 119)

The reset inputs (act as coils) are labelled:

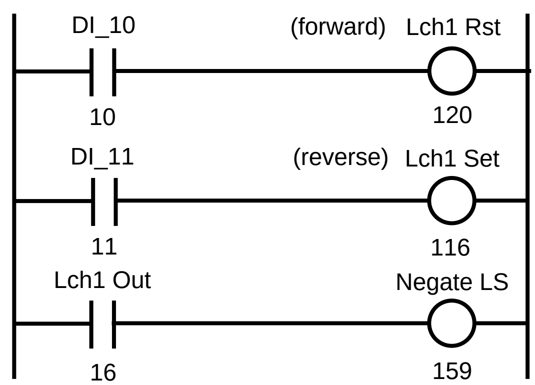
Lch1 Rst (PLC Bit 120)
Lch2 Rst (PLC Bit 121)
Lch3 Rst (PLC Bit 122)
Lch4 Rst (PLC Bit 123)

The outputs (used as contacts or status) are labelled:

Lch1 Out (PLC Bit 16)
Lch2 Out (PLC Bit 17)
Lch3 Out (PLC Bit 18)
Lch4 Out (PLC Bit 19)

A latch can be used to reverse the direction of motion with two sensors, one for forward, one for reverse. The sensors will only be active temporarily, so the latch retains the state until the opposite sensor is reached. The forward sensor is connected to DI_10, the reverse input to DI_11.

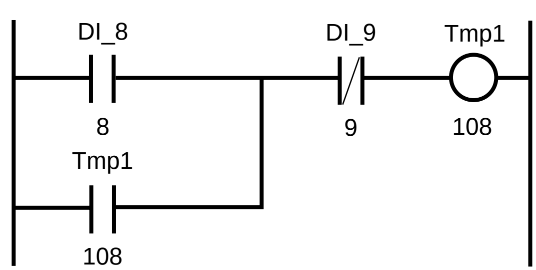
```
LOAD     10    DI_10
OUT     120    Lch1 Rst

LOAD     11    D_11
OUT     116    Lch1 Set

LOAD     16    Lch1 Out
OUT     159    Negate LS
```



The Latch set and reset rungs should be placed next to each other. The output of the Latch is set at the conclusion of the scan.

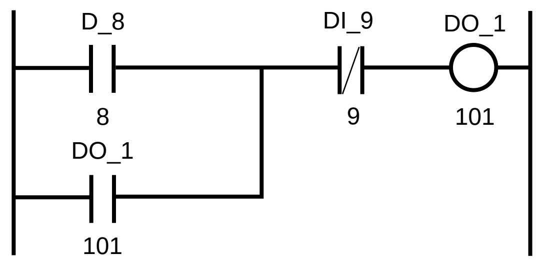
You can create your own custom latch using standard PLC logic.

```
LOAD        8    DI_8
OR        108    Tmp1
AND NOT     9    DI_9
OUT       108    Tmp1
```



Here DI_8 serves as the set input and DI_9 serves as the reset input. Tmp1 retains the state of the latch. If the Latch Output is used as a digital output, you can use the digital output PLC bit directly (DO_0 through DO_7, Bits 100-107) as the latch state.   The state of this latch is determined in the sequence of the PLC program .

```
LOAD        8    DI_8
OR        101    DO_1
AND NOT     9    DI_9
OUT       101    DO_1
```



—NOTES—

PLC MONITOR

Use the PLC Monitor screens to monitor the state of all the PLC operands. Pages 2, 3 and 4 of the screens display the PLC bits in sequential order. Press the “help” key on each line to view the names for each bit. The Help screen will highlight the bits that are active.

Page 1 of the PLC Monitor screens displays the parameters that select the PLC bits and monitor the PLC. Use the Control Parameters Bit ; PLC Monitor 1 (CP-405) and PLC Monitor 2 (CP-406) to select a bit. The name and value of the bit that you choose is displayed in the corresponding Monitor Parameters ; PLC Mon 1 Val (MP-108) and PLC Mon 2 Val (MP-109). The default names for these Monitor Parameters (PLC Mon 1 Val and PLC Mon 2 Val) are replaced by the name and value of the PLC Bits selected in PLC Monitor 1 (CP-405) and PLC Monitor 2 (CP-406). You can also use the Code key when you are in any parameter screen to display the PLC Bit names and values of PLC Mon 1 Val (MP-108) or PLC Mon 2 Val (MP-109). You can also customize the Status screen to display them.

DI Set (CP-403) simulates an active low condition on one of the digital inputs, DI_8 through DI_15, without having to physically short the input connector to common. Enter a number with a “1” in the bit location corresponding to the digital input you want to force active. The action will be reflected in PLC 15-8 (MP-110), which displays the bit values for the digital inputs DI_8 through DI_15.

PLC Bit Set (CP-407) and PLC Bit Clear (CP-408) allow you to force a PLC Bit “On” (1) or “Off” (0). You can set (or clear) one of the status bits (contacts), PLC Bits 8-95, but you can not control a PLC Bit (coil) that is controlled by the PLC program (with the “OUT” command). Enter the number of the PLC Bit that you want to set (1) into PLC Bit Set (CP-407) and the number that you want to clear (0) into PLC Bit Clear (CP-408). When you are done testing, enter a “0” into PLC Bit Set (CP-407) and PLC Bit Clear (CP-408) . They will automatically default back to PLC Bits 3 (One) and 2 (Zero), respectively.

PLC MONITOR P1/4

PLC Monitor 1

PLC Monitor 1 (CP-405) determines which PLC bit will be monitored in PLC Mon 1 Val (MP-108). The PLC Mon 1 Val (MP-108) displays the name of the bit rather than "PLC Mon 1 Val". To select a PLC bit to monitor, enter the number of the bit or by use the 'Scroll' keys (^ or v) to scroll through the list. This bit can be monitored in any screen when the code select line set to PLC Mon 1 Val (MP-108). For the bit list, refer to *Appendices: Appendix L.*

PLC Mon 1 Val

PLC Monitor 1 Value (MP-108) displays both the description and the value of the PLC bit that was selected in PLC Monitor 1 (CP-405). Please note that a description of the PLC bit appears on the display line instead of the parameter name (PLC Mon 1 Val).

PLC Monitor 2

PLC Monitor 2 (CP-406) functions identically to PLC Monitor 1 (CP-405). See above.

PLC Mon 2 Val

PLC Monitor 2 Value (MP-109) functions identically to PLC Monitor 1 Value (MP-108). See above.

DI Set

Digital Input Set (CP-403) simulates an "ACTIVE" condition on any or all of the PLC dedicated Digital Inputs (DI 15..8). Digital Input Set (CP-403) is logically OR'ed with the actual DI 15..8 (MP-101) bits to form the PLC 15-8 (MP-110) bits. The PLC 15-8 (MP-110) bits are used by the PLC logic. The value of DI Set (CP-403) will not effect the actual DI 15..8 (MP-101) value, rather, DI 15..8 (MP-101) reflects the present status of the actual inputs. Enter a "1" in a bit location to simulate an active condition on the corresponding input. DI 15 to DI 8 get mapped into Bit 7 to Bit 0. Page two of the "Help" screen displays inputs 15..8. Refer to *Appendices: Appendic C.*

PLC 15-8

PLC 15-8 (MP-110) displays the status of PLC bits 15-8. A "1" in any bit indicates that the input is "active". The digital inputs are active low. Page one of the "Help" screen displays the bit map for PLC 15-8. Also refer to *Appendices: Appendic C.*

PLC Bit Set

PLC Bit Set (CP-407) forces a PLC bit to be set at "1". Enter the number of the bit that you want to set at "1". PLC Bit Set (CP-407) tests your PLC program rather than commanding a direct operation. The bit is set prior to the PLC program execution but after all the inputs, comparisons, timers and counters have had their status bits set up. However, the PLC could clear this bit and unpredictable results can occur. Do not attempt to set a PLC bit that is controlled by an OUT instruction in the PLC program. If you need to force an output, use DIG I/O TEST in the diagnostics screen. For the bit list, refer to *Appendices: Appendix L.*

PLC Bit Clear

PLC Bit Clear (CP-408) forces a PLC bit to be reset to "0". Enter the number of the bit that you want to clear. PLC Bit Clear (CP-408) tests your PLC rather than to commanding a direct operation. The bit is cleared prior to the PLC program execution but after all the inputs, comparisons, timers and counters have set up their status bits. However, the PLC could set this bit and unpredictable results can occur. Do not attempt to clear set a PLC bit that is controlled by an OUT instruction in the PLC program. If you need to force an output, use DIG I/O TEST in the diagnostics screen. For the bit list, refer to *Appendices: Appendix L.*

PLC MONITOR P2/4

PLC 23-16

PLC 23-16 (MP-111) displays the status of the internal PLC status bits 23-16. A "1" in any bit indicates that the bit is "active". Page one of the "Help" screen displays the bit map for PLC 23-16. Also refer to *Appendices: Appendic C*.

PLC 31-24

PLC 31-24 (MP-112) displays the status of the internal PLC status bits 31-24. A "1" in any bit indicates that the bit is "active". Page one of the "Help" screen displays the bit map for PLC 31-24. Also refer to *Appendices: Appendic C*.

PLC 39-32

PLC 39-32 (MP-113) displays the status of the internal PLC status bits 39-32. A "1" in any bit indicates that the bit is "active". Page one of the "Help" screen displays the bit map for PLC 39-32. Also refer to *Appendices: Appendic C*.

PLC 47-40

PLC 47-40 (MP-114) displays the status of the internal PLC status bits 47-40. A "1" in any bit indicates that the bit is "active". Page one of the "Help" screen displays the bit map for PLC 47-40. Also refer to *Appendices: Appendic C*.

PLC 55-48

PLC 55-48 (MP-115) displays the status of the internal PLC status bits 55-48. A "1" in any bit indicates that the bit is "active". Page one of the "Help" screen displays the bit map for PLC 55-48. Also refer to *Appendices: Appendic C*.

PLC 63-56

PLC 63-56 (MP-116) displays the status of the internal PLC status bits 63-56. A "1" in any bit indicates that the bit is "active". Page one of the "Help" screen displays the bit map for PLC 63-56. Also refer to *Appendices: Appendic C*.

PLC 71-64

PLC 71-64 (MP-117) displays the status of the internal PLC status bits 71-64. A "1" in any bit indicates that the bit is "active". Page one of the "Help" screen displays the bit map for PLC 71-64. Also refer to *Appendices: Appendic C*.

PLC 79-72

PLC 79-72 (MP-118) displays the status of the internal PLC status bits 79-72. A "1" in any bit indicates that the bit is "active". These bits are only used to monitor the operating state of the CX-1102. Page one of the "Help" screen displays the bit map for PLC 79-72. Also refer to *Appendices: Appendic C*

PLC 87-80

PLC 87-80 (MP-119) displays the status of the internal PLC status bits 87-80. A "1" in any bit indicates that the bit is "active". These bits are only used to monitor the parameter block that is active. Page one of the "Help" screen displays the bit map for PLC 87-80. Also refer to *Appendices: Appendic C*.

PLC 95-88

PLC 95-88 (MP-120) displays the status of the internal PLC status bits 95-88. A "1" in any bit indicates that the bit is "active". Page one of the "Help" screen displays the bit map for PLC 95-88. Also refer to *Appendices: Appendic C*.

PLC MONITOR   P3/4

PLC 107-100

PLC 107-100 (MP-121) displays the status of PLC bits 107-100. A "1" in any bit indicates that the output is "active". The digital outputs are active low (current sinking). Page one of the "Help" screen displays the bit map for PLC 107-100. Also refer to *Appendices: Appendic C*.

PLC 115-108

PLC 115-108 (MP-122) displays the status of the internal PLC control bits 115-108. A "1" in any bit indicates that the bit is "active". These internal bits (control relays) can be used as global "control relays". For example, they can be used to create one-shots or latches. They can also be used to simplify programming. Page one of the "Help" screen displays the bit map for PLC 115-108. Also refer to *Appendices: Appendic C*.

PLC 123-116

PLC 123-116 (MP-123) displays the status of the internal PLC control bits 123-116. A "1" in any bit indicates that the bit is "active". Page one of the "Help" screen displays the bit map for PLC 123-116. Also refer to *Appendices: Appendic C*.

PLC 131-124

PLC 131-124 (MP-124) displays the status of the internal PLC control bits 131-124. A "1" in any bit indicates that the bit is "active". Page one of the "Help" screen displays the bit map for PLC 131-124. Also refer to *Appendices: Appendic C*.

PLC 139-132

PLC 139-132 (MP-125) displays the status of the internal PLC control bits 139-132. A "1" in any bit indicates that the bit is "active". Page one of the "Help" screen displays the bit map for PLC 139-132. Also refer to *Appendices: Appendic C*.

PLC 147-140

PLC 147-140 (MP-126) displays the status of the internal PLC control bits 147-140. A "1" in any bit indicates that the bit is "active". Blk Sel A, B, C select the block that is active, if Blk Sel Source (CP-478) has been set to "1" (DgIn). Page one of the "Help" screen displays the bit map for PLC 147-140. Also refer to *Appendices: Appendic C*.

PLC 155-148

PLC 155-148 (MP-127) displays the status of the internal PLC control bits 155-148. A "1" in any bit indicates that the bit is "active". Page one of the "Help" screen displays the bit map for PLC 155-148. Also refer to *Appendices: Appendic C*.

PLC 163-156

PLC 163-156 (MP-128) displays the status of the internal PLC control bits 163-156. A "1" in any bit indicates that the bit is "active". Page one of the "Help" screen displays the bit map for PLC 163-156. Also refer to *Appendices: Appendic C*.

PLC 171-164

PLC 171-164 (MP-129) displays the status of the internal PLC control bits 171-164. A "1" in any bit indicates that the bit is "active". Page one of the "Help" screen displays the bit map for PLC 171-164. Also refer to *Appendices: Appendic C*.

PLC 179-172

PLC 179-172 (MP-130) displays the status of the internal PLC status bits 179-172. None of these bits are presently active. They are reserved for future use. Page one of the "Help" screen displays the bit map for PLC 179-172. Also refer to *Appendices: Appendic C*.

PLC MONITOR P4/4

PLC 187-180

PLC 187-180 (MP-131) displays the status of the internal PLC control bits 187-180. A “1” in any bit indicates that the output is “active”. Page one of the “Help” screen displays the bit map for PLC 187-180. Also refer to *Appendices: Appendic C*.

PLC 195-188

PLC 195-188 (MP-132) displays the status of the internal PLC control bits 195-188. A “1” in any bit indicates that the bit is “active”. Page one of the “Help” screen displays the bit map for PLC 195-188. Also refer to *Appendices: Appendic C.*

PLC 203-196

PLC 203-196 (MP-133) displays the status of the internal PLC control bits 203-196. A “1” in any bit indicates that the bit is “active”. Page one of the “Help” screen displays the bit map for PLC 203-196. Also refer to *Appendices: Appendic C.*

PLC 211-204

PLC 211-204 (MP-134) displays the status of the internal PLC control bits 211-204. A “1” in any bit indicates that the bit is “active”. Page one of the “Help” screen displays the bit map for PLC 211-204. Also refer to *Appendices: Appendic C.*

PLC 219-212

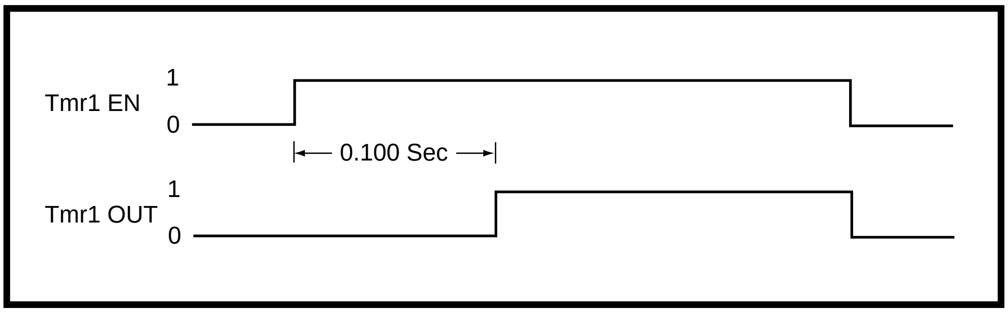
PLC 219-212 (MP-135) displays the status of the internal PLC control bits 219-212. A “1” in any bit indicates that the bit is “active”. Page one of the “Help” screen displays the bit map for PLC 219-212. Also refer to *Appendices: Appendic C.*

—NOTES—

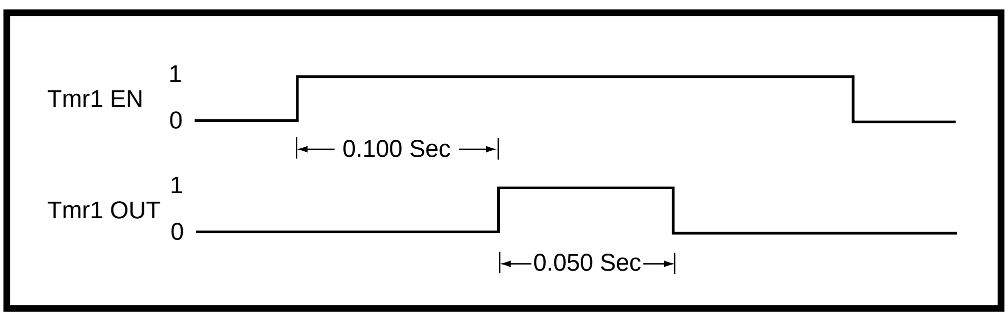
PLC TIMERS

The are four timers that work in conjunction with the PLC. Each timer can be set up to generate a pulse. The timers operate with 1 millisecond resolution. However, when the timer times out and the timer output becomes active, the PLC program may not react for another millisecond because of the two millisecond scan time. Therefore, enter the time values at “1” or “2” milliseconds shorter than you actually need to compensate. The timer outputs reflect the operation of an On-delay timer. If you need an Off-delay operation, use the “NOT” (complement) of the output. Timer 4, retains the accumulated time even when the Enable is deactivated.

The operation of each timer is dictated by their respective delay and on-time parameters. The following shows a typical time-trace of the Tmr1 Out when Tmr1 En changes from “0 ”to “1”. Tmr1 Delay (CP-410) equals “0.100” Seconds and Tmr1 on Tm (CP-411) equals “-1”.



The following shows a time-trace of the Tmr1 Out when Tmr1 En changes from “0” to “1”. Tmr1 Delay (CP-410) equals “0.100” Seconds and Tmr1 on Tm (CP-411) equals “0.050” Seconds.



PLC TIMERS   P1/1

Tmr1 Delay

Timer 1 Delay (CP-410) is the time, in seconds, from which Timer 1 becomes enabled (Tmr1 En bit going from “0” to “1”) until Tmr1 Out bit (24) in the PLC is going active (1). When the Tmr1 En bit (124) returns to “0”, the Tmr1 Out bit (24) is reset to “0” and the delay-time is reset to “0”.

Tmr1 on Tm

Timer 1 on Time (CP-411) is the time, in seconds, from which Timer 1 is going active (= 1) until Tmr1 Out is going inactive (back to “0”). When the Tmr1 En bit (124) returns to “0”, the Tmr1 Out bit (24) is reset = “0” and the on-time is reset to “0”. If you want Timer 1on-time to be infinite (“On” until Tmr1 is disabled with Tmr1 En = “0”), then enter a value of "-1" into Tmr1 on Tm (CP-411).

Tmr2 Delay

Timer 2 Delay (CP-412) is the time in seconds from which Timer 2 becoming enabled (Tmr2 En bit going from “0” to “1”) until Tmr2 Out bit (25) in the PLC going active (1). When the Tmr2 En bit (125) returns to “0”, the Tmr2 Out bit (25) is reset to “0” and the delay-time is reset to “0”.

Tmr2 on Tm

Timer 2 on Time (CP-413) is the time, in seconds, from which Timer 2 is going active (= 1) until Tmr2 Out is going inactive (back to “0”). When the Tmr2 En bit (125) returns to “0”, the Tmr2 Out bit (25) is reset = “0” and the on-time is reset to “0”. If you want Tmr2 on-time to be infinite (“On” until Tmr2 is disabled with Tmr2 En = “0”), then enter a value of "-1" into Tmr2 on Tm (CP-413).

Tmr3 Delay

Timer 3 Delay (CP-414) is the time, in seconds, from which Timer 3 becomes enabled (Tmr3 En bit going from “0” to “1”) until Tmr3 Out bit (26) in the PLC is going active (1). When the Tmr3 En bit (126) returns to “0”, the Tmr3 Out bit (26) is reset to “0” and the delay-time is reset to “0”.

Tmr3 on Tm

Timer 3 on Time (CP-415) is the time, in seconds, from which Timer 3 is going active (= 1) until Tmr3 Out is going inactive (back to “0”). When the Tmr3 En bit (126) returns to “0”, the Tmr3 Out bit (26) is reset = “0” and the on-time is reset to “0”. If you want Timer 3 on-time to be infinite (“On” until Tmr3 is disabled with Tmr3 En = “0”), then enter a value of "-1" into Timer 3 on Time (CP-415).

Tmr4 Delay

Timer 4 Delay (CP-416) is the time, in seconds, from Timer 4 becoming enabled (Tmr4 En bit going from “0” to “1”) toTmr4 Out bit (27) in the PLC going active (1). If Tmr4 becomes disabled, the delay-time is retained so the timing can continue when Tmr4 is re-enabled. The Tmr4Rst bit (128) in the PLC must be used to reset the delay time to “0”.

Tmr4 on Tm

Timer 4 on Tm (CP-417) is the time, in seconds, from Tmr4 Out going active (= 1) until Tmr4 Out going inactive (back to “0”). When Tmr4 becomes disabled, the on-time is retained so the timing can continue when Tmr4 is re-enabled. The Tmr4 Rst bit (128) in the PLC must be used to reset the on-time to “0”. If you want Tmr4 on-time to be infinite (“On” until Tmr4 is reset with Tmr4 Rst = 1) then enter a value of “-1” in Tmr4 on Tm (CP-417).

Tmr4 Time

Timer 4 Time (MP-107) displays the elapsed time, in seconds, for Timer 4 during the delay part of it's operation.

—NOTES—

PLC COUNTERS

There are four event counters that are associated with the PLC. One of these counters functions as an up/down counter. The other three counters operate as up-counters. The maximum count rate is approximately 100 counts per second (100 Hz). The up-counters all have upper trigger values associated with them. When the count reaches this trigger value, the counter output will be set automatically to “1”. The count will continue past the trigger level when more transitions occur on the Increment PLC Bit. However, as long as the count is equal to or greater than the (up-counter) trigger level, the counter output PLC Bit will be “1”. Each up-counter has a reset PLC bit associated with it to reset the count to “0”. The up/down counter has a preset value that is loaded into the counter when the counter reset PLC Bit is set to a “1”. Special Control Parameters hold the current count of the counters. As a result, the values are retained during a power-down. In addition, you can enter a new value into the count or increment/decrement the value with the scroll keys. The up/down counter has a down count trigger value and an associated output to indicate when the count is less than or equal to this trigger level.

The position counters that are associated with Lead Encoder and Follower Encoder inputs are available for monitoring as well as for use in the numerical comparators. These counters are also used to determine the position error, which in turn drives the position loops. These counters count pulses for non-quadrature (x1) encoders or count edges for quadrature (x4) encoders. When the position-counter count reaches (or exceeds) the rollover value, the counter is reset to “0” (plus any count over the rollover value).

PLC EVENT CNTRS   P1/1

Cntr1 Cnt

Counter 1 Count (CP-421) is the current count for “Counter 1”. The CX-1102 automatically increments it one count for every “0” to “1” transition of the Cntr1 Inc bit (130). Counter 1 Count is the default batch counter. Either use the “Scroll” keys or enter a new number to change this value. When the PLC program sets Cntr1 Rst bit (135) to “1”, then the Counter 1 Count (CP-421) resets to “0” .

Cntr1 Trig

When Counter 1 Count (CP-421) is greater than or equal to Counter 1 Trigger (CP-420), then the Cntr1 Out bit (32) in the PLC is set to “1”. If the count is less than, Cntr1 Out bit (32) will equal “0”.

Cntr2 Cnt

Counter 2 Count (CP-423) is the current count for “Counter 2”. The CX-1102 automatically increments it one count for every “0” to “1” transition of the Cntr1 Inc bit (131). Counter 2 Count is the default batch counter. Either use the “Scroll” keys or enter a new number to change this value. When the PLC program sets Cntr1 Rst bit (136) to “1”, then the Counter 2 Count (CP-423) resets to “0” .

Cntr2 Trig

When Counter 2 Count (CP-423) is greater than or equal to Counter 2 Trigger (CP-422), then the Cntr2 Out bit (33) in the PLC is set to “1”. If the count is less than, Cntr2 Out bit (33) will equal “0”.

Cntr3 Cnt

Counter 3 Count (CP-425) is the current count for “Counter 3”. The CX-1102 automatically increments it one count for every “0” to “1” transition of the Cntr3 Inc bit (132). Counter 3 Count is the default batch counter. Either use the “Scroll” keys or enter a new number to change this value. When the PLC program sets Cntr3 Rst bit (137) to “1”, then the Counter 3 Count (CP-425) resets to “0” .

Cntr3 Trig

When Counter 3 Count (CP-425) is greater than or equal to Counter 3 Trigger (CP-424), then the Cntr3 Out bit (34) in the PLC is set to “1”. If the count is less than, Cntr3Out bit (34) will equal “0”.

Cntr4 Cnt

Counter 4 Count (CP-427) is the current count for “Counter 4”. The CX-1102 automatically increments it one count for every “0” to “1” transition of the Cntr4 Inc bit (133). Counter 4 Count is the default batch counter. Either use the “Scroll” keys or enter a new number to change this value. When the PLC program sets Cntr4 Rst bit (138) to “1”, then the Counter 4 Count (CP-427) resets to “0” .

Cntr4 Preset

When the Counter 4 Rst bit in the PLC Programming screen is set to “ 1”, then Counter 4 Cnt (CP-427) is set to and held at the Counter 4 Preset (CP-429) value. If you need a transition preset, then create a one-shot or, when possible, use the DI 1 Shot (CP-402) mask.

Cntr4 TrigUp

When Counter 4 Count (CP-427) is greater than or equal to Counter 4 Trigger Up (CP-426), then the Cntr4 UpOut bit (35) in the PLC is set to “1”. If the count is less than, Cntr4UpO bit (35) will equal “0”.

Cntr4 TrigDn

When Counter 4 Count (CP-427) is less than or equal to Counter 4 Trigger Down (CP-428), then the Cntr4DnO bit (36) in the PLC is set to “1”. If the count is greater than, Cntr4DnO bit (36) will equal “0”.

PLC DATA COPY   P1/1

The PLC Data Copy function is used to copy CP or MP data (values) to a different CP (copy from source to destination). When a 0 to 1 transition occurs in the DataCopy 1 PLC bit (160), the value of the CP or MP selected by Copy Source 1 (CP-396) is copied to the CP selected by Copy Dest 1 (CP-397). When a 0 to 1 transition occurs in the DataCopy 2 PLC bit (161), the value of the CP or MP selected by Copy Source 2 (CP-398) is copied to the CP selected by Copy Dest 2 (CP-399). The values of the Copy Source CP or MP is unaffected by the data copy function.

Copy Source 1

Copy Source 1 (CP-396) identifies the CP or MP whose value is copied to Copy Dest 1 when a 0 to 1 transition occurs in the DataCopy 1 PLC bit.

Copy Dest 1

Copy Dest 1 (CP-397) identifies the CP that takes on the value of the CP or MP identified by Copy Source 1 when a 0 to 1 transition occurs in the DataCopy 1 PLC bit.

Copy Source 2

Copy Source 2 (CP-398) identifies the CP or MP whose value is copied to Copy Dest 2 when a 0 to 1 transition occurs in the DataCopy 2 PLC bit.

Copy Dest 2

Copy Dest 2 (CP-399) identifies the CP that takes on the value of the CP or MP identified by Copy Source 2 when a 0 to 1 transition occurs in the DataCopy 2 PLC bit.

—NOTES—

DIGITAL I/O

The PLC / Digital I/O, (page 1) screen displays parameters that are associated with the digital inputs for the PLC (DI-8 through DI-15). The DI-14 and DI-15 are routed to the Scroll Up bit (168) and Scroll Dn bit (169) respectively by the default PLC program. This allows these digital inputs to control the remote scroll-up and remote scroll-down function. The remote-scroll function can be assigned to almost any of the Control Parameters. Use Remote Scroll (CP-400) to select the Control Parameter that you want to assign to the remote scroll function. The rate of change when the PLC Bit is "1" (On or Digital Input active with default PLC program) is determined by Rmt Scroll Rate (CP-401). This is the number of increments/decrements to the least significant digit every second that the PLC bit (input) is active. Use Table 5-1 for the time-between increments or decrements of the various remote scroll rates.

DI 1 Shot (CP-402) determines which digital inputs will cause the corresponding PLC bit (8-15) to be "1" (On) for one PLC scan (one-shot) when an open-to-closed (active) transition occurs on the input. This is the default one-shot for the PLC.

Remote Scroll Rate	Increment Interval (Time)	Number of 10 - mSec Samples per Interval
1	1000 mSec = 1 Sec	100
2	500 mSec	50
3	333 mSec --> 330 mSec	33
4	250 mSec	25
5	200 mSec	20
10	100 mSec	10
11	91 mSec --> 90 mSec	9
12	83 mSec --> 80 mSec	8
14	71 mSec --> 70 mSec	7
15	67 mSec --> 60 mSec	6
20	50 mSec	5
25	40 mSec	4
30	33 mSec --> 30 mSec	3
50	20 mSec	2
100	10 mSec	**1**

Table 5-1 Remote Scroll Rates

DIGITAL I/O   P1/1

DI 1 Shot

Use the Digital Input 1 Shot (CP-402) to create a one scan pulse (one-shot) as the result of a high-to-low (open-to-closed) transition on any or all of the PLC dedicated inputs. To generate a 1-scan pulse for an inactive high to an active low transition, enter a “1” in the bit location of corresponding digital input. In the example below, the “1” has been entered in digital input 14.

DI 7..0

Digital Input 7..0 (MP-100) displays the value of the “J6” digital inputs. A ‘1’ in the bit location indicates a “low voltage” condition on the corresponding input (which is consistent with a contact closure to common). Refer to Appendices: Appendix C for the DI 7..0 (MP-100) bit map list.

DI 15..8

Digital Input 15..8 (MP-101) displays the value of the “J7” digital inputs. A ‘1’ in the bit location indicates a “low voltage” condition on the corresponding input (which is consistent with a contact closure to common). These eight inputs can be set up in the PLC Programming screen to generate a One-Shot Pulse on a high-to-low transition. Refer to Appendices: Appendix C for the DI 15..8 (MP-101) bit map list.

DO 7..0

Digital Output 7..0 (MP-102) displays the value of the “J2” digital outputs. A ‘1’ in the bit location indicates an active “low voltage” condition on the corresponding open collector output (which would sink DC current). Refer to Appendices: Appendix C for the DO 7..0 (MP-102) bit map list.

PLC PROGRAMMING

Editor and the Compiler:
The PLC program consists of a text-based list of commands (instructions) and operands that work on bit data to produce the same result as a ladder-logic language. Each rung of a ladder logic program is implemented as a group of commands/operands starting with the “LOAD” (or LD NOT) command and ending with the “OUT ”command. A special series of screens that function as an editor allow you to change the PLC program. You can add commands, delete commands or change a command or operand. This is done with the keypad and screens; programming computer is not required.

Go to PLC / PLC Programming. This will bring up the current PLC program. There are five pages with a total of 64 lines. Each line consists of one command and one operand. The simplest rung would require two lines: one for the opening “LOAD” and one for the closing “OUT”. Scroll through the lines with the Par Up or Par Down keys. The second line of the PLC Programming title block will display what line is active (highlight) and if the command or operand on that line is active. Use the Page Up and Page Down keys scroll quickly through the entire program. Any changes made to the PLC program will be compiled immediately. The changes go into effect as soon as the PLC Program has been exited and saved.

Changing Commands:
Scroll the Par Up or Par Down keys to the command that you want to change (highlight). Use the Page Up and Page Down keys scroll quickly through the entire program. The second line of the PLC Programming title block will display what line is active (highlight) and the command on the line that is active. When an command is active (highlight), it can be changed by using the “increment scroll up/down” keys to scroll through the list of available commands. Stop scrolling when the correct command appears. Use the Clear key to delete a the active line. The operand may need to be changed to be consistent with the new command. Use the Par Down key to scroll to the operand (highlight).

Changing Operands:
Scroll the Par Up or Par Down keys to the to the operand that you want to change. Use the Page Up and Page Down keys scroll quickly through the entire program. The second line of the PLC Programming title block will display what line is active (highlight) and the operand on the line that is active. When a operands is active, it can be changed either by entering the PLC Bit number or by scrolling through the list of operands with the “increment scroll s or t” keys. The name of the operand appears on the line to the right of the PLC Bit number. Stop scrolling when the correct operand appears. Press the Enter key to enter operand. Use the Clear key to delete a the active line.

Inserting a New Line:
To insert a new line at the active line (highlight), scroll to the command and press the Enter key. The new line is now active and the prior active line, as well as the rest of the lines, move down one line. The new line appears as a “NOP” (no operation) command and a “No Opnd” (No operand).

To Insert a new line below the active line (highlight), scroll to the operand and press the Enter key. A new line is inserted on the next line and becomes the active line. The entire program, moves down one line. The new line appears as a “NOP” (no operation) command and a “No Opnd” (No operand).

Delete a Line:
To delete a line, scroll to either the command or operand of the line and press the Clear key. A dialog box appears and asks if you want to delete the line. Press the Enter key to delete the line or the Clear key to cancel the request to delete.

Status and Help screens:
Press the Help key to go to the help screen for a description of the PLC Programming. Press the Status key to access the status screen. Press the Status key again to return to the PLC Programming screen. The Code is still functional in the status screen. However, if you access the status screen from the PLC programming screen, then you can not access the menu screens from the status screen. You must exit the PLC Programming screen in order to access the menu screens.

Closing and Saving the PLC Programming screen:
To return to the menu screen, press the Menu key. If you made any changes, a dialog box will appear to confirm the changes. To keep the changes, press the Enter key. Pressing the Enter key to accept the changes does not alter the PLC backup or the PLC default program. To discard the current changes, press the Clear key.

DANGER

When you exit the PLC Programming screen and press the Enter key, the changes will take effect immediately.

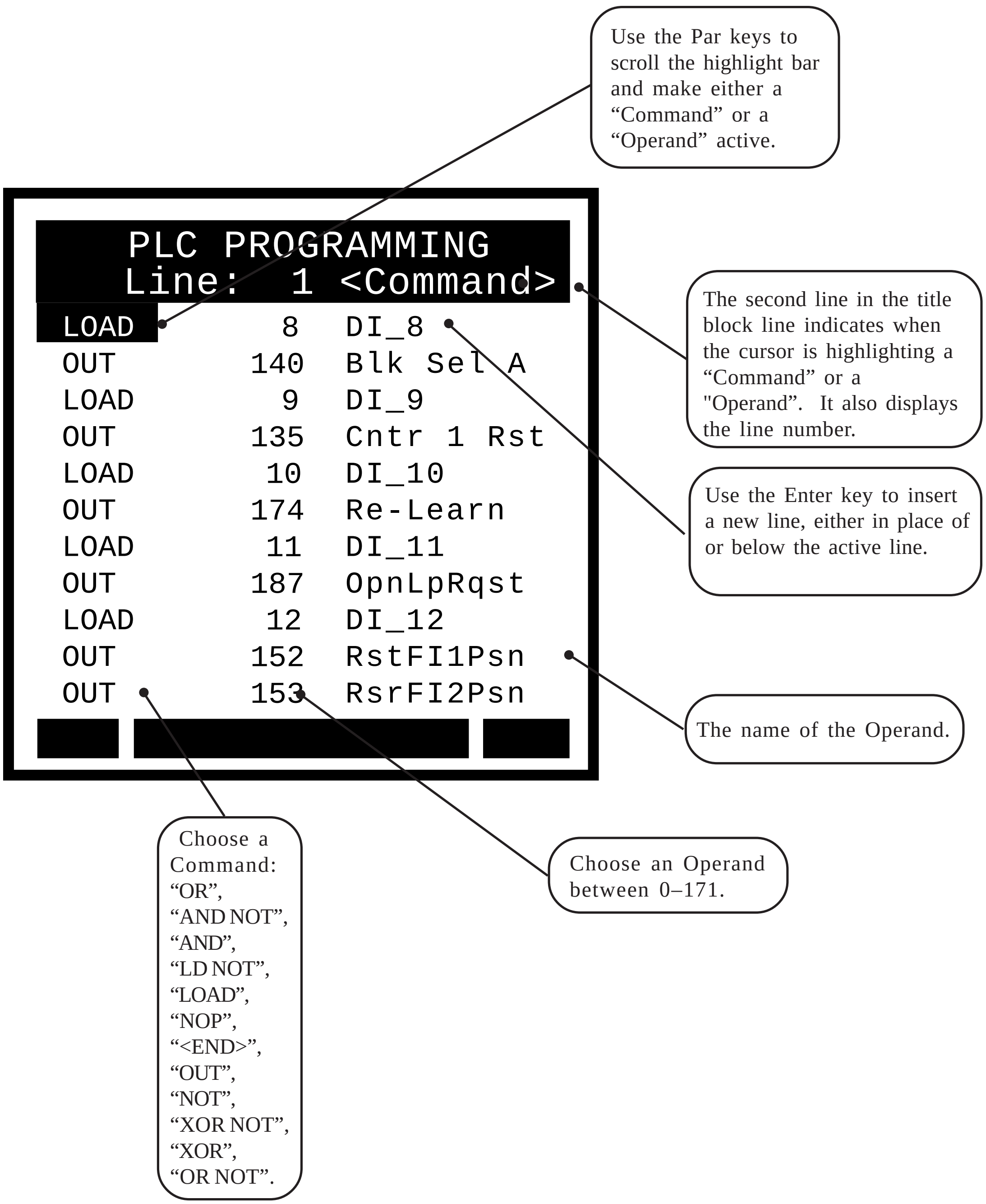
The new program could cause a digital output to change state, and cause an actuator to engage or disengage.

Creating a Customized Backup Program:
To save the changes that you have made to the PLC Program as a customized backup PLC program, go to the Setup/Load & Save Parms screen (page 1) and enter “1” in Save PLC Prgm (CP-499).

Loading the Backup Program or the Default Program:
The last page (page 5) of the PLC programming help screens (accessed from any line) allows you to choose between loading the backup PLC program (that you have customized) or loading the default PLC program that was shipped from the factory. “Load Default Program” is the default. You can also access the PLC backup or the PLC default programs from the Setup/Load & Save Parms screen (page 1). For the list of the factory default PLC Program Logic, see *Appendices: Appendix J*.

NOTE: The backup PLC Program is identical to the default PLC Program until you customize the PLC and then save the backup in the Setup/Load & Save Parms screen. In addition, if you perform a “Clear 9” power-up, your customized backup PLC Program will revert back to the default PLC Program.

The PLC Programing screens are accessed through
—> Main Menu / PLC <—



Use the Page keys to go scroll through the 64 command lines, a page at a time. The screens below display the default sttings for lines 12 through 64.

PLC PROGRAMMING
Line: 12 <Command>

LOAD	13	DI_13
OUT	172	LdSyncOff
OUT	173	FbSyncOff
LOAD	14	DI_14
OUT	169	Scroll Dn
LOAD	15	DI_15
OUT	168	Scroll Up
LOAD	69	FbSyncRcv
OUT	130	Cntr 1 Inc
LOAD	53	RR@0Spd
AND	54	Fb@oSpd

PLC PROGRAMMING
Line: 23 <Command>

OUT	100	DO_0
LOAD	29	HiSpdAlm
OR	28	LoSpdAlm
OUT	101	DO_1
LOAD	65	OutOfPosn
OUT	102	DO_2
LOAD	66	LdSyncMis
OUT	103	DO_3
LOAD	67	FbSyncMis
OUT	104	DO_4
LOAD	32	Cntr 1 Out

PLC PROGRAMMING
Line: 34 <Command>

OUT	105	DO_5
LOAD	89	Rvs Cmd
OUT	106	DO_6
LOAD	51	DrvEnable
OUT	107	DO_7
<END>	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd

PLC PROGRAMMING
Line: 45 <Command>

NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd

PLC PROGRAMMING
Line: 56 <Command>

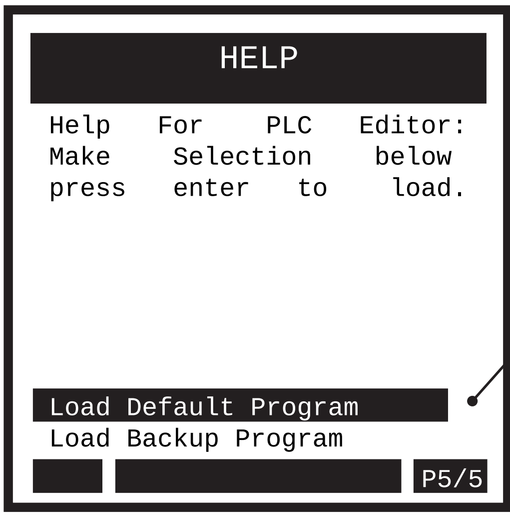
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd

PLC PROGRAMMING
Line: 64 <Command>

NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd
NOP	171	NOP Opnd

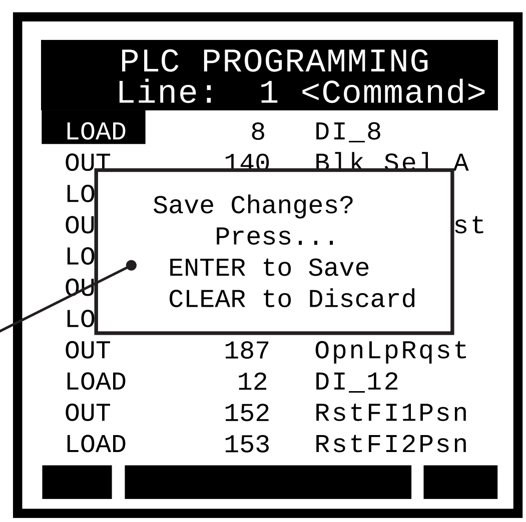
PLC Programming / Help Screen Option and Save Screen

The last page of the Help screens (page 5) allows you to choose between creating a backup of the changes that you have entered or loading the default bit program that was shipped from the factory. “Load Default Program” is the default choice.



To change to “Load Backup Program”, use the “par” key to scroll the highlight bar.

Press the Menu key from any of the PLC Proramming screens to exit. If you have made changes in any of the screens, a dialog box will popup and give you the opportunity to save or to discard your changes.



Press the Enter key to save your changes or press the Clear key to discard your changes.

—NOTES—

System Monitoring/Monitor Parameters

INTRODUCTION TO
MONITOR PARAMETERS

Parameters are divided into two classifications; Control Parameters (CP) and Monitor Parameters (MP). This section is about Monitor Parameters. Control Parameters are explained in *System Setup/Control Parameters.*

The parameters appear on the screens by a Parameter Name. The Help screens list the parameters by both their name and by a numbered code, which is called the Parameter Code. The operational data is the Parameter Value.

		Parameter Name	Parameter Code	Parameter Value
Parameters =	Monitor Parameter	Scaled Fb	MP-40	0.0 (default)
	Control Parameter	Master SP	CP-210	0.0 (default)

Note: Monitor Parameters are status indicators only - you can not directly affect or change a Monitor Parameter. When Monitor Parameters are displayed on the screens, they do not have a small indicator "dot" to the left of the Parameter Name (unlike Control Parameters, which do have a small indicator "dot" to the left of the Parameter Name).

Monitor Parameter (MP) screens allow you to monitor the performance of the CX-1200 and your system. These screens also help you troubleshoot for problems as well as confirm the wiring and tuning. Monitor Parameter screens can be accessed at any time during the CX-1200's operation, including during Run, Jog and F-Stop. The Monitor Parameter screens are accessed through the System Monitor screen.

—NOTES—

SYSTEM MONITOR

Use the system monitor screens to access the Monitor Parameter screens that monitor the operation of the CX-1200. In addition to their monitoring capability, the Control Override screens provide limited control of the Run/Stop/Jog logic and the block selection.

The CX-1200 system monitor screens are:

- Run Monitor
- Position
- Job Sizes
- STD Signals Monitor
- Alarms and Limits Monitor
- DIG I/O Monitor
- Aux Analog Monitor
- Control Overrides

RUN MONITOR / SYSTEM P1/3

The Run Monitor screen (page 1) contains monitor system data parameters. Setpoint X (CP-201) is also included on this screen to allow convenient assess to your active setpoint.

State

State (MP-50) displays the present system operating state of the CX-1200 (see list below). Only one operating state may be active at a time. To access either the “Run” or the “Jog” operating state, the F-Stop, R-Stop and H-Stop inputs must be closed.

9 = Not Defined	8 = Diagnostics	7 = Not Defined
6 = Not Defined	5 = Jog	4 = Not Defined
3 = Run	2 = H-Stop	1 = R-Stop
0 = F-Stop		

Setpoint X

Setpoint X (CP-201) displays the name and value of the setpoint that corresponds with the mode of operation selected in RUN Mode (CP-202). The setpoint could be the Master SP (CP-210), the Follower SP (CP-220) or the Direct SP (CP-230). Setpoint X acts as a quick access to the setpoint value. In addition to changing a setpoint value in the setpoint screens, you can also change the value of the active setpoint by entering a new value in Setpoint X (CP-201).

Scaled Fb

Scaled Feedback (MP-40) displays the scaled feedback , which is scaled per ScFbDispEq (CP-250). The placement of the decimal point is the same as the placement of the decimal point in Master SP (CP-210) in "Master" and Follower SP (CP-220) in "Ratio or Inverse Ratio".

ActScaleFactor

Active Scale Factor (MP-42) displays the scale factor currently being utilized by the position control algorithm. The ActScaleFactor (MP-42) may not be the same as ScaleFactor (MP-41).

Ld EU/Tm

Frequency Input 1 Engineering Units per Time (MP-05) displays the current speed of the Frequency Input 1 in the Engineering Units per Time (EU/Tm) relative to the Pulses FI1 (CP-262), EU FI1 (CP-263) and Time Base (CP-209). The placement of the decimal point is the same as the placement of the decimal point in EU FI1 (CP-263).

Fb EU/Tm

Frequency Input 2 Engineering Units per Time (MP-06) displays the current speed of the Frequency Input 2 in the Engineering Units per Time (EU/Tm) relative to the Pulses FI2 (CP-267), EU FI2 (CP-268) and Time Base (CP-209). The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

Ld Posn

Lead Position (MP-10) displays the present value of the Lead Position in Engineering Units, as specified by Pulses FI1 (CP-262) and EU FI1 (CP-263). The placement of the decimal point is the same as the placement of the decimal point in EU FI1 (CP-263).

Fb Posn

Feedback Position (MP-20) displays the present value of the Feedback Position in Engineering Units, as specified by Pulses FI2 (CP-267) and EU FI2 (CP-268). The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

PosnErr

Position Error (MP-33) displays the value, in engineering units, of the accumulated position error between the lead (FI1) and the feedback (FI2) input signals. The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

RUN MONITOR / LEAD   P2/3

The Run Monitor / Lead screen (page 2) monitor the parameters that are related to the Lead.

Cntrl Loop

Control Loop (MP-49) displays the present operating mode of the CX-1200. Only one type of loop can be active at a time. These modes are automatically selected depending on the present system State (MP-50).

3 = Psn Hld (H-Stop Position Loop)
2 = Position Loop
1 = Velocity Loop
0 = Open Loop

State

State (MP-50) displays the present system operating state of the CX-1200 (see list below). Only one operating state may be active at a time. To access either the “Run” or the “Jog” operating state, the F-Stop, R-Stop and H-Stop inputs must be closed.

9 = Not Defined	8 = Diagnostics	7 = Not Defined
6 = Not Defined	5 = Jog	4 = Not Defined
3 = Run	2 = H-Stop	1 = R-Stop
0 = F-Stop		

FI1 Hz

Frequency Input 1 Hertz (MP-01) displays the current frequency of the Frequency Input 1, in Hertz.

FI1 RPM

Frequency Input 1 RPM (MP-02) displays the current speed of the Frequency Input 1 encoder in RPM, based on PPR FI1 (CP-261).

Fb EU/Tm

Frequency Input 1 Engineering Units per Time (MP-05) displays the current speed of the Frequency Input 1 in the Engineering Units per Time (EU/Tm) relative to the Pulses FI1 (CP-262), EU FI1 (CP-263) and Time Base (CP-209). The placement of the decimal point is the same as the placement of the decimal point in EU FI1 (CP-263).

LdJbSzAve

Lead Job Size Average (MP-13) displays a running average value of the last 16 lead job sizes determined by the Lead Frequency and Lead Sync inputs. Displayed in EU’s.

Ld Posn

Lead Position (MP-10) displays the present value of the Lead Position in Engineering Units, as specified by Pulses FI1 (CP-262) and EU FI1 (CP-263). The placement of the decimal point is the same as the placement of the decimal point in EU FI1 (CP-263).

PosnErr

Position Error (MP-33) displays the value, in engineering units, of the accumulated position error between the lead (FI1) and the feedback (FI2) input signals. The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

RUN MONITOR / FOLLOWER   P3/3

The Run Monitor / Follower screen (page 3) monitor that are related to the Follower.

Cntrl Loop

Control Loop (MP-49) displays the present operating mode of the CX-1200. Only one type of loop can be active at a time. These modes are automatically selected depending on the present system State (MP-50).

3 = Psn Hld (H-Stop Position Loop)
2 = Position Loop
1 = Velocity Loop
0 = Open Loop

State

State (MP-50) displays the present system operating state of the CX-1200 (see list below). Only one operating state may be active at a time. To access either the “Run” or the “Jog” operating state, the F-Stop, R-Stop and H-Stop inputs must be closed.

9 = Not Defined	8 = Diagnostics	7 = Not Defined
6 = Not Defined	5 = Jog	4 = Not Defined
3 = Run	2 = H-Stop	1 = R-Stop
0 = F-Stop		

ScaledRef

Scaled Reference (MP-30) displays the reference speed, in Engineering Units per Time. This is the calculated setpoint before the accel/decel ramps are applied. The placement of the decimal point is the same as the placement of the decimal point in Master SP (CP-210).

RampedRef

Ramped Reference (MP-31) displays the speed command, in Engineering Units per Time. This is the output of the ramp calculations. When the ramp has been completed, the RampedRef (MP-31) should equal the ScaledRef (MP-30).

Fb EU/Tm

Frequency Input 2 Engineering Units per Time (MP-06) displays the current speed of the Frequency Input 2 in the Engineering Units per Time (EU/Tm) relative to the Pulses FI2 (CP-267), EU FI2 (CP-268) and Time Base (CP-209). The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

VelError

Velocity Error (MP-32) displays the difference between the RampedRef (MP-31) and Fb EU/Tm (MP-6). Displayed in EU/Tm.

Fb Posn

Feedback Position (MP-20) displays the present value of the Feedback Position in Engineering Units, as specified by Pulses FI2 (CP-267) and EU FI2 (CP-268). The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

PosnErr

Position Error (MP-33) displays the value, in engineering units, of the accumulated position error between the lead (FI1) and the feedback (FI2) input signals. The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

Trim Out

Trim Out (MP-36) displays the value of the output of the PID compensator. Trim Out is displayed in Volts. Trim Out is the sum of the conditioned error signals that, combined with the FeedFwd (MP-35), become the CO Volts (MP-37). Trim Out is the combination of all three terms of the PID error correction algorithm.

CO Volts

Control Output Volts (MP-37) displays the present value, in volts, of the Control Output (CO_Sig) signal to the drive. It is the combination of FeedFwd (MP-35) plus Trim Out (MP-36).

POSITION   P1/2

The Position screen (page 1) allows you to select and monitor the position for the CX-1200. The first line on the screen displays the current operating state.

State

State (MP-50) displays the present system operating state of the CX-1200 (see list below). Only one operating state may be active at a time. To access either the "Run" or the "Jog" operating state, the F-Stop, R-Stop and H-Stop inputs must be closed.

9 = Not Defined	8 = Diagnostics	7 = Not Defined
6 = Not Defined	5 = Jog	4 = Not Defined
3 = Run	2 = H-Stop	1 = R-Stop
0 = F-Stop		

Run Mode

Run Mode (CP-202) sets the mode of operation and the subsequent Setpoint, that are used when your system is in "Run". The Setpoint and mode of operation combined, determine the Reference Speed and, if applicable, the Reference Position. The modes of operation are:

4 = Inv Foll Mode
3 = Follower Mode
2 = Master Mode (default)
1 = Direct Mode

ScaleFactor

Scale Factor (MP-41) displays the calculated ratio between the LdJbSzAve (MP-13) and the FbJbSzAve (MP-23). This may be different than the scale factor actually being used by the control algorithm.

ActScaleFactor

Active Scale Factor (MP-42) displays the scale factor currently being utilized by the position control algorithm. The ActScaleFactor (MP-42) may not be the same as ScaleFactor (MP-41).

Ld Posn

Lead Position (MP-10) displays the present value of the Lead Position in Engineering Units, as specified by Pulses FI1 (CP-262) and EU FI1 (CP-263). The placement of the decimal point is the same as the placement of the decimal point in EU FI1 (CP-263).

Fb Posn

Feedback Position (MP-20) displays the present value of the Feedback Position in Engineering Units, as specified by Pulses FI2 (CP-267) and EU FI2 (CP-268). The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

PosnErr

Position Error (MP-33) displays the value, in engineering units, of the accumulated position error between the lead (FI1) and the feedback (FI2) input signals. The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

LdNetOfst

Lead Net Offset (MP-15) displays the resultant Net-Offset applied to the lead position after considering the LdSnsrDist (CP-340) and the LdSnsrOfst (CP-341) values. LdNetOfst (MP-15) is the final resultant offset inside a lead job size.

FbNetOfst

Follower Net Offset (MP-25) displays the resultant Net-Offset applied to the follower position after considering the FbSnsrDist (CP-350) and the FbSnsrOfst (CP-351) values. FbNetOfst (MP-25) is the final resultant offset inside a follower job size.

SyncFlgDif

Sync Flag Difference (MP-29) displays the difference, in EU's, between the position of the Lead and Follower sync pulses.

POSITION COUNTS P2/2

The Position Counts screen (page 2) allows you to select and monitor the position for the CX-1200. The first line on the screen displays the current operating state.

State

State (MP-50) displays the present system operating state of the CX-1200 (see list below). Only one operating state may be active at a time. To access either the "Run" or the "Jog" operating state, the F-Stop, R-Stop and H-Stop inputs must be closed.

9 = Not Defined	8 = Diagnostics	7 = Not Defined
6 = Not Defined	5 = Jog	4 = Not Defined
3 = Run	2 = H-Stop	1 = R-Stop
0 = F-Stop		

Run Mode

Run Mode (CP-202) sets the mode of operation and the subsequent Setpoint, that are used when your system is in "Run". The Setpoint and mode of operation combined, determine the Reference Speed and, if applicable, the Reference Position. The modes of operation are:

4 = Inv Foll Mode
3 = Follower Mode
2 = Master Mode (default)
1 = Direct Mode

ScaleFactor

Scale Factor (MP-41) displays the calculated ratio between the LdJbSzAve (MP-13) and the FbJbSzAve (MP-23). This may be different than the scale factor actually being used by the control algorithm.

ActScaleFactor

Active Scale Factor (MP-42) displays the scale factor currently being utilized by the position control algorithm. The ActScaleFactor (MP-42) may not be the same as ScaleFactor (MP-41).

LdPsnCnt

Lead Position Count (MP-180) displays Ld Posn (MP-10) in lines.

FbPsnCnt

Follower Position Count (MP-190) displays Fb Posn (MP-20) in lines.

PsnErrCnt

Position Error Count (MP-178) displays PosnErr (MP-33) in lines.

SyncFgDifC

Sync Flag Difference Count (MP-179) displays SyncFlgDif (MP-29) in lines.

JOB SIZES P1/2

The Job Sizes screen (page 1) allows you to select and monitor the job sizes for the CX-1200. The first line on the screen displays the current operating state.

State

State (MP-50) displays the present system operating state of the CX-1200 (see list below). Only one operating state may be active at a time. To access either the “Run” or the “Jog” operating state, the F-Stop, R-Stop and H-Stop inputs must be closed.

9 = Not Defined	8 = Diagnostics	7 = Not Defined
6 = Not Defined	5 = Jog	4 = Not Defined
3 = Run	2 = H-Stop	1 = R-Stop
0 = F-Stop		

Cntrl Loop

Control Loop (MP-49) displays the present operating mode of the CX-1200. Only one type of loop can be active at a time. These modes are automatically selected depending on the present system State (MP-50).

3 = Psn Hld (H-Stop Position Loop)
2 = Position Loop
1 = Velocity Loop
0 = Open Loop

Run Mode

Run Mode (CP-202) sets the mode of operation and the subsequent Setpoint, that are used when your system is in “Run”. The Setpoint and mode of operation combined, determine the Reference Speed and, if applicable, the Reference Position. The modes of operation are:

4 = Inv Foll Mode
3 = Follower Mode
2 = Master Mode (default)
1 = Direct Mode

Sync Mode

Sync Mode (CP-203) selects the algorithm to be used when RUN Mode (CP-202) is set for Follower or Inverse Follower. 0 = Non-Sync Mode the position follower only, sync pulses are ignored by the control algorithm. 1 = Fixed Mode the follower setpoint is the ratio/scale factor. 2 = Trend Mode the follower setpoint is altered by the control algorithm to allow for continuously changing job sizes. 3 = Learn Mode learns the job spaces and the scale factor, also modifies the follower setpoint.

3 = Learn
2 = Trend
1 = Fixed
0 = Off (default)

LdJobSize

Lead Job Size (MP-11) displays the present value determined by the Lead Frequency and Lead Sync inputs. Displayed in EU’s. It is the size of the very last job size that was encountered.

FbJobSize

Follower Job Size (MP-21) displays the present value determined by the Follower Frequency and Follower Sync inputs. Displayed in EU’s. It is the size of the very last job size that was encountered.

LdJbSzAvg

Lead Job Size Average (MP-13) displays a running average value of the last 16 lead job sizes determined by the Lead Frequency and Lead Sync inputs. Displayed in EU’s.

LdJbSzVar

Lead Job Size Variance (MP-12) displays the maximum variance of the last 16 lead job sizes. Displayed in EU’s.

FbJbSzAve

Follower Job Size Average (MP-23) displays a running average value of the last 16 follower job sizes determined by the Follower Frequency and Follower Sync inputs. Displayed in EU’s.

FbJbSzVar

Follower Job Size Variance (MP-22) displays the maximum variance of the last 16 follower job sizes. Displayed in EU’s.

JOB SIZES   P2/2

The Job Sizes screen (page 2) allows you to select and monitor the job sizes for the CX-1200. The first line on the screen displays the current operating state.

State

State (MP-50) displays the present system operating state of the CX-1200 (see list below). Only one operating state may be active at a time. To access either the "Run" or the "Jog" operating state, the F-Stop, R-Stop and H-Stop inputs must be closed.

9 = Not Defined	8 = Diagnostics	7 = Not Defined
6 = Not Defined	5 = Jog	4 = Not Defined
3 = Run	2 = H-Stop	1 = R-Stop
0 = F-Stop		

Cntrl Loop

Control Loop (MP-49) displays the present operating mode of the CX-1200. Only one type of loop can be active at a time. These modes are automatically selected depending on the present system State (MP-50).

3 = Psn Hld (H-Stop Position Loop)
2 = Position Loop
1 = Velocity Loop
0 = Open Loop

Run Mode

Run Mode (CP-202) sets the mode of operation and the subsequent Setpoint, that are used when your system is in "Run". The Setpoint and mode of operation combined, determine the Reference Speed and, if applicable, the Reference Position. The modes of operation are:

4 = Inv Foll Mode
3 = Follower Mode
2 = Master Mode (default)
1 = Direct Mode

Sync Mode

Sync Mode (CP-203) selects the algorithm to be used when RUN Mode (CP-202) is set for Follower or Inverse Follower. 0 = Non-Sync Mode the position follower only, sync pulses are ignored by the control algorithm. 1 = Fixed Mode the follower setpoint is the ratio/scale factor. 2 = Trend Mode the follower setpoint is altered by the control algorithm to allow for continuously changing job sizes. 3 = Learn Mode learns the job spaces and the scale factor, also modifies the follower setpoint.

3 = Learn
2 = Trend
1 = Fixed
0 = Off (default)

LdJSCnt

Lead Job Size Count (MP-182) displays LdJobSize (MP-11) in lines.

FbJSCnt

Follower Job Size Count (MP-192) displays the FbJobSize (MP-21) in lines.

LdJSAvgCt

Lead Job Size Average Count (MP-183) displays LdJbSzAvg (MP-14) in lines.

LdJSVarCt

Lead Job Size Variance Count (MP-184) displays LdJbSzVar (MP-12) in lines.

FbJSAveCt

Follower Job Size Average Count (MP-193) displays FbJbSzAvg (MP-24) in lines.

FbJSVarCt

Follower Job Size Variance Count (MP-194) displays FbJbSzVar (MP-22) in lines.

STD SIGNAL MONITOR / LEAD   P1/3

The STD Signal Monitor / Lead screen (page 1) displays parameters that are related to the Frequency Input 1 signal.

Cntrl Loop

Control Loop (MP-49) displays the present operating mode of the CX-1200. Only one type of loop can be active at a time. These modes are automatically selected depending on the present system State (MP-50).

3 = Psn Hld (H-Stop Position Loop)
2 = Position Loop
1 = Velocity Loop
0 = Open Loop

State

State (MP-50) displays the present system operating state of the CX-1200 (see list below). Only one operating state may be active at a time. To access either the “Run” or the “Jog” operating state, the F-Stop, R-Stop and H-Stop inputs must be closed.

9 = Not Defined	8 = Diagnostics	7 = Not Defined
6 = Not Defined	5 = Jog	4 = Not Defined
3 = Run	2 = H-Stop	1 = R-Stop
0 = F-Stop		

FI1 Hz

Frequency Input 1 Hertz (MP-01) displays the current frequency of the Frequency Input 1, in Hertz.

FI1 RPM

Frequency Input 1 RPM (MP-02) displays the current speed of the Frequency Input 1 encoder in RPM, based on PPR FI1 (CP-261).

Ld EU/Tm

Frequency Input 1 Engineering Units per Time (MP-05) displays the current speed of the Frequency Input 1 in the Engineering Units per Time (EU/Tm) relative to the Pulses FI1 (CP-262), EU FI1 (CP-263) and Time Base (CP-209). The placement of the decimal point is the same as the placement of the decimal point in EU FI1 (CP-263).

Ld Posn

Lead Position (MP-10) displays the present value of the Lead Position in Engineering Units, as specified by Pulses FI1 (CP-262) and EU FI1 (CP-263). The placement of the decimal point is the same as the placement of the decimal point in EU FI1 (CP-263).

PosnErr

Position Error (MP-33) displays the value, in engineering units, of the accumulated position error between the lead (FI1) and the feedback (FI2) input signals. The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

STD SIGNAL MONITOR / FOLLOWER P2/3

The STD Signal Monitor / Follower screen (page 2) displays the parameters that are related to the Frequency Input 1 signal.

Cntrl Loop

Control Loop (MP-49) displays the present operating mode of the CX-1200. Only one type of loop can be active at a time. These modes are automatically selected depending on the present system State (MP-50).

3 = Psn Hld (H-Stop Position Loop)
2 = Position Loop
1 = Velocity Loop
0 = Open Loop

State

State (MP-50) displays the present system operating state of the CX-1200 (see list below). Only one operating state may be active at a time. To access either the “Run” or the “Jog” operating state, the F-Stop, R-Stop and H-Stop inputs must be closed.

9 = Not Defined	8 = Diagnostics	7 = Not Defined
6 = Not Defined	5 = Jog	4 = Not Defined
3 = Run	2 = H-Stop	1 = R-Stop
0 = F-Stop		

RampedRef

Ramped Reference (MP-31) displays the speed command, in Engineering Units per Time. This is the output of the ramp calculations. When the ramp has been completed, the RampedRef (MP-31) should equal the ScaledRef (MP-30).

FI2 Hz

Frequency Input 2 Hz (MP-03) displays the current frequency of the Frequency Input 2, in Hertz.

FI2 RPM

Frequency Input 2 RPM (MP-04) displays the current speed of the Frequency Input 2 encoder in RPM, based on PPR FI2 (CP-266).

Fb EU/Tm

Frequency Input 2 Engineering Units per Time (MP-06) displays the current speed of the Frequency Input 2 in the Engineering Units per Time (EU/Tm) relative to the Pulses FI2 (CP-267), EU FI2 (CP-268) and Time Base (CP-209). The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

VelError

Velocity Error (MP-32) displays the difference between the RampedRef (MP-31) and Fb EU/Tm (MP-6). Displayed in EU/Tm.

Fb Posn

Feedback Position (MP-20) displays the present value of the Feedback Position in Engineering Units, as specified by Pulses FI2 (CP-267) and EU FI2 (CP-268). The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

PosnErr

Position Error (MP-33) displays the value, in engineering units, of the accumulated position error between the lead (FI1) and the feedback (FI2) input signals. The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

STD SIGNAL MONITOR / CONTROL OUTPUTS P3/3

The STD Signal Monitor / Control Outputs screen (page 3) displays CO_Sig signal data. The CO_Sig is the CX-1200 output signal that is the input to the drive as a velocity (or torque) command.

RampedRef

Ramped Reference (MP-31) displays the speed command, in Engineering Units per Time. This is the output of the ramp calculations. When the ramp has been completed, the RampedRef (MP-31) should equal the ScaledRef (MP-30).

FeedFwd

Feedforward (MP-35) displays the estimated voltage command to the drive required achieve the commanded RampedRef (MP-31). It is usually the major portion of the CO Volts (MP-37) signal.

Intgrl

Integral (MP-34) displays the value of the integral term (i.e., integrated error times the Ki constant) of the PID compensator. Intgrl (MP-34) is displayed in Volts. Intgrl (MP-34) is a conditioned error signal that serves to adjust the CO Volts (MP-37) to help achieve the desired speed. It is part of the PID error correction algorithm.

Trim Out

Trim Out (MP-36) displays the value of the output of the PID compensator. Trim Out is displayed in Volts. Trim Out is the sum of the conditioned error signals that, combined with the FeedFwd (MP-35), become the CO Volts (MP-37). Trim Out is the combination of all three terms of the PID error correction algorithm.

CO Volts

Control Output Volts (MP-37) displays the present value, in volts, of the Control Output (CO_Sig) signal to the drive. It is the combination of FeedFwd (MP-35) plus Trim Out (MP-36).

CO Bits

Control Output Bits (MP-38) displays the present value, in DAC bits, of the Control Output (CO_Sig) signal to the drive. CO Bits is the CO Volts (MP-37) expressed in DAC bits.

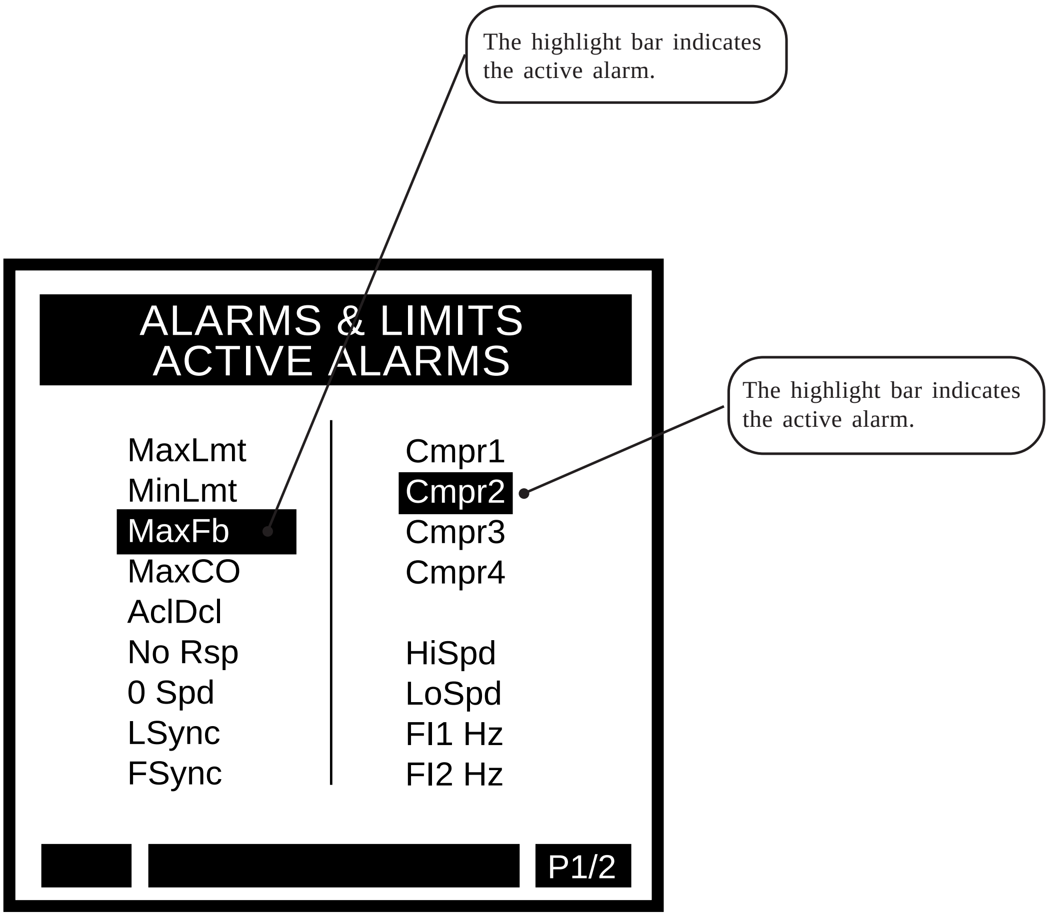
CO Max Bits

Control Output Maximum Bits (MP-39) reflects the maximum allowed output in units of DAC bits. The value of CO Max Volts (CP-271) determines this parameter, based on the conversion of 32767 bits = 15 VDC.

ALARMS & LIMITS / ACTIVE ALARMS   P1/2

The Alarms & Limits / Active Alarms screen (page 1) displays the status of the alarms and limits. This screen displays a list of the Limits, General Alarms and Custom Alms. The active Limits, Alarms and Custom Alms are highlighted *(See next page)*.

The Alarms & Limits screen is accessed through
—> Main Menu / System Monitor



ALARMS AND LIMITS P2/2

The Alarms & Limitsscreen (page 2) displays the bit-mapped Monitor Parameters that monitor the status of the Limits, Alarms and Custom Alms. Use either the *Appendices: Appendix C* or the "Help" screen to preview the bit map lists.

Active Blk

Active Block (MP-51) displays the active block (0-7). The block can be selected and made active by the Block select bits (Blk Sel A,B.C), in the PLC Programming screen if Blk Sel Source (CP-478) is set to "1" (DigIn & PLC). Or the block can be selected and made active by the keypad if Blk Sel Source (CP-478) is set to "2" (Keypad Blk Sel).

InvalidBlks

Invalid Blocks (MP-52) displays the status of the blocks in the Block Setup screens. A "1" indicates that there is an error with the corresponding block. Generally, this indicates that an overflow condition can occur if the corresponding block is activated. In addition, since other parameters are used in conjunction with the Block Parameters that you selected, an error can result from a parameter that is not selected in Block Parameters. If a bad block is activated, the CX-1200 will execute an F-Stop until either the block error is corrected or a another block is activated.

Misc Status

Miscellaneous Status (MP-53) displays various status conditions. A "1" in the Drive Enable bit indicates a drive enabled output. A "1" in any other bit location indicates an active condition. Refer to *Appendices: Appendix C* for the Misc Status (MP-53) bit map list.

Std Alarms

Std Alarms (MP-54) displays various alarm conditions . A "1" in any bit location indicates an active condition. Refer to *Appendices: Appendix C* for the Std Alarms (MP-54) bit map list.

Custom Alms

Custom Alarms (MP-55) displays the outputs of the PLC numerical comparators. A "1" in bit locations 0-3 indicates that the result of the compare (Cmprx Parm value vs. Cmprx Val) is true for the given Cmprx Type. A "1" in bit locations 4-7 indicates that the result of the compare (Cmprx Parm value vs. Cmprx Val) is false for the given Cmprx Type (the NOT is true). Refer to CP-380 through CP-395. Refer to *Appendices: Appendix C* for the Custom Alms (MP-55) bit map list.

Misc Alarms

Misc Alarms (MP-56) displays various alarm conditions . A "1" in any bit location indicates an active condition. Refer to *Appendices: Appendix C* for the Misc Alarms (MP-56) bit map list.

DIG I/O MONITOR   P1/1

The DIG I/O Monitor screen displays the status (state) of all the digital inputs and outputs.

DI 7..0

Digital Input 7..0 (MP-100) displays the value of the “J6” digital inputs. A ‘1’ in the bit location indicates a “low voltage” condition on the corresponding input (which is consistent with a contact closure to common). Refer to *Appendices: Appendix C* for the DI 7..0 (MP-100) bit map list. The Help screen for DI 7..0 (MP-100) also contains a bit map list.

DI 15..8

Digital Input 15..8 (MP-101) displays the value of the “J7” digital inputs. A ‘1’ in the bit location indicates a “low voltage” condition on the corresponding input (which is consistent with a contact closure to common). These eight inputs can be set up in the PLC Programming screen to generate a One-Shot -Pulse on a high-to-low transition. Refer to *Appendices: Appendix C* for the DI 15..8 (MP-101) bit map list. The Help screen for DI 15..8 (MP-101) also contains a bit map list.

DO 7..0

Digital Output 7..0 (MP-102) displays the value of the “J2” digital outputs. A ‘1’ in the bit location indicates an active “low voltage” condition on the corresponding open collector output (which would sink DC current). Refer to *Appendices: Appendix C* for the DO 7..0 (MP-102) bit map list. The Help screen for DO 7..0 (MP-102) also contains a bit map list.

ANALOG IN MONITOR P1/2

The Analog In Monitor screen (page 1) monitors the input signals and displays the parameters for the analog inputs (AI1 and AI2).

AI1 Bits

Analog Input 1 Bits (MP-160) displays the present value in ADC bits of Auxiliary Board Analog Input 1 signal.

AI1 Signal

Analog Input 1 Signal (MP-161) displays the present value of the Auxiliary Board Analog Input 1 signal in either volts or milliamps relative to which setting (volts or current) has been entered in AI1 Mode (CP-280).

AI1 EU

Analog Input 1 EU (MP-162) displays the present value of the Auxiliary Board Analog Input 1 signal in Engineering Units (EU) as relative to the AI1 RA (CP-281), EU@AI1 RA (CP-282), AI1 RB (CP-283), EU@AI1 RB (CP-284) and Time Base (CP-209). The placement of the decimal point is the same as the placement of the decimal point in EU@AI1 RA (CP-282).

AI1 Mode

Analog Input 1 Mode (CP-280) identifies the mode of operation and the calibration that are used for the Auxiliary Board Analog Input 1 signal.

2 = Current
1 = Voltage (default)

AI2 Bits

Analog Input 2 Bits (MP-163) displays the present value in ADC bits of Auxiliary Board Analog Input 2 signal.

AI2 Signal

Analog Input 2 Signal (MP-164) displays the present value of the Auxiliary Board Analog Input 2 signal in either volts or milliamps, relative to which setting (volts or current) has been entered in AI2 Mode (CP-285).

AI2 EU

Analog Input 2 EU (MP-165) displays the present value of the Auxiliary Board Analog Input 2 signal in Engineering Units (EU) relative to the AI2 RA (CP-286), EU@AI2 RA (CP-287), AI2 RB (CP-288), EU@AI2 RB (CP-289) and Time Base (CP-209). The placement of the decimal point is the same as the placement of the decimal point in EU@AI2 RA (CP-286).

AI2 Mode

Analog Input 2 Mode (CP-285) identifies the mode of operation and the calibration that are used for the Auxiliary Board Analog Input 2 signal.

2=Current
1=Voltage (default)

ANALOG OUT MONITOR   P2/2

The Analog Out Monitor screen (page 2) monitors the output signal and displays the parameters for the analog output (AO).

AO Bits

Analog Output Bits (MP-166) displays the present value, in DAC Bits, of the Auxiliary Analog Output.

AO Signal

Analog Output Signal (MP-167) displays the present value, in either volts or milliamps of the Auxiliary Analog Output, relative to AO Mode (CP-291).

AO Mode

Analog Output Mode (CP-291) identifies the mode of operation and calibration that are used for the Auxiliary Board Analog Output signal.

2 = Current
1 = Voltage (default)

CONTROL OVERRIDES / STATE   P1/4

The Control Overrides / State screen (page 1) allows you to select and monitor the operating state for the CX-1200. The first line on the screen displays the current operating state.

State

State (MP-50) displays the present system operating state of the CX-1200 (see list below). Only one operating state may be active at a time. To access either the "Run" or the "Jog" operating state, the F-Stop, R-Stop and H-Stop inputs must be closed.

9 = Not Defined	8 = Diagnostics	7 = Not Defined
6 = Not Defined	5 = Jog	4 = Not Defined
3 = Run	2 = H-Stop	1 = R-Stop
0 = F-Stop		

Run Mode

Run Mode (CP-202) sets the mode of operation and the subsequent Setpoint, that are used when your system is in "Run". The Setpoint and mode of operation combined, determine the Reference Speed and, if applicable, the Reference Position. The modes of operation are:

4 = Inv Foll Mode
3 = Follower Mode
2 = Master Mode (default)
1 = Direct Mode

Blk Sel Source

Block Select Source (CP-478) determines whether the active block will be selected by the digital inputs and PLC, by Keypad Blk Sel (CP-479) or by Cntr4 Cnt.

3 = Cntr4 Cnt
2 = KyPd = Keypad Blk Sel
1 = DgIn = Digital Inputs/PLC (default)

Keypad Blk Sel

The Keypad Block Select (CP-479) determines which block will be active when Blk Sel Source (CP-478) is set to "2" (KyPd).

Active Blk

Active Block (MP-51) displays the active block (0-7). The block can be selected and made active by the Block select bits (Blk Sel A,B.C), in the PLC Programming screen if Blk Sel Source (CP-478) is set to "1" (DigIn & PLC). Or the block can be selected and made active by the keypad if Blk Sel Source (CP-478) is set to "2" (Keypad Blk Sel).

Cntrl Loop

Control Loop (MP-49) displays the present operating mode of the CX-1200. Only one type of loop can be active at a time. These modes are automatically selected depending on the present system State (MP-50).

3 = Psn Hld (H-Stop Position Loop)
2 = Position Loop
1 = Velocity Loop
0 = Open Loop

CONTROL OVERRIDES   P2/4

Use the Control Overrides screen (page 2) to reset the position. Scroll to the item that you want to reset and press the Enter key to activate that item.

Reset Lead Position
Reset Foll Position
Reset Ld & Fol Posn

Reset Position Error
Reset Posn's &Err

Re-Learn

CONTROL OVERRIDES   P3/4

Use the Control Overrides screen (page 3) to effect the following control functions:

Negate Scaled Ref (change direction),
Stop Ramp
Stop Integral
Open Loop

Lead Sync Disable
Foll Sync Disable

Sync Disable

Scroll the cursor to the item that you want to activate and press Enter. The highlighter will appear and will remain on the function(s) that are active. If you want to deactivate a function, scroll the cursor to the function that you want to deactivate and press Enter. The highlighter will disappear and that function is no longer active.

The Cntrl Latch bits are OR'ed with the corresponding PLC Bits. Use either the PLC or the keypad to activate these functions.

CONTROL OVERRIDES   P4/4

You can also use this screen to select the source from which active block will be selected, as well as to monitor the active block.   Use Blk Sel Source (CP-478) to determine the source (Digital Inputs & PLC, Keypad Blk Sel, or Cntr 4 Cnt) from which the active block is will be selected. Enter “Keypad Blk Sel” (2) in Blk Sel Source (CP-478) to control the selection of the blocks from Keypad Blk Sel (CP-479), using the keyboard. Enter “DI & PLC” (1) in Blk Sel Source (CP-478) to control the selection of the blocks from the inputs.

State

State (MP-50) displays the present system operating state of the CX-1200 (see list below).   Only one operating state may be active at a time. To access either the “Run” or the “Jog” operating state, the F-Stop, R-Stop and H-Stop inputs must be closed.

9 = Not Defined	8 = Diagnostics	7 = Not Defined
6 = Not Defined	5 = Jog	4 = Not Defined
3 = Run	2 = H-Stop	1 = R-Stop
0 = F-Stop		

Blk Sel Source

Block Select Source (CP-478) determines whether the active block will be selected by the digital inputs and PLC, by Keypad Blk Sel (CP-479) or by Cntr4 Cnt.

3 = Cntr4 Cnt
2 = KyPd = Keypad Blk Sel
1 = DgIn = Digital Inputs/PLC (default)

Keypad Blk Sel

The Keypad Block Select (CP-479) determines which block will be active when Blk Sel Source (CP-478) is set to “2” (KyPd).

Active Blk

Active Block (MP-51) displays the active block (0-7). The block can be selected and made active by the Block select bits (Blk Sel A,B.C), in the PLC Programming screen if Blk Sel Source (CP-478) is set to “1” (DigIn & PLC). Or the block can be selected and made active by the keypad if Blk Sel Source (CP-478) is set to “2” (Keypad Blk Sel).

Setpoint X

Setpoint X (CP-201) displays the name and value of the setpoint that corresponds with the mode of operation selected in RUN Mode (CP-202). The setpoint could be the Master SP (CP-210), the Follower SP (CP-220) or the Direct SP (CP-230). Setpoint X acts as a quick access to the setpoint value. In addition to changing a setpoint value in the setpoint screens, you can also change the value of the active setpoint by entering a new value in Setpoint X (CP-201).

Run Mode

Run Mode (CP-202) sets the mode of operation and the subsequent Setpoint, that are used when your system is in “Run”. The Setpoint and mode of operation combined, determine the Reference Speed and, if applicable, the Reference Position. The modes of operation are:

4 = Inv Foll Mode
3 = Follower Mode
2 = Master Mode (default)
1 = Direct Mode

Sync Mode

Sync Mode (CP-203) selects the algorithm to be used when RUN Mode (CP-202) is set for Follower or Inverse Follower. 0 = Non-Sync Mode the position follower only, sync pulses are ignored by the control algorithm. 1 = Fixed Mode the follower setpoint is the ratio/scale factor. 2 = Trend Mode the follower setpoint is altered by the control algorithm to allow for continuously changing job sizes. 3 = Learn Mode learns the job spaces and the scale factor, also modifies the follower setpoint.

3 = Learn
2 = Trend
1 = Fixed (default)
0 = Off

Cntrl Loop

Control Loop (MP-49) displays the present operating mode of the CX-1200. Only one type of loop can be active at a time. These modes are automatically selected depending on the present system State (MP-50).

3 = Psn Hld (H-Stop Position Loop)
2 = Position Loop
1 = Velocity Loop
0 = Open Loop

—NOTES—

Serial Communications

INTRODUCTION TO SERIAL COMMUNICATIONS

The CX-1200 can interface with a host computer through a RS-485 Serial Communications Interface (refer to Figure 2-30, *CX-1200 Multidrop Installation*, page 2-24). This interface allows the host computer to perform remote control of the CX-1200, Control Parameter entry, and status or performance monitoring.

This following sections describe the three available interfaces for Serial Communications:

CX-1200 Serial Communications ASCII Data-Link Protocol
(Message Transmission / Response Structures)

CX-1200 Serial Communications ASCII2 Data-Link Protocol
(Message Transmission / Response Structures)

CX-1200 Serial Communications Binary Data-Link Protocol
(Message Transmission / Response Structures)

NOTE: Before you can apply Serial Communications, the CX-1200 must be interfaced with a host computer through a RS-485 Serial Communications Interface.

The CX-1200 comes factory pre-loaded with default Control Parameters for Serial Communications. These Control Parameters set up the CX-1200 to accommodate the RS-485 Serial Communications Interface. Generally, the default settings are suitable for most applications and do not require modification, however, these default parameters can be modified for your specific application.

All of the other Control Parameters can be modified as well, when communications have been established through the host computer using the Serial Communications Interface. To configure for Serial Communications, refer to *System Setup - Control Parameters: Device Configure, Serial Communications* section.

CX-1200 Serial Communications ASCII Data-Link Protocol

(Message Transmission / Response Structures)

STX	1 Byte ^B Char(2)
Address	2 ASCII Chars
Function	2 ASCII Chars
Message Error	2 ASCII Chars
Data Field	Number of characters defined by Function
ETX	1 Byte ^C Char(3)
CRC	4 ASCII HEX Chars (0000 - FFFF)

Number of constant characters per Transmission = 10 characters (Minimum # of characters)
CX-1200 Serial Communications Buffer Size = 255 characters (Maximum # of characters)
(leaves a maximum of 245 characters for the data field)

Note: In this document pertaining to ASCII protocols, any reference to ASCII HEX or “0-F” refers to ASCII representation of a HEX number using ASCII characters “0-9” & “A-F”.

Functions that are included in the ASCII Protocol:

01) Data Read Single Parameter
02) Data Write Single Parameter
03) Data Read Parm Block (14 parameter limit)
04) Data Write Parm Block (14 parameter limit)
05) Control Command Send
08) Data Read Custom Engineering Units
09) Data Write Custom Engineering Units
10) Data Read Constant Table (4 parameter limit)

Example:
Request Value for CP-210

Table 7-1 Data Read Single Parameter, Host Transmission

STX	ADDR		FUNC		DATA			EXT	CRC			
^B	0	1	0	1	2	1	0	^C	F	4	4	6

Definition of Message Elements

"STX"	Signals the start of transmission. (Host/CX-1200) A single byte ASCII Char (02) "^B".
"Address"	Address of the CX-1200 that will recognize and interpret the message. A two character ASCII number in the range of "01" - "99". ("@0" = Global Transmission)
"Function"	The CX-1200 function requested which defines the data structure to follow. It is a two character ASCII number in the range of "01"-"10" (accepted functions are defined above).
"Message Error" (Msg Error)	General transmission response from the CX-1200. This is a two character ASCII HEX number, in the range of "00" - "FF", which may indicate a serial communications error has occurred upon receipt of a message transmission.
"Data Field"	A field of variable length which contains the data for the function requested. The Data Field is defined for individual functions through out the following section.
"ETX"	Signals the end of the message. (Host/CX-1200) A single byte ASCII Char (03) "^C".
"CRC"	(Cyclic Redundancy Check) If CRC Enable is "ON", a CRC value is calculated and sent with each transmission. The CRC includes all message data except the STX byte. The data stream is checked against the CRC at the receiving end. The CRC is a four character ASCII HEX number in the range of "0000" - "FFFF".
"Format Character" (Fmt)	An ASCII character, in the range of "0-2"; where "0" indicates the value is "OK" as is, "1" indicates the value is negative and "2" indicates the value is in binary format.
"Resolution Character" (Res)	An ASCII character, in the range of "0-9", that indicates the number of digits to the right of the decimal point for the value.

FUNCTION (01) DATA READ SINGLE PARAMETER

Table 7-2 Host Transmission

Character #	1	2	3	4	5	6	7	8	9	10	11	12	13
DESC	STX	Address		Function		Parameter Number			ETX	CRC (0000 - FFFF)			
ASCII	^B	0-9	1-9	0	1	0-9	0-9	0-9	^C	0-F	0-F	0-F	0-F

Data Field - Parameter Number - 3 characters.

Message Length = 13 characters.

Table 7-3 CX-1200 Response

Character #	1	2	3	4	5	6-19	20	21	22	23	24
DESC	STX	Address		Msg Error		Data Field	ETX	CRC (0000 - FFFF)			
ASCII	^B	0-9	1-9	0-F	0-F	<below>	^C	0-F	0-F	0-F	0-F

Data Field per Table 7-3 (14 characters)

Character #	6	7	8	9	10	11	12	13	14	15	16	17	18	19
DESC	Error Code		Res	Fmt	Parameter Value (0000000000-9999999999)									
ASCII	0-3	0-9	0-9	0-2	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9

Parameter Error Code - 2 characters.
Resolution - 1 character (Number of digits to the right of the decimal point).
Format - 1 character (0 = OK as is, 1 = Negative value, 2 = Binary value).
Parameter Value - 10 character (Positive numeric value of the parameter).

Message Length = 24 characters.

FUNCTION (02) DATA WRITE SINGLE PARAMETER

Table 7-4 Host Transmission

Character #	1	2	3	4	5	6-20	21	22	23	24	25
DESC	STX	Address		Function		Data Field	ETX	CRC (0000 - FFFF)			
ASCII	^B	0-9	0-9	0	2	<below>	^C	0-F	0-F	0-F	0-F

Data Field per Table 7-4 (15 characters)

Character #	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
DESC	Parm Number			Res	Fmt	Parameter Value (0000000000-9999999999)									
ASCII	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9

Parameter Number - 3 characters.
Resolution - 1 character.
Format - 1 character.
Parameter Value - 10 characters.

Message Length = 25 characters.

Table 7-5 CX-1200 Response

Character #	1	2	3	4	5	6	7	8	9	10	11	12
DESC	STX	Address		Msg Error		Error Code		ETX	CRC (0000 - FFFF)			
ASCII	^B	0-9	1-9	0-F	0-F	0-3	0-9	^C	0-F	0-F	0-F	0-F

Data Field - Parameter Error Code - 2 characters.

Message Length = 12 characters

FUNCTION (03) DATA READ PARAMETER BLOCK

Table 7-6 Host Transmission

Character #	1	2	3	4	5	6-8	9	10	11	12	13
DESC	STX	Address		Function		Data Field	ETX	CRC (0000 - FFFF)			
ASCII	^B	0-9	1-9	0	3	<below>	^C	0-F	0-F	0-F	0-F

Data Field per Table 7-6
Number of Parameters x 3 characters/parameter (14 parameters max. = 42 characters)

Character #	6	7	8
DESC	Parameter Number 100's	Parameter Number 10's	Parameter Number 1's
ASCII	0-9	0-9	0-9

Parameter Number - 3 characters.

Message Length = 13 to 52 characters.

Data Field Example:
Data Read Block of 3 Parameters (MP-40, CP-201, CP-440)

Character #	6	7	8	9	10	11	12	13	14
DESC	Parameter 40			Parameter 101			Parameter 440		
ASCII	0	4	0	2	0	1	4	4	0

Table 7-7 CX-1200 Response

Character #	1	2	3	4	5	6-22	23	24	25	26	27
DESC	STX	Address		Msg Error		Data Field	ETX	CRC (0000 - FFFF)			
ASCII	^B	0-9	1-9	0-F	0-F	<below>	^C	0-F	0-F	0-F	0-F

Data Field per Table 7-7
Number of Parameters x 17 characters/parameter (14 parameters max. = 238 characters)

Character #	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
DESC	Parm Number			Error Code		Res	Fmt	Parameter Value (0000000000-9999999999									
ASCII	0-9	0-9	0-9	0-3	0-9	0-9	0-2	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9

Parameter Number - 3 characters.
Parameter Error Code - 2 characters.
Resolution - 1 character.
Format - 1 character.
Parameter Value - 10 characters.

Message Length = 27 to 248 characters.

FUNCTION (04) DATA WRITE PARAMETER BLOCK

Table 7-8 Host Transmission

Character #	1	2	3	4	5	6-20	21	22	23	24	25
DESC	STX	Address		Function		Data Field	ETX	CRC (0000 - FFFF)			
ASCII	^B	0-9	0-9	0	4	<below>	^C	0-F	0-F	0-F	0-F

Data Field per Table 7-8
Number of Parameters x 15 characters/parameter (14 parameters max. = 210 characters)

Character #	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
DESC	Parm Number			Res	Fmt	Parameter Value (0000000000-9999999999)									
ASCII	0-9	0-9	0-9	0-9	0-2	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9

Parameter Number - 3 characters.
Resolution - 1 characters.
Format - 1 characters.
Parameter Value - 10 characters.

Message Length = 25 to 220 characters.

Table 7-9 CX-1200 Response

Character #	1	2	3	4	5	6-10	11	12	13	14	15
DESC	STX	Address		Msg Error		Data Field	ETX	CRC (0000 - FFFF)			
ASCII	^B	0-9	1-9	0-F	0-F	<below>	^C	0-F	0-F	0-F	0-F

Data Field per Table 7-9
Number of Parameters x 5 characters/parameter (14 parameters max. = 70 characters)

Character #	6	7	8	9	10
DESC	Parameter Number			Parameter Error Code	
ASCII	0-9	0-9	0-9	0-3	0-9

Parameter Number - 3 characters.
Parameter Error Code - 2 characters.

Message Length = 15 to 80 characters.

FUNCTION (05) CONTROL COMMAND SEND

Table 7-10 Host Transmission

Character #	1	2	3	4	5	6	7	8	9	10	11	12
DESC	STX	Address		Function		Command		ETX	CRC (0000 - FFFF)			
ASCII	^B	0-9	0-9	0	5	0-2	0-9	^C	0-F	0-F	0-F	0-F

Data Field - Control Command - 2 characters
Valid Control Commands:

01 = F-Stop.
02 = R-Stop.
03 = H-Stop.
04 = Run.
05 = Jog Forward.
06 = Jog Reverse.
07 = Jog Stop.
09 = Reset Integral.
10 = Preset FB Position.
11 = Preset LD Position.
12 = Reset Position Error.
13 = Preset FB & LD Position.
14 = Preset FB, LD, & Reset Position Error.
17 = Negate Scaled Reference.
21 = Bypass Ramp.
22 = Stop Ramp.
23 = Open Loop.
24 = Stop Integral.

Message Length = 12 characters.

Table 7-11 CX-1200 Response

Character #	1	2	3	4	5	6	7	8	9	10	11	12
DESC	STX	Address		Msg Error		Cmd Error		ETX	CRC (0000 - FFFF)			
ASCII	^B	0-9	1-9	0-F	0-F	0-3	0-9	^C	0-F	0-F	0-F	0-F

Data Field - Command Error Code - 2 characters.

Message Length = 12 characters.

FUNCTION (08) DATA READ CUSTOM ENGINEERING UNITS

Table 7-12 Host Transmission

Character #	1	2	3	4	5	6	7	8	9	10
DESC	STX	Address		Function		ETX	CRC (0000-FFFF)			
ASCII	^B	0-9	1-9	0	8	^C	0-F	0-F	0-F	0-F

Data Field - 0 characters.

Message Length = 10 characters.

Table 7-13 CX-1200 Response

Character #	1	2	3	4	5	6-20	21	22	23	24	25
DESC	STX	Address		Msg Error		Data Field	ETX	CRC (0000 - FFFF)			
ASCII	^B	0-9	1-9	0-F	0-F	<below>	^C	0-F	0-F	0-F	0-F

Data Field per Table 7-13
Engineering Units Text - (1 to 15 characters)

Character #	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
DESC	Engineering Units Text														
ASCII	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~

Message Length = 11 to 25 characters.

Note: The Engineering Units Text string may be any string of printable ASCII characters of up to 15 characters long.

FUNCTION (09) DATA WRITE CUSTOM ENGINEERING UNITS

Table 7-14 Host Transmission

Character #	1	2	3	4	5	6-20	21	22	23	24	25
DESC	STX	Address		Function		Data Field	ETX	CRC (0000 - FFFF)			
ASCII	^B	0-9	0-9	0	9	<below>	^C	0-F	0-F	0-F	0-F

Data Field per Table 7-14
Engineering Units Text - (1 to 15 characters)

Character #	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
DESC	Engineering Units Text														
ASCII	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~	!- ~

Message Length = 11 to 25 characters.

Note: The Engineering Units Text String may be any string of printable ASCII characters of up to 15 characters long.

Table 7-15 CX-1200 Response

Character #	1	2	3	4	5	6	7	8	9	10	11	12
DESC	STX	Address		Msg Error		Error Code		ETX	CRC (0000 - FFFF)			
ASCII	^B	0-9	1-9	0-F	0-F	0-3	0-9	^C	0-F	0-F	0-F	0-F

Data Field - EU Text Error Code - 2 characters.

Message Length = 12 characters.

FUNCTION (10) DATA READ PARAMETER CONSTANT TABLE

Table 7-16 Host Transmission

Character #	1	2	3	4	5	6-8	9	10	11	12	13
DESC	STX	Address		Function		Data Field	ETX	CRC (0000 - FFFF)			
ASCII	^B	0-9	1-9	1	0	<below>	^C	0-F	0-F	0-F	0-F

Data Field per Table 7-16
Number of Parameters x 3 characters/parameter (4 parameters max. = 12 characters)

Character #	6	7	8
DESC	Parameter Number 100's	Parameter Number 10's	Parameter Number 1's
ASCII	0-9	0-9	0-9

Parameter Number - 3 characters.

Message Length = 13 to 22 characters.

Table 7-17 CX-1200 Response

Character #	1	2	3	4	5	6-241	242	243	244	245	246
DESC	STX	Address		Msg Error		Data Field	ETX	CRC (0000 - FFFF)			
ASCII	^B	0-9	1-9	0-F	0-F	<below>	^C	0-F	0-F	0-F	0-F

Data Field - Number of Parameters x 59 characters/parameter (4 parameters max. = 236 characters).

Parameter Number	- 3 characters	(000 - 999).
Parameter Error Code	- 2 characters	(00 - 32).
Title Text String	- 15 characters	(String of 15 printable ASCII characters).
Minimum Value Format*	- 1 character	(0 - 2).
Minimum Value*	- 10 characters	(0000000000 - 9999999999).
Maximum Value Format*	- 1 character	(0 - 2).
Maximum Value*	- 10 characters	(0000000000 - 9999999999).
Default Value Format*	- 1 character	(0 - 2).
Default Value*	- 10 characters	(0000000000 - 9999999999).
Minimum Resolution*	- 1 character	(0 - 9) Resolution for Minimum Value.
Maximum Resolution*	- 1 character	(0 - 9) Maximum Resolution for any value.
Default Resolution*	- 1 character	(0 - 9) Resolution for Default Value.
Parameter Control byte	- 2 characters	(ASCII HEX Number, 00 - FF).
Field Length	- 1 character	(0 - 9) Length of parameter field.

* These fields will be filled with zeros for all Monitor Parameter requests.

Message Length = 69 to 246 characters

Message Error Bits Definitions:

Bit 7	=	(1) CRC Failure
Bit 6	=	(1) Buffer Overflow
Bit 5	=	(1) ETX Not Received/Data Field Error
Bit 4	=	(1) Invalid Function/Data Error
Bit 3	=	(1) Over-Run Error
Bit 2	=	(1) Noise Error
Bit 1	=	(1) Framing Error
Bit 0	=	(1) Parity Error

Example:

“86” = the number 10000110 (binary) would indicate a CRC failure with Noise errors and Framing errors occurred when the transmission message was received.

Other Errors Returned From The Control Through Serial Communications:

00	=	OK
01	=	General Data Error
02	=	Res Byte Error
03	=	Invalid Parameter
04	=	String too Long
05	=	Out of Range
06	=	Not Allowed
07	=	Lockout During Run
08	=	Not Ready
09	=	Block Parameter Error
10	=	Block Value Error
11	=	Block Parameter Memory Limit
12	=	MIN Error
13	=	MAX Error
14	=	Invalid Command (PLC/Control Command Send)
15	=	Invalid Operand (PLC)
16	=	<END> Statement Missing (PLC)
17	=	PLC Program Memory Limit
18	=	Defaults Loaded
19	=	Backup Loaded
20	=	Backup Saved
21	=	Checksum Error
22	=	Faults Cleared
23	=	Test Passed
24	=	Test Failed
25	=	No Compare Parameter
26	=	Divide by Zero
27	=	Long Word Overflow
28	=	Parameter Transfer Limit Overflow
29	=	Memory Read request too long
30	=	Data Field Length Error
31	=	Message Function Request/Parameter NOT Processed
32	=	Invalid Function Request

Parameter Control Byte Definitions:

Bit 7 = (1) Negative Numbers are Possible (0) Positive Numbers Only
Bit 6 = (1) Leading Zero's OK (0) No Leading Zero's
Bit 5 = (1) Restricted (0) Not Restricted
Bit 4 = (1) Parameter Defined (0) Parameter is NOT Defined
Bit 3 = Not Used (Reserved) always 0
Bit 2 = (1) Floating Point Number (0) Fixed Decimal Point Number
Bit 1 = (1) Binary Number (0) Decimal Number
Bit 0 = (1) Integer (0) Non-Integer

Example of CRC-16 Calculation (in C):

```
#define CRC16  0x8005                         /* CRC-16 Generating Poly */

/* function returns the accumulated CRC value calculated for the Buffer */
/* this value can be transmitted or compared to a CRC value received */
/* "*data" is a pointer to the Buffer of data bytes to calculate the CRC for */
/* "len" is the number of data bytes to use for the calculation */

unsigned int do_crc(unsigned char *data, int len)
{
   int i, j;                                  /* byte & bit counters */
   unsigned int accum = 0xFFFF;               /* CRC value accumulator */
   unsigned int dat;                          /* holds data byte */

   for(i = 0; i < len; ++i){                  /* for each byte of data */
        dat = *data++;                        /* get data byte & goto next */
        accum ^= (dat << 8);                  /* put data into high byte */
        j = 0;                                /* clear bit counter */
        while(j++ < 8){                       /* for each bit */
             if(accum & 0x8000)               /* if MSB set */
                  accum ^= CRC16;             /* Modulus-2 math w/CRC 16 */
             accum <<= 1;                     /* shift left 1 bit */
        }                                     /* end for each bit */
   }                                          /* end for each byte */

return(accum);                                /* return the CRC value */
}                                             /* End do_crc function */
```

Note: This "CRC" must be converted to 4 ASCII characters before transmission. (Chars 0 to 9 and A to F should be used). For all "ASCII HEX" values the A through F characters must be in Upper Case when Transmitted in order to keep the conversions consistent.

CX-1200 Serial Communications ASCII2 Data-Link Protocol

(Message Transmission / Response Structures)

STX	1 Byte ^B Char(2)
Address	1 or 2 ASCII characters, normally followed by a comma
Data Field	Flexible field of ASCII characters defined later in this document
ETX	1 Byte ^C Char(3)

Note: The “ETX” character may be followed by “CRC” characters if “CRC Enable” is “ON”. Any reference to ASCII HEX or “0-F” refers to ASCII representation of a HEX number using ASCII characters “0-9” & “A-F”.

Functions that are included in the ASCII2 Protocol:

1) Control Acknowledgment
2) Data Read Single Parameter
3) Data Write Single Parameter
4) Control Command Send
5) Data Read Custom Engineering Units
6) Data Write Custom Engineering units
7) Data Read Parameter Title
8) Data Read Maximum Parameter Value
9) Data Read Minimum Parameter Value
10) Data Read Default Parameter Value
11) Data Read Backup Parameter Value
12) Data Read Value of the Maximum Parameter Field length
13) Data Read Parameter Control Byte

Definition of Message Elements

"STX"	Signals the start of a transmission. (Host/CX-1200) A single byte ASCII Char (02) "^B".
"Address"	Address of the CX-1200 to recognize and interpret the message. One or two ASCII characters, followed by a comma, in the range of "0-99". ("0" indicates a Global Transmission to be received by all controls on the serial link).
"Message Error" (Msg Error)	General transmission response from the CX-1200. This is a two character ASCII HEX number, in the range of "00" - "FF", which may indicate a serial communications error has occurred upon receipt of a message transmission.
"Data Field"	A field of variable length which contains the data for the function requested. The Data Field is defined for individual functions through out the following section.
"?"	Field terminator requesting response from the CX-1200.
","	Address and Data Field separator.
"="	Assignment operator indicating assignment of data to follow, or indicator of a parameter value to follow.
"."	Indicates a Constant Table Read of type to follow.
"!"	Indicates a Control Command Send.
"ETX"	Signals the end of the message. (Host/CX-1200) A single byte ASCII Char (03) "^C".
"CRC"	(Cyclic Redundancy Check) If CRC Enable is "ON", a CRC value is calculated and sent with each transmission. The CRC includes all message data except the STX byte. The data stream is checked against the CRC at the receiving end. The CRC is a four character ASCII HEX number in the range of "0000" - "FFFF".

Note: To conserve space, the CRC field has been omitted on all of the following message definition tables. If the CRC Enable is "ON", then a CRC value must be appended to each message transmission immediately following the ETX character.

FUNCTION (01) CONTROL ACKNOWLEDGMENT

Table 7-18 Host Transmission

Character #	1	2	3	4
DESC	STX	Address	Inquiry	ETX
ASCII	^B	1-99	?	^C

Address Field

This field may consist of one or two ASCII characters, depending on the address of the control. For example, if the address is less than 10, then only one ASCII character is required in this field. If the address is greater than 9, then two ASCII characters are required in this field to represent the address. Leading spaces in this field will be ignored.

Table 7-19 CX-1200 Response

Character #	1	2	3	4	5
DESC	STX	Msg Error	Separator	ACK	ETX
ASCII	^B	0-FF	,	^F	^C

Msg Error Field

This field may consist of one or two ASCII HEX characters that indicate any serial communications errors that may have occurred when the message transmission was received.

ACK

This field acknowledges that the control exists (represented by ASCII character #6). If there is not a control at the address indicated, there will not be a response.

FUNCTION (02) DATA READ SINGLE PARAMETER

Table 20 Host Transmission

Character #	1	2	3	4	5	6
DESC	STX	Address	Separator	Parm #	Inquiry	ETX
ASCII	^B	1-99	,	0-999	?	^C

Parm # Field

This field may consist of one or more ASCII characters representing the parameter number requested. If the parameter number is less than 10, then a single ASCII character may be used to represent the parameter number. If the parameter number is in the range of 10 to 99, then two characters are required to represent the parameter number. If the parameter number is 100 or greater, then three characters are required to represent the parameter number. Any leading spaces will be ignored.

Table 21 CX-1200 Response

Character #	1	2	3	4	5	6	7
DESC	STX	Msg Error	Separator	Parm #	Equals	Value	ETX
ASCII	^B	0-FF	,	0-999	=	<below>	^C

Value Field

This field will consist of an ASCII string representing the value for the parameter requested. If there is an error retrieving the parameter value, this field will contain the error code number preceded by an "E" (e.g., "E3").

Examples with No Error:

decimal integer value of 1	"1"
decimal integer value of 1000	"1000"
decimal integer value of -20	"-20"
decimal value of 1234.56	"1234.56"
decimal value of -15.00	"-15.00"
Binary value of 89_D	"01011001"

FUNCTION (03) DATA WRITE SINGLE PARAMETER

Table 22 Host Transmission

Character #	1	2	3	4	5	6	7	8
DESC	STX	Address	Separator	Parm #	Assign	Value	Inquiry	ETX
ASCII	^B	0-99	,	0-999	=	<below>	?	^C

Value Field

This field will consist of an ASCII string representing the value to be assigned to the parameter. Leading spaces in this field will be ignored.

Examples:

decimal integer value of 1	"1"
decimal integer value of 1	" 1"
decimal integer value of 1000	"1000"
decimal integer value of -20	"-20"
decimal value of 1234.56	"1234.56"
decimal value of -15.00	"-15.00"
Binary value of 89_D	"01011001"

Inquiry Field (Inq)

The inclusion of the inquiry designator is optional. If no response is required this character may be omitted from the message. If this character field is not included in the message, the operation will be performed, however the control will not respond.

Table 23 CX-1200 Response

Character #	1	2	3	4	5	6	7
DESC	STX	Msg Error	Separator	Parm #	Equals	Value	ETX
ASCII	^B	0-FF	,	0-999	=	<below	^C

Value Field

This field will consist of an ASCII string representing the value assigned to the parameter. If an error occurred in the assignment operation, this field will contain the error code number preceded by an "E" (e.g., "E3").

Value Field Examples with No Error:

decimal integer value of 1	"1"
decimal integer value of 1000	"1000"
decimal integer value of -20	"-20"
decimal value of 1234.56	"1234.56"
decimal value of -15.00	"-15.00"
Binary value of 89_D	"01011001"

FUNCTION (04) CONTROL COMMAND SEND

Table 24 Host Transmission

Character #	1	2	3	4	5	6
DESC	STX	Address	Separator	Command	Inquiry	ETX
ASCII	^B	0-99	,	ASCII2 Command String	?	^C

List of Valid ASCII2 Command Strings:

FST!	=	F-Stop
ULD!	=	Unload
HST!	=	H-Stop
RUN!	=	Run
LDD!	=	Load
PUD!	=	Set Unwind Diameter to Preset value
PWD!	=	Set Wind Diameter to Preset value
PUC!	=	Set Unwind Roll Content to Preset value
PWC!	=	Set Wind Roll Content to Preset value
PAU!	=	Set Unwind Diameter and Roll Content to Preset values
PAW!	=	Set Wind Diameter and Roll Content to Preset values
RAP!	=	Set Both Wind and Unwind Diameter and Roll Content to Preset values
NSR!	=	Negate the Line Speed Scaled Reference
OLW!	=	Open Loop Wind
FWI!	=	Freeze the Wind Integral
STR!	=	Stop the Line Speed Ramp
OLU!	=	Open Loop Unwind
FUI!	=	Freeze the Unwind Integral

Command Field

Insert any of the valid ASCII2 command strings defined above.

Inquiry Field (Inquiry)

The inclusion of the inquiry designator is optional. If no response is required this character may be omitted from the message. If this character field is not included in the message, the commanded operation will be performed, however the control will not respond.

Table 25 CX-1200 Response

Character #	1	2	3	4	5
DESC	STX	Msg Error	Separator	Command	ETX
ASCII	^B	0-FF	,	<below>	^C

Command Field

If the requested command is acted upon, this field will contain the command string that was sent. If an error occurred, this field will contain an “E” followed immediately by an ASCII representation of the error code number which occurred. (e.g., “E31”)

FUNCTION (05) DATA READ CUSTOM ENGINEERING UNITS

Table 26 Host Transmission

Character #	1	2	3	4	5	6	7
DESC	STX	Msg Error	Separator	EU Request		Inquiry	ETX
ASCII	^B	1-99	,	E	U	?	^C

Table 27 CX-1200 Response

Character #	1	2	3	4	5	6	7	8
DESC	STX	Msg Error	Separator	EU Indicator		Equals	EU Text	ETX
ASCII	^B	0-FF	,	E	U	=	<below>	^C

Engineering Unit Text Field

This field will contain the custom engineering units text string from the control's memory. (Up to 15 printable ASCII characters long)

FUNCTION (06) DATA WRITE CUSTOM ENGINEERING UNITS

Table 28 Host Transmission

Character #	1	2	3	4	5	6	7	8	9
DESC	STX	Address	Separator	EU Indicator		Assign	EU Text	Inquiry	ETX
ASCII	^B	0-99	,	E	U	=	<below>	?	^C

EU Text Field

This field should contain a string of up to 15 printable ASCII characters that are to be assigned to the custom engineering units text for the control at the indicated address.

Inquiry Field (Inquiry)

The inclusion of the inquiry designator is optional. If no response is required this character may be omitted from the message. If this character field is not included in the message, the commanded operation will be performed, however the control will not respond.

Table 29 CX-1200 Response

Character #	1	2	3	4	5	6	7	8
DESC	STX	Msg Error	Separator	EU Indicator		Equals	EU Text	ETX
ASCII	^B	0-FF	,	E	U	=	<below>	^C

Engineering Unit Text Field

If the assignment is successful, this field will contain the custom engineering units text string assigned. (Up to 15 printable ASCII characters long) If an error occurred in the assignment operation, this field will contain the error code number preceded by an “E” (e.g., “E4”).

Data Read Constant Table

7) Data Read Parameter Title
8) Data Read Maximum Parameter Value
9) Data Read Minimum Parameter Value
10) Data Read Default Parameter Value
11) Data Read Backup Parameter Value
12) Data Read Value of the Maximum Parameter Field length
13) Data Read Parameter Control Byte

Note: For all constant table reads, the host transmission message structure is the same differing only by the read command following the period.

Table 30 Host Transmission

Character #	1	2	3	4	5	6	7	8	9	10
DESC	STX	Address	Separator	Parm Number			CTR	Type	Inquiry	ETX
ASCII	^B	1-99	,	0-9	0-9	0-9	.	<below>	?	^C

Constant Table Read Type Strings:

TTL	=	Parameter Title Text
MAX	=	Maximum Parameter Value
MIN	=	Minimum Parameter Value
DEF	=	Default Parameter Value
BKU	=	Backup Parameter Value
FLD	=	Parameter Field length
CTB	=	Parameter Control Byte

CTR Field

This field should always be a period designating a Constant Table Read of type to follow for the indicated parameter.

Type Field

Insert the desired constant table read type string into this field. The control will respond with the appropriate data for the type of read requested. This is a three character field.

FUNCTION (07) DATA READ PARAMETER TITLE

Table 31 CX-1200 Response

Character #	1	2	3	4	5	6	7
DESC	STX	Msg Error	Separator	Parm #	Equals	Parm Title Text	ETX
ASCII	^B	0-FF	,	1-999	=	<below>	^C

Parm Title Text Field

This field will contain an ASCII string of 15 characters for the title of the parameter requested. If there is an error in the request, this field will contain the error code number preceded by an “E” (e.g., “E3”).

FUNCTION (08) DATA READ MAXIMUM PARAMETER VALUE

Table 32 CX-1200 Response

Character #	1	2	3	4	5	6	7
DESC	STX	Msg Error	Separator	Parm #	Equals	Max Parm Value	ETX
ASCII	^B	0-FF	,	1-999	=	<below>	^C

Max Parm Value Field

This field will contain an ASCII string Representation of the numeric maximum value for the parameter requested. If there is an error in the request, this field will contain the error code number preceded by an “E” (e.g., “E3”).

FUNCTION (09) DATA READ MINIMUM PARAMETER VALUE

Table 33 CX-1200 Response

Character #	1	2	3	4	5	6	7
DESC	STX	Msg Error	Separator	Parm #	Equals	Min Parm Value	ETX
ASCII	^B	0-FF	,	1-999	=	<below>	^C

Min Parm Value Field

This field will contain an ASCII string Representation of the numeric minimum value for the parameter requested. If there is an error in the request, this field will contain the error code number preceded by an “E” (e.g., “E3”).

FUNCTION (10) DATA READ DEFAULT PARAMETER VALUE

Table 34 CX-1200 Response

Character #	1	2	3	4	5	6	7
DESC	STX	Msg Error	Separator	Parm #	Equals	Default Parm Value	ETX
ASCII	^B	0-FF	,	1-999	=	<below>	^C

Default Parm Value Field

This field will contain an ASCII string Representation of the numeric default value for the parameter requested. If there is an error in the request, this field will contain the error code number preceded by an “E” (e.g., “E3”).

FUNCTION (11) DATA READ BACKUP PARAMETER VALUE

Table 35 CX-1200 Response

Character #	1	2	3	4	5	6	7
DESC	STX	Msg Error	Separator	Parm #	Equals	Backup Parm Value	ETX
ASCII	^B	0-FF	,	1-999	=	<below>	^C

Backup Parm Value Field

This field will contain an ASCII string Representation of the numeric backup value for the parameter requested. If there is an error in the request, this field will contain the error code number preceded by an "E" (e.g., "E3").

FUNCTION (12) DATA READ VALUE OF THE MAXIMUM PARAMETER FIELD LENGTH

Table 36 CX-1200 Response

Character #	1	2	3	4	5	6	7
DESC	STX	Msg Error	Separator	Parm #	Equals	Parm Field Length	ETX
ASCII	^B	0-FF	,	1-999	=	0-9	^C

Parm Field Length Field

This field will contain an ASCII character, of the range 0 to 9, for the field length of the parameter requested. If there is an error in the request, this field will contain the error code number preceded by an “E” (e.g., “E3”).

FUNCTION (13) DATA READ PARAMETER CONTROL BYTE

Table 37 CX-1200 Response

Character #	1	2	3	4	5	6-13	14
DESC	STX	Msg Error	Separator	Parm #	Equals	Parm Control Byte	ETX
ASCII	^B	0-FF	,	1-999	=	0-1	^C

Parameter Control Byte Field

This field will contain an ASCII string of 8 characters, of the range 0 to 1, representing, in binary format, the parameter control byte for the parameter requested. If there is an error in the request, this field will contain the error code number preceded by an “E” (e.g., “E3”).

Parameter Control Byte field per Table 37

Character #	6	7	8	9	10	11	12	13
DESC	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
ASCII	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1

Parameter Control Byte Definitions:

Bit 7 = (1) Negative Numbers are Possible (0) Positive Numbers Only
Bit 6 = (1) Leading Zero’s OK (0) No Leading Zero’s
Bit 5 = (1) Restricted (0) Not Restricted
Bit 4 = (1) Parameter Define (0) Parameter is NOT Defined
Bit 3 = Not Used (Reserved) always 0
Bit 2 = (1) Floating Decimal Point Number (0) Fixed Decimal Point Number
Bit 1 = (1) Binary Number (0) Decimal Number
Bit 0 = (1) Integer (0) Non-Integer

Message Error Response Field
Consists of 2 Bytes (ASCII “HEX”)
“ASCII HEX” means the numeric value in the field is NOT represented as a decimal (Base 10) Number. The Number is represented by the characters: 0 through 9 and A through F for the HEX equivalent of the binary number.

Message Error Bit Definitions:

Bit 7 = (1) CRC Failure
Bit 6 = (1) Buffer Overflow
Bit 5 = (1) ETX Not Received/Data Field Error
Bit 4 = (1) Invalid Function/Data Error
Bit 3 = (1) Over-Run Error
Bit 2 = (1) Noise Error
Bit 1 = (1) Framing Error
Bit 0 = (1) Parity Error

Example:

“86” = the number 10000110 (binary) would indicate a CRC failure with Noise errors and Framing errors occurred when the transmission message was received.

Other Errors Returned From The Control Through Serial Communications:

00	=	OK
01	=	General Data Error
02	=	Res Byte Error
03	=	Invalid Parameter
04	=	String too Long
05	=	Out of Range
06	=	Not Allowed
07	=	Lockout During Run
08	=	Not Ready
09	=	Block Parameter Error
10	=	Block Value Error
11	=	Block Parameter Memory Limit
12	=	MIN Error
13	=	MAX Error
14	=	Invalid Command (PLC/Control Command Send)
15	=	Invalid Operand (PLC)
16	=	<END> Statement Missing (PLC)
17	=	PLC Program Memory Limit
18	=	Defaults Loaded
19	=	Backup Loaded
20	=	Backup Saved
21	=	Checksum Error
22	=	Faults Cleared
23	=	Test Passed
24	=	Test Failed
25	=	No Compare Parameter
26	=	Divide by Zero
27	=	Long Word Overflow
28	=	Parameter Transfer Limit Overflow
29	=	Memory Read request too long
30	=	Data Field Length Error
31	=	Message Function Request/Parameter NOT Processed
32	=	Invalid Function Request

Note: In the ASCII2 protocol the error codes listed above are preceded by an “E” (e.g., “E32” indicates an Invalid Function Request)

Example of CRC-16 Calculation (in C):

```
#define CRC16  0x8005                          /* CRC-16 Generating Poly */

/* function returns the accumulated CRC value calculated for the Buffer */
/* this value can be transmitted or compared to a CRC value received */
/* "*data" is a pointer to the Buffer of data bytes to calculate the CRC for */
/* "len" is the number of data bytes to use for the calculation */

unsigned int do_crc(unsigned char *data, int len)
{
   int i, j;                                   /* byte & bit counters */
   unsigned int accum = 0xFFFF;                /* CRC value accumulator */
   unsigned int dat;                           /* holds data byte */

   for(i = 0; i < len; ++i){                   /* for each byte of data */
         dat = *data++;                        /* get data byte & goto next */
         accum ^= (dat << 8);                  /* put data into high byte */
         j = 0;                                /* clear bit counter */
         while(j++ < 8){                       /* for each bit */
              if(accum & 0x8000)               /* if MSB set */
                   accum ^= CRC16;             /* Modulus-2 math w/CRC 16 */
              accum <<= 1;                     /* shift left 1 bit */
         }                                     /* end for each bit */
   }                                           /* end for each byte */

return(accum);                                 /* return the CRC value */
}                                              /* End do_crc function */
```

Note: This "CRC" must be converted to 4 ASCII characters before transmission. (Chars 0 to 9 and A to F should be used). For all "ASCII HEX" values the A through F characters must be in Upper Case when Transmitted in order to keep the conversions consistent.

CX-1200 Serial Communications Binary Data-Link Protocol

(Message Transmission / Response Structures)

STX	BYTE
Length	BYTE
Address	BYTE
Function	BYTE
Message Error	BYTE
Data Field	Defined later for each function type
ETX	BYTE
CRC	WORD (2 BYTES)

Valid Binary Protocol Functions:

1) Data Read Single Parameter
2) Data Write Single Parameter
3) Data Read Parameter Block (Limit 16)
4) Data Write Parameter Block (Limit 16)
5) Control Commands
6) PLC Program Download from Control
7) PLC Program Upload to Control
8) Custom Engineering Units Download
9) Custom Engineering Units Upload
10) Data Read Constant Table (Limit 6)
11) Parameter Data Trace Enable/Disable (enables/disables the CX-1200's ability to collect data traces)
12) Data Read Parameter Trace (read consecutive trace data from the CX-1200)
13) Data Read Trace Status Byte

Example:
Request for CP-210

Table 38 Data Read Single Parameter, Host Transmission

STX	LEN	ADDR	FUNC	DATA	ETX	CRC
02	09	01	01	00D2	03	0C56

Definition of Message Elements

"STX"	Signals the start of a transmission (Host/CX-1200)
"Length"	Length of complete message in bytes including STX, ETX, & CRC
"Address"	Address of the CX-1200
"Function"	Defines the data structure that is expected to follow and what action the CX-1200 will take.
"Message Error"	This is a general transmission error response from the CX-1200.
"Data Field"	A field of variable length which contains the data for the function requested. The Data Field is defined for individual functions through out the following section.
"ETX"	Signals the end of a data transmission (Host/CX-1200)
"CRC"	(Cyclic Redundancy Check) The CRC is calculated and sent with each transmission. It includes all message data except the STX byte. The data stream is checked against the CRC at the receiving end.
"Resolution Character" (Res)	An ASCII character, in the range of "0-9", that indicates the number of digits to the right of the decimal point for the value.

FUNCTION (01) DATA READ SINGLE PARAMETER

Table 39 Host Transmission

Byte #	1	2	3	4	5	6	7	8	9
DESC	STX	Length	Address	Function	Parm Number		ETX	CRC	
Decimal	2	9	1-99	1	1-999		3	0-65535	
Hex	02	09	01-63	01	0001-03E7		03	0000-FFFF	

Message Length = 9 bytes

Table 40 CX-1200 Response

Byte #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
DESC	STX	Length	Address	Msg Error	Error Code	Control Byte	Res	Parameter Value				ETX	CRC	
Decimal	2	14	1-99	0-255	0-32	0-244	0-9	-2147483648 2147483647				3	0-65535	
Hex	02	0E	01-63	00-FF	00-20	00-F4	00-09	80000000-7FFFFFFF				03	0000-FFFF	

Data Field -(7 Bytes)

Parameter Error Code - 1 byte
Parameter Control byte - 1 byte
Resolution - 1 byte
Parameter Value - LONG (4 bytes)

Message Length = 14 bytes

FUNCTION (02) DATA WRITE SINGLE PARAMETER

Table 41 Host Transmission

Byte #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
DESC	STX	Length	Address	Func	Parm Number		Res	Parameter Value				ETX	CRC	
Decimal	2	14	0-99	2	101-999		0-9	-2147483648 2147483647				3	0-65535	
Hex	02	0E	00-63	02	0065-03E7		00-09	80000000-7FFFFFFF				03	0000-FFFF	

Data Field -(7 Bytes)

Parameter Number - WORD (2 bytes)
Resolution - 1 byte
Parameter Value - LONG (4 bytes)

Message Length = 14 bytes

Table 42 CX-1200 Response

Byte #	1	2	3	4	5	6	7	8
DESC	STX	Length	Address	Msg Error	Error Code	ETX	CRC	
Decimal	2	8	1-99	0-255	0-32	3	0-65535	
Hex	02	08	01-63	00-FF	00-20	03	0000-FFFF	

Message Length = 8 bytes

FUNCTION (03) DATA READ PARAMETER BLOCK

Table 43 Host Transmission

Byte #	1	2	3	4	5	6	7	8	9
DESC	STX	Length	Address	Function	Parm Number		ETX	CRC	
Decimal	2	9-39	1-99	3	1-999		3	0-65535	
Hex	02	09-27	01-63	03	0001-03E7		03	0000-FFFF	

Data Field per Table 43
Number of parameters x 2 bytes/parameter (16 parameters max. = 32 bytes)

Parameter Number - WORD (2 bytes) for each parameter request

Message Length = 9 to 39 bytes

Table 44 CX-1200 Response

Byte #	1	2	3	4	5-13	14	15	16
DESC	STX	Length	Address	Msg Error	Data Field	ETX	CRC	
Decimal	2	16-151	1-99	0-255	<below>	3	0-65535	
Hex	02	10-97	01-63	00-FF	<below>	03	0000-FFFF	

Data Field per Table 44
Number of parameters x 9 bytes/parameter (16 parameters max. = 144 bytes)

Byte #	5	6	7	8	9	10	11	12	13
DESC	Error Code	Parmameter Number		Control Byte	Res	Parameter Value			
Decimal	0-32	1-999		0-244	0-9	-2147483648-2147483647			
Hex	00-20	0000-03E7		00-F4	00-09	80000000-7FFFFFFF			

Parameter Error Code - 1 byte
Parameter Number - WORD (2 bytes)
Parameter Control byte - 1 byte
Resolution - 1 byte
Parameter Value - LONG (4 bytes)

Message Length = 16 to 151 bytes

FUNCTION (04) DATA WRITE PARAMETER BLOCK

Table 45 Host Transmission

Byte #	1	2	3	4	5-11	12	13	14
DESC	STX	Length	Address	Function	Data Field	ETX	CRC	
Decimal	2	14-199	0-99	4	<below>	3	0-65535	
Hex	02	0E-77	00-63	04	<below>	03	0000-FFFF	

Data Field per Table 45
Number of parameters x 7 bytes/parameter (16 parameters max. = 112 bytes)

Byte #	5	6	7	8	9	10	11
DESC	Parameter Number		Resolution	Parameter Value			
Decimal	101-999		0-9	-2147483648 to 2147483647			
Hex	0065-03E7		00-09	80000000-7FFFFFFF			

Parameter Number - WORD (2 bytes)
Resolution - 1 byte
Parameter Value - LONG (4 bytes)

Message Length = 14 to 119 bytes

Table 46 CX-1200 Response

Byte #	1	2	3	4	5-7	8	9	10
DESC	STX	Length	Address	Msg Error	Data Field	ETX	CRC	
Decimal	2	10-55	1-99	0-255	<below>	3	0-65535	
Hex	02	0A-37	01-63	00-FF	<below>	03	0000-FFFF	

Data Field per Table 46
Number of Parameters x 3 bytes/parameter (16 parameters max. = 48 bytes)

Byte #	5	6	7
DESC	Error Code	Parameter Number	
Decimal	0-32	1-999	
Hex	00-20	001-03E7	

Parameter Error Code - BYTE
Parameter Number - WORD (2 Bytes)

Message Length = 10 to 55 bytes

FUNCTION (05) DATA WRITE CONTROL COMMAND

Table 47 Host Transmission

Byte #	1	2	3	4	5	6	7	8
DESC	STX	Length	Address	Function	Command	ETX	CRC	
Decimal	2	8	0-99	5	1-24	3	0-65535	
Hex	02	08	00-63	05	01-18	03	0000-FFFF	

Valid Control Commands:

01 (01) = F-Stop
02 (02) = R-Stop
03 (03) = H-Stop
04 (04) = Run
05 (05) = Jog Forward
06 (06) = Jog Reverse
07 (07) = Jog Stop
09 (09) = Reset Integral
10 (0A) = Preset Feedback Position
11 (0B) = Preset Lead Position
12 (0C) = Reset Position Error
13 (0D) = Preset Feedback & Lead Position
14 (0E) = Preset Feedback & Lead Position and Reset Position Error
17 (11) = Negate Scaled Reference
21 (15) = Bypass Ramp
22 (16) = Stop Ramp
23 (17) = Open Loop
24 (18) = Stop Integral

Message Length = 8 bytes

Table 48 CX-1200 Response

Byte #	1	2	3	4	5	6	7	8
DESC	STX	Length	Address	Msg Error	Error Code	ETX	CRC	
Decimal	2	8	1-99	0-255	0-32	3	0-65535	
Hex	02	08	01-63	00-FF	00-20	03	0000-FFFF	

Message Length = 8 bytes

FUNCTION (06) DATA READ PLC PROGRAM

Table 49 Host Transmission

Byte #	1	2	3	4	5	6	7	8
DESC	STX	Length	Address	Function	PLC Type	ETX	CRC	
Decimal	2	8	1-99	6	0-1	3	0-65535	
Hex	02	08	01-63	06	00-01	03	0000-FFFF	

PLC Program Type:

00 = Default Program
01 = Current User Program

Message Length = 8 bytes

Table 50 CX-1200 Response

Byte #	1	2	3	4	5-132	133	134	135
DESC	STX	Length	Address	Msg Error	PLC Program	ETX	CRC	
Decimal	2	9-135	1-99	0-255	0-255	3	0-65535	
Hex	02	09-87	01-63	00-FF	00-FF	03	0000-FFFF	

PLC Program Field - (2 to 128 Bytes)
This field will contain the PLC Program Requested, which may be any where from 2 to 128 bytes of data. The format for this data will be in pairs of Commands & Operands:

PLC Command - 1 byte
PLC Operand - 1 byte

Refer to *Appendices: Appendix K* for the PLC Program Commands and *Appendices: Appendix L* for the PLC Program Operands.

Message Length = 9 to 135 bytes

FUNCTION (07) DATA WRITE PLC PROGRAM

Table 51 Host Transmission

Byte #	1	2	3	4	5-132	133	134	135
DESC	STX	Length	Address	Function	PLC Program	ETX	CRC	
Decimal	2	9-135	0-99	7	0-255	3	0-65535	
Hex	02	09-87	00-63	07	00-FF	03	0000-FFFF	

PLC Program Field - (2 to 128 Bytes)
This field should contain a PLC Program, which may be any where from 2 to 128 bytes of data. The format for this data should be in pairs of Commands & Operands:

PLC Command - 1 byte
PLC Operand - 1 byte

Refer to *Appendices: Appendix K* for the PLC Program Commands and *Appendices: Appendix L* for the PLC Program Operands.

Message Length = 9 to 135 bytes

Table 52 CX-1200 Response

Byte #	1	2	3	4	5	6	7	8
DESC	STX	Length	Address	Msg Error	Error Code	ETX	CRC	
Decimal	2	8	1-99	0-255	0-32	3	0-65535	
Hex	02	08	01-63	00-FF	00-20	03	0000-FFFF	

Message Length = 8 bytes

FUNCTION (08) DATA READ CUSTOM ENGINEERING UNITS

Table 53 Host Transmission

Byte #	1	2	3	4	5	6	7
DESC	STX	Length	Address	Function	ETX	CRC	
Decimal	2	7	1-99	8	3	0-65535	
Hex	02	07	01-63	08	03	0000-FFFF	

Message Length = 7 bytes

Table 54 CX-1200 Response

Byte #	1	2	3	4	5-19	20	21	22
DESC	STX	Length	Address	Msg Error	EU Text	ETX	CRC	
Decimal	2	8-22	1-99	0-255	<below>	3	0-65535	
Hex	02	08-16	01-63	00-FF	<below>	03	0000-FFFF	

EU Text Field - Engineering Units Text String (0 to 15 Printable ASCII characters)

Message Length = 7 to 22 bytes

FUNCTION (09) DATA WRITE CUSTOM ENGINEERING UNITS

Table 55 Host Transmission

Byte #	1	2	3	4	5-19	20	21	22
DESC	STX	Length	Address	Function	EU Text	ETX	CRC	
Decimal	2	8-22	0-99	9	<below>	3	0-65535	
Hex	02	08-16	00-63	09	<below>	03	0000-FFFF	

EU Text Field - Engineering Units Text String (1 to 15 Printable ASCII characters)

Message Length = 8 to 22 bytes

Table 56 CX-1200 Response

Byte #	1	2	3	4	5	6	7	8
DESC	STX	Length	Address	Msg Error	Error Code	ETX	CRC	
Decimal	2	8	1-99	0-255	0-32	3	0-65535	
Hex	02	08	01-63	00-FF	00-20	03	0000-FFFF	

Message Length = 8 bytes

FUNCTION (10) DATA READ CONSTANT TABLE

Table 57 Host Transmission

Byte #	1	2	3	4	5-6	7	8	9
DESC	STX	Length	Address	Function	Parameter #	ETX	CRC	
Decimal	2	9-19	1-99	10	1-999	3	0-65535	
Hex	02	09-13	01-63	0A	0001-03E7	03	0000-FFFF	

Parameter Number Field - Number of parameters x 2 bytes/parameter (6 parameters max. = 12 bytes)

Message Length = 9 to 19 bytes

Table 58 CX-1200 Response

Byte #	1	2	3	4	5-220	221	222	223
DESC	STX	Length	Address	Msg Error	Data Field	ETX	CRC	
Decimal	2	43-223	1-99	0-255	<below>	3	0-65535	
Hex	02	2B-DF	01-63	00-FF	<below>	03	0000-FFFF	

Data Field - Number of parameters x 36 bytes/parameter (6 parameters max. = 216 bytes)

Parameter Number	-WORD (2 bytes) (0000 - 03E7)
Parameter Error Code	-1 byte (00 - 20)
Parameter Title	-16 bytes (String of 16 Printable ASCII characters)
Minimum Value*	-LONG (4 bytes) (80000000 - 7FFFFFFF)
Maximum Value*	-LONG (4 bytes) (80000000 - 7FFFFFFF)
Default Value*	-LONG (4 bytes) (80000000 - 7FFFFFFF)
Resolution for Minimum*	-1 byte (00 - 09)
Maximum Resolution*	-1 byte (00 - 09)
Resolution for Default*	-1 byte (00 - 09)
Parameter Control byte	-1 byte (00 - F4)
Field Length	-1 byte (00 - 09)

* These fields will be filled with zeros for all Monitor Parameter requests.

Message Length = 43 to 223 bytes

FUNCTION (11) PARAMETER TRACE ENABLE/DISABLE

This function is used to setup and control the CX-1200 internal data collection feature: "Data Trace".

CX-1200 internal data collection feature

The CX-1200 control has the capability to record 1 millisecond samples of up to 4 monitor parameters. The total size is 8192 samples (data points). The number of "Traces" (monitor parameters sampled) may be 1 (single trace), 2 (dual trace), or 4 (quad trace). The number of samples collected per trace are listed below:

Number of Samples per Trace

# of Trace Parameters	Description	Samples per Trace Parameter	Total Sample Time
1	Single Trace	8192	8.192 Sec
2	Dual Trace	4096	4.096 Sec
4	Quad Trace	2048	2.048 Sec

Configuration:

For a single trace, set the value for Trace Parameter 1 to the desired monitor parameter number, and set the rest of the Trace Parameters to zero (0).

For a dual trace, set the values for Trace Parameter 1 and 2 to the desired monitor parameter numbers, and set the rest of the Trace Parameters to zero (0).

For a quad trace, set all of the values for Trace Parameters 1 thru 4 to the desired monitor parameter numbers.

Trigger:

The trace sampling begins when a "trigger" is encountered, after the "data trace" has been enabled. The trigger is signaled through the PLC program by the "start trace" bit (167) transition from 0 to 1.

The CX-1200 control has the capability to collect "pre-trigger" data samples. These are samples collected prior to a "trigger". The "pre-trigger time" is variable from 0 seconds to 2.000 seconds, and is setup by the pre-trigger time (Pre-Trig) value and resolution in a "Set Trace Configuration" message (defined later in this section).

Actions taken by the CX-1200 control in response to this function (11) are controlled by a "message control byte" defined below.

Control Byte Definitions:

Bit 7 = Not Used (always 0)
Bit 6 = Not Used (always 0)
Bit 5 = Not Used (always 0)
Bit 4 = Not Used (always 0)
Bit 3 = Not Used (always 0)
Bit 2 = (1) Set Trace configuration (Pre-Trigger setting, and all Trace Parameter numbers)
Bit 1 = (1) Read Data Trace configuration (Pre-Trigger setting, and all Trace Parameter numbers)
Bit 0 = (1) Enable the Data Trace collection and wait for a trigger point (0) Disable the Trace collection "stop"

Message Control byte definition description:

Value	CX-1200 Control actions	CX-1200 Response
00	Disable Trace, stop collecting data	Error code
01	Enable Trace, wait for trigger	Error code
02	Read Trace Configuration, ignore bit 0	Status Byte, Trace Configuration
03	Read Trace Configuration, ignore bit 0	Status Byte, Trace Configuration
04	Set Trace Config, Disable Trace, stop	Configuration Error Codes
05	Set Trace Config, Reset Trace, wait for trigger	Configuration Error Codes
06	Set & Read Trace Config & Disable Trace, stop	Error Codes & Trace Configuration
07	Set & Read Trace Config & Reset, wait for trigger	Error Codes & Trace Configuration

Trace Status Byte Definitions:

Bit 7 = Not Used (always 0)
Bit 6 = Not Used (always 0)
Bit 5 = Not Used (always 0)
Bit 4 = Not Used (always 0)
Bit 3 = (1) Trace complete (0) Trace not complete
Bit 2 = (1) Trace active, trigger encountered, collecting data (0) No Trigger encountered
Bit 1 = (1) Trigger enabled, collecting data, waiting for trigger (0) Trigger disabled
Bit 0 = (1) Trace enabled (0) Trace disabled

Trace Status Byte values:

00 = Trace disabled
01 = Trace enabled
03 = Trace enabled, collecting pre-trigger data, waiting for trigger
05 = Trace enabled, trigger encountered, collecting data
08 = Trace complete, data collected

Set Trace Configuration, Read Trace Configuration, and enable or disable the internal trace data capture
Message Control byte value: 6 or 7

Table 59 Host Transmission

Byte #	1	2	3	4	5	6 - 16	17	18	19
DESC	STX	Length	Address	Function	Control	Data Field	EXT	CRC	
Decimal	2	19	1-99	11	6 or 7	<below>	3	0 - 65535	
Hex	02	13	01 - 63	0B	06 or 07	<below>	03	0000 - FFFF	

Data Field per Table 59

Byte #	6	7	8	9	10	11	12	13	14	15	16
DESC	Trace Parm 1		Trace Parm 2		Trace Parm 3		Trace Parm 4		Pre-Trigger		Resolution
Decimal	0 - 90		0 - 90		0 - 90		0 - 90		0.000 - 2.000		0 - 3
Hex	0000 - 005A		0000 - 005A		0000 - 005A		0000 - 005A		0000 - 07D0		00 - 03

Message length = 19 bytes
Result: Trace parameters 1 to 4 and the pre-trigger time value are all set, and the Trace Data collection is enabled or disabled. The values for the Trace Parameters are returned along with the Pre-Trigger setting.

Table 60 CX-1200 Response

Byte #	1	2	3	4	5 - 20	21	22	23
DESC	STX	Length	Address	Msg Error	Data Field	ETX	CRC	
Decimal	2	23	1 - 99	0 - 255	<below>	3	0 - 65535	
Hex	02	17	01-63	00 - FF	<below>	03	0000 - FFFF	

Data Field per Table 60

Byte #	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
DESC	Error	Trace Parm 1		Error	Trace Parm 2		Error	Trace Parm 3		Error	Trace Parm 4		Error	Pre-Trigger		Res
Decimal	0-32	0-90		0-32	0-90		0-32	0-90		0-32	0-90		0-32	0.000-2.000		0-3
Hex	00-20	0000-005A		00-20	0000-005A		00-20	0000-005A		00-20	0000-005A		00-20	0000-07D0		00-03

Message length = 23 bytes

Response Data Field Definitions:

Byte #	Type	Description
5	byte	Error code result from Setting Trace Parameter 1
6-7	UINT	Trace Parameter 1 value
8	byte	Error code result from Setting Trace Parameter 2
9-10	UINT	Trace Parameter 2 value
11	byte	Error code result from Setting Trace Parameter 3
12-13	UINT	Trace Parameter 3 value
14	byte	Error code result from Setting Trace Parameter 4
15-16	UINT	Trace Parameter 4 value
17	byte	Error code result from Setting Pre-Trigger Time
18-19	UINT	Pre-Trigger Time value setting (seconds)
20	byte	Pre-Trigger Time value resolution byte

Set Trace Configuration and enable or disable the internal trace data capture.
Message Control byte value: 4 or 5

Table 61 Host Transmission

Byte #	1	2	3	4	5	6 - 16	17	18	19
DESC	STX	Length	Address	Function	Control	Data Field	EXT	CRC	
Decimal	2	19	1 - 99	11	4 or 5	<below>	3	0 - 65535	
Hex	02	13	01 - 63	0B	04 or 05	<below>	03	0000 - FFFF	

Data Field per Table 61

Byte #	6	7	8	9	10	11	12	13	14	15	16
DESC	Trace Parm 1		Trace Parm 2		Trace Parm 3		Trace Parm 4		Pre-Trigger		Resolution
Decimal	0 - 90		0 - 90		0 - 90		0 - 90		0.000 - 2.000		0 - 3
Hex	0000 - 005A		0000 - 005A		0000 - 005A		0000 - 005A		0000 - 07D0		00 - 03

Message length = 19

Result: Trace parameters 1 to 4 and the pre-trigger time value are all set, and the Trace Data collection is enabled or disabled.

Table 62 CX-1200 Response

Byte #	1	2	3	4	5 - 9	10	11	12
DESC	STX	Length	Address	Msg Error	Data Field	ETX	CRC	
Decimal	2	12	1 - 99	0 - 255	<below>	3	0 - 65535	
Hex	02	0C	01-63	00 - FF	<below>	03	0000 - FFFF	

Data Field per Table 62

Byte #	5	6	7	8	9
DESC	TrcParm 1 Error	TrcParm 2 Error	TrcParm 3 Error	TrcParm 4 Error	Pre-Trigger Error
Decimal	0 - 32	0 - 32	0 - 32	0 - 32	0 - 32
Hex	00 - 20	00 - 20	00 - 20	00 - 20	00 - 20

Message length = 12 bytes

Read Trace Configuration
Message Control byte value: 2 or 3

Table 63 Host Transmission

Byte #	1	2	3	4	5	6	7	8
DESC	STX	Length	Address	Function	Control	EXT	CRC	
Decimal	2	8	1 - 99	11	2 or 3	3	0 - 65535	
Hex	02	08	01 - 63	0B	02 or 03	03	0000 - FFFF	

Message length = 8 bytes

Result: The Data Trace is neither enabled nor disabled. The Trace configuration is simply returned in the response along with the Trace Status byte.

Table 64 CX-1200 Response

Byte #	1	2	3	4	5 - 16	17	18	19
DESC	STX	Length	Address	Msg Error	Data Field	ETX	CRC	
Decimal	2	19	1 - 99	0 - 255	<below>	3	0 - 65535	
Hex	02	13	01-63	00 - FF	<below>	03	0000 - FFFF	

Data Field per Table 64

Byte #		6	7	8	9	10	11	12	13	14	15	16
DESC	Status	Trace Parm 1		Trace Parm 2		Trace Parm 3		Trace Parm 4		Pre-Trigger		Res
Decimal	0-8	0 - 90		0 - 90		0 - 90		0 - 90		0 - 2.000		0 - 3
Hex	00-08	0000 - 005A		0000 - 005A		0000 - 005A		0000 - 005A		0000 - 07D0		00 - 03

Message length = 19 bytes

Table 65 Host Transmission

Byte #	1	2	3	4	5	6	7	8
DESC	STX	Length	Address	Function	Data	ETX	CRC	
Decimal	2	8	1-99	11	0-1	3	0-65535	
Hex	02	08	01-63	0B	00-01	03	0000-FFFF	

Data Field:

00 = Disable Data Trace Collection

01 = Enable Data Trace Collection and reset data pointers to the beginning, start collecting new data and wait for a trigger point.

Message Length = 8 bytes

Table 66 CX-1200 Response

Byte #	1	2	3	4	5	6	7	8
DESC	STX	Length	Address	Msg Error	Error Code	ETX	CRC	
Decimal	2	8	1-99	0-255	0-32	3	0-65535	
Hex	02	08	01-63	00-FF	00-20	03	0000-FFFF	

An Error Code of “00” indicates that the action was taken and was completed. Refer to page 7-53 for other error code responses.

Message Length = 8 bytes

FUNCTION (12) DATA READ PARAMETER TRACE

Use this function to read consecutive trace data from the control, re-read the last data set, or reset and re-read the trace data from the beginning again.

Table 67 Host Transmission

Byte #	1	2	3	4	5	6	7	8
DESC	STX	Length	Address	Function	Control	ETX	CRC	
Decimal	2	8	1-99	12	0-2	3	0-65535	
Hex	02	08	01-63	0C	00-02	03	0000-FFFF	

Control Byte (5) definition:
- 00 = Reset and re-read from beginning
- 01 = Continue reading from end of the last data point that was read
- 02 = Re-read the prior data segment

Message Length = 8 bytes

Table 68 CX-1200 Response

Byte #	1	2	3	4	5-245	246	247	248
DESC	STX	Length	Address	Msg Error	Data Field	ETX	CRC	
Decimal	2	12-248	1-99	0-255	<below>	3	0-65535	
Hex	02	0C	01-63	00-FF	<below>	03	0000-FFFF	

Data Field per Table 68
Length = 1 + [4 x Number of data points]

Byte #	5	6	7	8	9
DESC	Status/Error Code	Trace Data			
Decimal	0-32	-2147483648-2147483647			
Hex	00-20	80000000-7FFFFFFF			

Trace Read Status/Error Code - 1 byte/response
Trace Data - LONG (4 bytes/data point*)
*Maximum of 60 Data Points/Transmission (1 + [4 x 60] = 241 bytes)

Message Length = 12 to 248 bytes

FUNCTION (13) READ PARAMETER TRACE DATA/RE-READ PREVIOUS

Use this function to read the trace status byte.
Status Byte Definitions:

Bit 7	=	Not Defined (always 0)
Bit 6	=	Not Defined (always 0)
Bit 5	=	Not Defined (always 0)
Bit 4	=	Not Defined (always 0)
Bit 3	=	(1) Trace Complete (0) Not Complete
Bit 2	=	(1) Trace Active (trigger encountered, collecting data) (0) Not Active
Bit 1	=	(1) Trace Enabled (waiting for trigger to occur) (0) Disabled
Bit 0	=	(1) Trace Enabled (0) Disabled

Table 69 Host Transmission

Byte #	1	2	3	4	5	6	7
DESC	STX	Length	Address	Function	ETX	CRC	
Decimal	2	8	1-99	13	3	0-65535	
Hex	02	08	01-63	0D	03	0000-FFFF	

Message Length = 7 bytes

Table 70 CX-1200 Response

Byte #	1	2	3	4	5	6	7	8
DESC	STX	Length	Address	Msg Error	Status	ETX	CRC	
Decimal	2	8	1-99	0-255	0-8	3	0-65535	
Hex	02	08	01-63	00-FF	00-08	03	0000-FFFF	

Status Bytes values:

Bits:	76543210	Decimal:	Description
	00000000	= 0	Trace Disabled, no data collected.
	00000001	= 1	Trace Enabled.
	00000011	= 3	Trace Enabled, waiting for trigger.
	00000101	= 5	Trigger Encountered, collecting data.
	00001000	= 8	Trigger Complete, collecting data.

Message Length = 8 bytes

Message Error Response Field

This field consists of one byte. Each bit in the byte may be set to 1 indicating a specific error has occurred.

Message Error Bits Definitions:

Bit 7	=	(1) CRC Failure
Bit 6	=	(1) Buffer Overflow
Bit 5	=	(1) ETX Not Received/Data Field Error
Bit 4	=	(1) Invalid Function/Data Error
Bit 3	=	(1) Over-Run Error
Bit 2	=	(1) Noise Error
Bit 1	=	(1) Framing Error
Bit 0	=	(1) Parity Error

Example:

"86" = the number 10000110 (binary) would indicate a CRC failure with Noise errors and Framing errors occurred when the transmission message was received.

Other Errors Returned From Control Through The Serial Communications

0 (00)	=	OK
1 (01)	=	General Data Error
2 (02)	=	Res Byte Error
3 (03)	=	Invalid Parameter
4 (04)	=	String too Long
5 (05)	=	Out of Range
6 (06)	=	Not Allowed
7 (07)	=	Lockout During Run
8 (08)	=	Not Ready
9 (09)	=	Block Parameter Error
10 (0A)	=	Block Value Error
11 (0B)	=	Block Parameter Memory Limit
12 (0C)	=	MIN Error
13 (0D)	=	MAX Error
14 (0E)	=	Invalid Command (PLC/Control Command Send)
15 (0F)	=	Invalid Operand (PLC)
16 (10)	=	<END> Statement Missing (PLC)
17 (11)	=	PLC Program Memory Limit
18 (12)	=	Defaults Loaded
19 (13)	=	Backup Loaded
20 (14)	=	Backup Saved
21 (15)	=	Checksum Error
22 (16)	=	Faults Cleared
23 (17)	=	Test Passed
24 (18)	=	Test Failed
25 (19)	=	No Compare Parameter
26 (1A)	=	Divide by Zero
27 (1B)	=	Long Word Overflow
28 (1C)	=	Parameter Transfer Limit Overflow
29 (1D)	=	Memory Read request too long
30 (1E)	=	Data Field Length Error
31 (1F)	=	Message Function Request/Parameter NOT Processed
32 (20)	=	Invalid Function Request

Control Byte Definitions:

Bit 7	=	(1) Negative Numbers Allowed (0) Positive Numbers only
Bit 6	=	(1) Leading Zero's (0) No Leading Zero's
Bit 5	=	(1) Restricted Parameter (0) Unrestricted Parameter
Bit 4	=	(1) Parameter Defined (0) Undefined Parameter
Bit 3	=	Not Used (always 0)
Bit 2	=	(1) Floating Decimal Point (0) Fixed Decimal Point
Bit 1	=	(1) Binary Number (0) Decimal Number
Bit 0	=	(1) Integer (0) Non-Integer

Note: Applies to Parameters & Parameter Values

Example of CRC-16 Calculation (in C):

```
#define CRC16  0x8005                       /* CRC-16 Generating Poly */

/* function returns the accumulated CRC value calculated for the Buffer */
/* this value can be transmitted or compared to a CRC value received */
/* “*data” is a pointer to the Buffer of data bytes to calculate the CRC for */
/* “len” is the number of data bytes to use for the calculation */

unsigned int do_crc(unsigned char *data, int len)
{
   int i, j;                                /* byte & bit counters */
   unsigned int accum = 0xFFFF;             /* CRC value accumulator */
   unsigned int dat;                        /* holds data byte */

   for(i = 0; i < len; ++i){                /* for each byte of data */
         dat = *data++;                     /* get data byte & goto next */
         accum ^= (dat << 8);               /* put data into high byte */
         j = 0;                             /* clear bit counter */
         while(j++ < 8){                    /* for each bit */
              if(accum & 0x8000)            /* if MSB set */
                   accum ^= CRC16;          /* Modulus-2 math w/CRC 16 */
              accum <<= 1;                  /* shift left 1 bit */
         }                                  /* end for each bit */
   }                                        /* end for each byte */

return(accum);                              /* return the CRC value */
}                                           /* End do_crc function */
```

Troubleshooting/Diagnostics

DEVICE TESTS

The Device Tests screens allow you to test the memory, keypad and display of the CX-1200. You can also test the analog and digital I/O as well as the serial communications and calibrate the Analog Inputs. Processor fault conditions and counters can be monitored. The software revision level, the model and the release date is also available. If any test fails, contact Contrex Technical Support at (763) 424-7800 or (800) 342-4411.

The CX-1200 Device Tests screens are:

- Hardware Tests
- STD Signal Tests
- DIG I/O Tests
- Aux Analog Tests
- Serial Comm Test
- Device Status
- Device Model & Rev

HARDWARE TESTS / MEMORY   P1/3

Use the Hardware Tests / Memory (page 1) to test the CX-1200's memory. Enter the number in Memory Test (CP-490) that corresponds to the section of memory that you want to test (see list below), then press the Enter key. To test all three sections, enter a “4”, then press the Enter key.

4 = Test ALL MEMORY
3 = Test NVRAM
2 = Test SRAM
1 = Test ROM
0 = Test Done

You can also refer to page 1 of the Memory Test's (CP-490) Help screen for the test list and the corresponding numeric codes. You can enter a test from the Help screen by scrolling the highlight bar to the test and pressing the Enter key.

When the test(s) are complete, the ROM Test (MP-94), SRAM Test (MP-95) and NVRAM Test (MP-96) will update and indicate whether the test passed or failed. A message will flash in the message bar, as well. At the completion of the test, the value of Memory Test (CP-490) will automatically return to “0” (test done).

If any test fails, contact Contrex Technical Support at (763) 424-7800 or (800) 342-4411.

Memory Test

To test the physical memory, either enter the number associated with the test (see list below) in Memory Test (CP-490) or go to the Help screen for Memory Test (CP-490) and choose the test. The test result will flash in the error and message status bar at the bottom of the screen and is also summarized in the Diagnostics/Device Tests Memory screen. The test results are also available through Monitor Parameters MP-94, MP-95, MP-96.

4 = Test ALL MEMORY
3 = Test NVRAM
2 = Test SRAM
1 = Test ROM
0 = Test Done

ROM Test

ROM Test (MP-94) displays the result of the most recent ROM Test. ROM Test runs a checksum test on the CX-1200 program memory.

1 = Memory Test Fail
0 = Memory Test Pass

SRAM Test

SRAM Test (MP-95) displays the result of the most recent SRAM Test. SRAM Test runs a read/write test on the scratch-pad memory.

1 = Memory Test Fail
0 = Memory Test Pass

NVRAM Test

Non Volatile RAM Test (MP-96) displays the result of the most recent Non Volatile RAM Test. The test runs both a read/write and a checksum test on the nonvolatile memory. The parameter values, the PLC program and the backups are all stored in this memory.

1 = Memory Test Fail
0 = Memory Test Pass

HARDWARE TESTS / KEYPAD P2/3

Use the Hardware Tests / Keypad (page 2) to test the keypad. Press the Enter key to start the test. The "START" text on the first line of screen will change to "EXIT" and you can begin testing the keys (with the exception of the Enter key). Press each key individually. Each of the keys should register a number in the Keypad Buffer line that corresponds with the numbers listed in Figure 8-1. A key has failed the test if its number does not correspond with the numbers that are listed in Figure 8-1. Press the Enter key to exit the test.

KeyPad Lockout

Keypad Lockout (MP-103) displays the Keypad Lockout status. The Keypad Lockout is active when "On" is displayed. When Keypad Lockout is active, Control Parameter values can not be changed, with the exception of the Control Parameters that are exempted by CP's 480-489. The Keypad Lockout is not active when "OFF" is displayed. When the Keypad Lockout is not active, any Control Parameter can be changed.

Figure 8-1 The Hardware Tests Corresponding Keypad Numbers

HARDWARE TESTS / VIDEO P3/3

Use the Hardware Tests / Video (page 3) to test the screen display. Either enter a “1 ”in Video Test (CP-492) and press the Enter key to start the test. You can also use the increment scroll-up key, to start the test. The Display Diagnostic instructional screen will appear. Use the Page Up or Page Down keys to step through each test.

Each screen uses a different display combination to test the display hardware. The Contrast Test will automatically scroll through a range of contrast. Refrain from pressing a key during this test and allow the Contrast Test to complete its cycle. To exit the tests, and return to the Hardware Tests Display screen (page 3), press the Menu key.

Video Test

To start the Video Test, enter “1” in Video Test (CP-492). Then use the Page Up/Down keys to page through tests. Press the Menu key to exit the tests and return to the previous screen.

Video Mode

Video Mode (CP-474) determines how the LCD Screen Display will be displayed, per the list below:

3 = Standard Video w/Border
2 = Reverse Video
1 = Standard Video (default)

Contrast Value

Contrast Value (CP-475) determines the contrast for the LCD Screen Display. The higher values darken the pixels and lower values lighten the pixels.

—NOTES—

STD SIGNAL TESTS

The STD Signal Tests screens allow you to test the control output and the frequency inputs. The STD Signals Tests / Frequency Inputs screen (page 1) displays the Monitor Parameters that are associated with FI1 Frequency Input and the FI2 Frequency Input. Input a known frequency and monitor the results here.

Use the STD Signals Tests / Control Output screen (page 2) to test the Control Output (CO_Sig). The Control Output (CO_Sig) is the CX-1200 output signal that is input to the drive. Temporarily disconnect the signal from the drive and use a scope or voltmeter to verify the Control Output (CO_Sig) operation.

NOTE: The CX-1200 must be in “F-Stop" when you begin the diagnostics. To start the diagnostics, enter a “1” for Unwind, "2" for Wind or "3" for Both into Diagnostics En (CP-450) and press the Enter key.

Select the type of output test in Diag DAC Test (CP-453). The output test types are:

2 = Immediate Output (an immediate step to a constant voltage)
1 = Continuous Ramp (a continuous ramp to plus and minus voltage - if bipolar mode)
0 = Disabled (default)

In continuous ramp (1), you can set the ramp time.

Diag DAC Volts (CP-454) determines the voltage that is output for the “Immediate Output” test (2). This is also the peak voltage that the “Continuous Ramp” test (1) will reach. Diag DAC Bits (CP-455) also determines the voltage, but in terms of the DAC bit value. Diag DAC Test (CP-453) is limited to ± CO Max Volts (CP-271).

Diag Rmp Tm (CP-456) determines the slope of the ramp for the continuous ramp. This is the time in seconds that it takes to increase the voltage from 0 volts to the Diag DAC Volts (CP-454). In order to get every possible bit combination, the continuous ramp must ramp at a time of 32.767 seconds or more and the Diag DAC Volts (CP-454) must be equal to the CO Max Volts (CP-271). In this scenario, CO Max Volts (CP-271) must be 15 volts. The ramp should appear without discontinuity, even at low voltage.

The purpose of the CO Offset (CP-273) is to cancel any electrical offsets that may be present on the Control Output (CO_Sig) when the CX-1200 is calling for “0” volts on the output. Set Diagnostics En (CP-450) to “1” for (ON) and Diag DAC Test (CP-453) to “2” (Immediate Output), then set the Diag DAC Volts (CP-454) to “0” and measure the voltage on pin J3-1 relative to J3-2. Enter the negative of the voltage reading in CO Offset (CP-273) and then verify that the voltage on the Control Output (CO_Sig) reads at or close to “0” volts.

STD SIGNAL TESTS / FREQUENCY INPUTS   P1/2

The STD Signals Tests / Frequency Inputs screen (page 1) displays the Monitor Parameters that are associated with FI1 Frequency Input and the FI2 Frequency Input. Input a known frequency and monitor the results here.

FI1 Hz

Frequency Input 1 Hertz (MP-01) displays the current frequency of the Frequency Input 1, in Hertz.

FI1 RPM

Frequency Input 1 RPM (MP-02) displays the current speed of the Frequency Input 1 encoder in RPM, based on PPR FI1 (CP-261).

FI1 EU/Tm

Frequency Input 1 Engineering Units per Time (MP-05) displays the current speed of the Frequency Input 1 in the Engineering Units per Time (EU/Tm) relative to the Pulses FI1 (CP-262), EU FI1 (CP-263) and Time Base (CP-209). The placement of the decimal point is the same as the placement of the decimal point in EU FI1 (CP-263).

FI2 Hz

Frequency Input 2 Hz (MP-03) displays the current frequency of the Frequency Input 2, in Hertz.

FI2 RPM

Frequency Input 2 RPM (MP-04) displays the current speed of the Frequency Input 2 encoder in RPM, based on PPR FI2 (CP-266).

FI2 EU/Tm

Frequency Input 2 Engineering Units per Time (MP-06) displays the current speed of the Frequency Input 2 in the Engineering Units per Time (EU/Tm) relative to the Pulses FI2 (CP-267), EU FI2 (CP-268) and Time Base (CP-209). The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

STD SIGNAL TESTS / CONTROL OUTPUT   P2/2

The STD Signals Tests / Control Output screen (page 2) displays the Control and Monitor Parameters that are associated with the CO_SigU. Use this screen to perform a variety of tests that verify the operation of the CO_SigU.

Diagnostics En

When Diagnostics Enable (CP-450) is set to "1" (On or enabled), the digital inputs will not recognize their normal function and the digital outputs can be controlled by Diag DO (CP-452). In addition, the CO_Sig Control Output can be tested. When you enter diagnostics, Diag DO (CP-452) is forced equal to the current DO 7..0 (MP-102) so that there is no unexpected change in the outputs. Change the outputs through Diag DO (CP-452) while performing the diagnostics.

Warning: The actuator may energize if you change Diag DO (CP-452). Stand clear of the system.

1 = On
0 = Off (default)

Diag DAC Test

Diagnostic DAC Test (CP-453) selects and enables the type of output control that is used for the diagnostic Control Output DAC test.

2 = Immediate Output
1 = Continuous Ramp
0 = Disabled (default)

Diag DAC Volts

Diagnostic DAC Volts (CP-454) is the maximum voltage output (either positive or negative) at the Control Output DAC during a non zero diagnostic DAC test . The voltage corresponds to Diag DAC Bits (CP-455).

Diag DAC Bits

Diagnostic DAC Bits (CP-455) is the maximum value in bits written (either positive or negative) to the Control Output DAC during a non zero diagnostic DAC test (CP-453) and when Diag En (CP-450) is set to "1" (On or enabled). The value corresponds to Diag DAC Volts (CP-454).

Diag Rmp Tm

Diagnostic Ramp Time (CP-456) is the time, in seconds, from 0 volts to either positive or negative Diag DAC Volts (CP-454) during a diagnostic DAC test with a ramp.

CO Max Volts

Control Output Maximum Volts (CP-271) sets the upper limit on the voltage sent to the drive. Bipolar operation assumes plus or minus this value. It should be set equal, or lower, than the input specifications of the drive.

CO Offset

Control Output Offset (CP-273) adjusts for small variations in the specifications of certain IC devices on this particular controller board. Usually a very small number, it serves to true up the 0 volts end point of the output voltage scale. It is preset at the factory, and should not need field adjustments.

CO Volts

Control Output Volts (MP-37) displays the present value, in volts, of the Control Output (CO_Sig) signal to the drive. It is the combination of FeedFwd (MP-35) plus Trim Out (MP-36).

State

State (MP-50) displays the present system operating state of the CX-1200 (see list below). Only one operating state may be active at a time. To access either the "Run" or the "Jog" operating state, the F-Stop, R-Stop and H-Stop inputs must be closed.

9 = Not Defined	8 = Diagnostics	7 = Not Defined
6 = Not Defined	5 = Jog	4 = Not Defined
3 = Run	2 = H-Stop	1 = R-Stop
0 = F-Stop		

DIGITAL I/O TEST P1/1

Use the Digital I/O Test to activate the digital outputs and monitor the digital inputs without the inputs being in actual operation. To enter the diagnostics state, enter a "1" in Diagnostics En (CP-450) or use the increment scroll-up key. ***Danger: The CX-1200 must be in "F-Stop" when you begin the diagnostics.*** The Diag DO (CP-452) will automatically set to the current state of the Digital Outputs. This will prevent any unexpected change on the outputs. Determine the binary value for Diag DO (CP-452) that places a "1" in the bits corresponding to the digital outputs that you want active and a "0" in the bits corresponding to the outputs that you want inactive. ***Danger: Changing the digital outputs may cause movement in your system.*** Enter this value into Diag DO (CP-452). Verify that the outputs are active (low). The Digital Inputs can be monitored in DI 7..0 (MP-102) and DI 15..8 (MP-101). Short the corresponding pin common of the inputs to make the output active. Monitor these MP's to verify that the active pins are recognized (a "1" appears in the corresponding bit).

Diagnostics En

When Diagnostics Enable (CP-450) is set to "1" (On or enabled), the digital inputs will not recognize their normal function and the digital outputs can be controlled by Diag DO (CP-452). In addition, the CO_Sig Control Output can be tested. When you enter diagnostics, Diag DO (CP-452) is forced equal to the current DO 7..0 (MP-102) so that there is no unexpected change in the outputs. Change the outputs through Diag DO (CP-452) while performing the diagnostics.

Warning: The actuator may energize if you change Diag DO (CP-452). Stand clear of the system.

1 = On
0 = Off (default)

Diag DO

Diagnostic Digital Out (CP-452) controls the digital outputs when Diagnostics En (CP-450) is set to "1, 2 or 3" (On or enabled) during diagnostics. It is an 8 Bit Binary number with 1 bit per output. If the bit is a "1", then the corresponding output is pulled "low". When you enter diagnostics, Diag DO (CP-452) is forced equal to the current DO 7..0 (MP-102) so that there is no unexpected change in the outputs. Change the outputs through Diag DO (CP-452) while performing the diagnostics.

Warning: The actuator may energize if you change Diag DO (CP-452). Stand clear of the system.

Diag DO Shift

When in Diagnostics State, Diagnostics Digital Out Shift (CP-451) may be used to activate the digital outputs one at a time.

Warning: The actuator may energize if you change Diag DO (CP-452). Stand clear of the system.

8 = Drive Enable	Activated
7 = Fwd/Rvs Alm	Activated
6 = Batch Done	Activated
5 = Foll Sync Absent	Activated
4 = Lead Sync Absent	Activated
3 = Sync Alarm	Activated
2 = Hi/Low Spd Alm	Activated
1 = Zero Speed	Activated
0 = Off (default)	

DI 7..0

Digital Input 7..0 (MP-100) displays the value of the "J6" digital inputs. A '1' in the bit location indicates a "low voltage" condition on the corresponding input (which is consistent with a contact closure to common). Refer to *Appendices: Appendix C* for the DI 7..0 (MP-100) bit map list.

DI 15..8

Digital Input 15..8 (MP-101) displays the value of the "J7" digital inputs. A '1' in the bit location indicates a "low voltage" condition on the corresponding input (which is consistent with a contact closure to common). These eight inputs can be set up in the PLC Programming screen to generate a One-Shot -Pulse on a high-to-low transition. Refer to *Appendices: Appendix C* for the DI 15..8 (MP-101) bit map list.

DIGITAL I/O TEST P1/1 continued

DO 7..0

Digital Output 7..0 (MP-102) displays the value of the “J2” digital outputs. A ‘1’ in the bit location indicates an active “low voltage” condition on the corresponding open collector output (which would sink DC current). Refer to *Appendices: Appendix C* for the DO 7..0 (MP-102) bit map list.

State

State (MP-50) displays the present system operating state of the CX-1200 (see list below). Only one operating state may be active at a time. To access either the “Run” or the “Jog” operating state, the F-Stop, R-Stop and H-Stop inputs must be closed.

9 = Not Defined	8 = Diagnostics	7 = Not Defined
6 = Not Defined	5 = Jog	4 = Not Defined
3 = Run	2 = H-Stop	1 = R-Stop
0 = F-Stop		

DANGER

The CX-1200 should not be in “Run” or “Jog” when you begin the diagnostics.

Changing the digital outputs may cause movement in your system.

—NOTES—

ANALOG INPUT TESTS

The Auxiliary Analog tests screens display the input screen (page 1), the output screen (page 2) and the calibration screen (page 3). The Analog Input screen displays the Monitor Parameters that monitor the results of inputing a voltage or current. The Analog Output screen displays the Monitor Parameters that monitor the Auxiliary Analog Output. Use the Aux Analog Calibration screen (page 3) to calibrate the Auxiliary Analog I/O; AI1, AI2 and AO. The boards is calibrated at the factory and are adequate for most applications. However, you may need to re-calibrate if your application demands more accuracy in a specific range or if you need to calibrate directly to EU/Tm with a known signal level on the inputs. The following sections will explain the calibration for Analog Output (voltage), Analog Output (current), Analog Input 1 (voltage), Analog Input 1 (current), Analog Input 2 (voltage), Analog Input 2 (current), and calibration together with scaling.

Analog Output (voltage):

1. Connect a voltmeter between pins 10 and 11 with the positive lead on pin 10 (pin 11 is common).

2. Set AO Mode (CP-291) to “Volts” (1).

3. Set Analog Cal Sel (CP-461) to AO (3) to Select AO for calibration.

4. Set Analog Cal Ref (CP-462) to “A” (1) to select point A.

NOTE: The old calibration data will be overwritten.

5. Set Analog Cal EN (CP-460) to “On” (1) to start calibration.

6. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want set for point A. This is generally your smallest (or negative) voltage point. A -12 volts requires about -29500 bits, -10 volts about -24500 bits, 0 volts about 0 bits. For -12 volts, start with about -29400 and use the incremental scroll key .

7. Enter the exact voltage measured by the meter into AnalogRef Val (CP-463).

8. Set Analog Cal Ref (CP-462) to “B” (2) to select point B.

9. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want use for point B. This is usually your largest (or positive) voltage point. A +12 volts requires about 30100 bits, 10 volts about 25100 bits, 0 volts about 0 bits. For 12 volts, start with about 30000 and use the incremental scroll key.

10. Enter the exact voltage measured by the meter into AnalogRef Val (CP-463).

11. Set Analog Cal EN (CP-460) to “Off” (0) to disable further calibration.

Analog Output (current):

1. Connect a current meter in series with a 250 Ohm resistor between pins 9 and 11 with the positive lead on pin 9 (pin 11 is common). Connect the meter in series with the load.

2. Set AO Mode (CP-291) to “Current” (2).

3. Set Analog Cal Sel (CP-461) to AO (3) to Select AO for calibration.

4. Set Analog Cal Ref (CP-462) to “A” (1) to select point A.

NOTE: The old calibration data will be overwritten.

5. Set Analog Cal EN (CP-460) to “On” (1) to start calibration.

6. Adjust AO Bit Set (CP-464) until the meter reads the current you want to set for point A. This is generally your smallest current point. A 4 milliamp setting requires about -14450 bits, 0.5 milliamps about -24000 bits and 1.0 milliamps about -22600. For 4 milliamps, start with about -14300 and use the incremental scroll key.

7. Enter the exact current measured by the meter into AnalogRef Val (CP-463).

8 Set Analog Cal Ref (CP-462) to “B” (2) to select point B.

9. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want to set for point B. This is usually your largest current point. A 20 milliamp setting requires about 29300 bits, 10 milliamps about 1940. For 20 milliamps, start with about 29200 and use the incremental scroll key.

10. Enter the exact current measured by the meter into AnalogRef Val (CP-463).

11. Set Analog Cal EN (CP-460) to “Off” (0) to disable further calibration.

Analog Input 1 (voltage):

1. Connect the Analog Output voltage pins to the Analog Input 1 voltage pins - pin 10 to pin 2, pin 11 to pin 4. Connect a voltmeter between pins 2 and 4 with the positive lead on pin 2 (pin 4 is at common).

2. Set AO Mode (CP-291) to “Volts” (1).

3. Set AI1 Mode (CP-280) to “Volts” (1).

4. Set Analog Cal Sel (CP-461) to “AI1” (1) to Select AI1 for calibration.

5. Set Analog Cal Ref (CP-462) to “A” (1) to select point A.

NOTE: The old calibration data will be overwritten.

6. Set Analog Cal EN (CP-460) to “On” (1) to start calibration.

7. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want set for point A. This is generally your smallest (or negative) voltage point. A -12 volts requires about -29500 bits, -10 volts about -24500 bits, 0 volts about 0 bits. For -12 volts, start with about -29400 and use the incremental scroll key.

8. Enter the exact voltage measured by the meter into AnalogRef Val (CP-463).

9. Set Analog Cal Ref (CP-462) to “B” (2) to select point B.

10. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want use for point B. This is generally your largest (or positive) voltage point. A +12 volts requires about 30100 bits, 10 volts about 25100 bits, 0 volts about 0 bits. For 12 volts, start with about 30000 and use the incremental scroll key.

11. Enter the exact voltage measured by the meter into AnalogRef Val (CP-463).

12. Set Analog Cal EN (CP-460) to “Off” (0) to disable further calibration.

Analog Input 1 (current):

1. Connect a current meter between pin 9 and pin 2 with the positive lead on pin 9. Connect pin 3 to pin 4 and pin 4 to pin 11.

2. Set AO Mode (CP-291) to “Current” (2).

3. Set AI1 Mode (CP-280) to “Current” (2).

4. Set Analog Cal Sel (CP-461) to “AI1” (1) to Select AI1 for calibration.

5. Set Analog Cal Ref (CP-462) to “A” (1) to select point A.

NOTE: The old calibration data will be overwritten.

6. Set Analog Cal EN (CP-460) to “On” (1) to start calibration.

7. Adjust AO Bit Set (CP-464) until the meter reads the current you want to set for point A. This is generally your smallest current point. A 4 milliamp setting requires about -14450 bits, 0.5 milliamps about -24000 bits and 1.0 milliamps about -22600. For 4 milliamps, start with about -14300 and use the incremental scroll key.

8. Enter the exact current measured by the meter into AnalogRef Val (CP-463).

9. Set Analog Cal Ref (CP-462) to “B” (2) to select point B.

10. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want to set for point B. This is generally your largest current point. A 20 milliamp setting requires about 29300 bits, 10 milliamps about 1940. For 20 milliamps, start with about 29200 and use the incremental scroll key.

11. Enter the exact current measured by the meter into AnalogRef Val (CP-463).

12. Set Analog Cal EN (CP-460) to “Off” (0) to disable further calibration.

Analog Input 2 (voltage):

1. Connect the Analog Output voltage pins to the Analog Input 2 voltage pins - pin 10 to pin 5, pin 11 to pin 7 Connect a voltmeter between pins 5 and 7 with the positive lead on pin 5 (pin 7 is at common).

2. Set AO Mode (CP-291) to “Volts” (1).

3. Set AI2 Mode (CP-285) to “Volts” (1).

4. Set Analog Cal Sel (CP-461) to “AI2” (2) to Select AI2 for calibration.

5. Set Analog Cal Ref (CP-462) to “A” (1) to select point A.

NOTE: The old calibration data will be overwritten.

6. Set Analog Cal EN (CP-460) to “On” (1) to start calibration.

7. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want set for point A. This is generally your smallest (or negative) voltage point. A -12 volts requires about -29500 bits, -10 volts about -24500 bits, 0 volts about 0 bits. For -12 volts, start with about -29400 and use the incremental scroll key.

8. Enter the exact voltage measured by the meter into AnalogRef Val (CP-463).

9. Set Analog Cal Ref (CP-462) to “B” (2) to select point B.

10. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want use for point B. This is generally your largest (or positive) voltage point. A +12 volts requires about 30100 bits, 10 volts about 25100 bits, 0 volts about 0 bits. For 12 volts, start with about 30000 and use the incremental scroll key.

11. Enter the exact voltage measured by the meter into AnalogRef Val (CP-463).

12. Set Analog Cal EN (CP-460) to “Off” (0) to disable further calibration.

Analog Input 2 (current):

1. Connect a current meter between pin 9 and pin 5 with the positive lead on pin 9. Connect pin 6 to pin 7 and pin 7 to pin 11.

2. Set AO Mode (CP-291) to “Current” (2).

3. Set AI2 Mode (CP-285) to “Current” (2).

4. Set Analog Cal Sel (CP-461) to “AI2” (2) to Select AI2 for calibration.

5. Set Analog Cal Ref (CP-462) to “A” (1) to select point A.

NOTE: The old calibration data will be overwritten.

6. Set Analog Cal EN (CP-460) to “On” (1) to start calibration.

7. Adjust AO Bit Set (CP-464) until the meter reads the current you want to set for point A. This is generally your smallest current point. A 4 milliamp setting requires about -14450 bits, 0.5 milliamps about -24000 bits and 1.0 milliamps about -22600. For 4 milliamps, start with about -14300 and use the incremental scroll key.

8. Enter the exact current measured by the meter into AnalogRef Val (CP-463).

9. Set Analog Cal Ref (CP-462) to “B” (2) to select point B.

10. Adjust AO Bit Set (CP-464) until the meter reads the voltage that you want to set for point B. This is generally your largest current point. A 20 milliamp setting requires about 29300 bits, 10 milliamps about 1940. For 20 milliamps, start with about 29200 and use the incremental scroll key.

11. Enter the exact current measured by the meter into AnalogRef Val (CP-463).

12. Set Analog Cal EN (CP-460) to “Off” (0) to disable further calibration.

Calibrating and Scaling AI1 Together

In some applications you may not know the voltage (or current) to EU/Tm representation, e.g. you may know that your flow meter operates from 0 to 10 gallons per minute, but you have no idea the voltage produced by the meter at either end point. You can 'calibrate' the signal directly in terms of EU/Tm by setting the calibration references the same as the scaling references, i.e. set AI1 RA (CP-281) equal to AnlgCal Ref A (MP-168) for this signal and set AI1 RB (CP-283) equal to Cal Ref B (MP-169) for this signal. These two points should be discretely different from each other and should be reasonable estimates for the actual voltage or current range. You would then set the EU@ AI1 RA (CP-282) and EU@ AI1 RB (CP-284) to the sensor's operating points used during the calibration process for points A and B respectively.

1. Connect the sensor to the AI1 voltage (or current) pins. Connect pins 3 and 4 together if using current mode.
2. Set AI1 Mode (CP-280) to "Volts" (1) or "Current" (2).
3. Set Analog Cal Sel (CP-461) to "AI1" (1) to Select AI1 for calibration.
4. Set Analog Cal Ref (CP-462) to "A" (1) to select point A.

NOTE: The old calibration data will be overwritten.

5. Set Analog Cal EN (CP-460) to "On" (1) to start calibration.
6. Run the sensor at the operating point for calibration point A. This is generally your smallest (or negative) voltage point (or smallest current point). Record the value of this operating point as sensor operating point A in EU/Tm.
7. Enter an estimate of the voltage (or current) that the sensor is producing at this operating point into AnalogRef Val (CP-463). Record this value as point A reference voltage (or current) along side the sensor operating point A.
8. Set Analog Cal Ref (CP-462) to "B" (2) to select point B.
9. Run the sensor at the operating point for calibration point B. This is generally your largest (or positive) voltage point (or largest current point). Record the value of this operating point as point B EU/Tm.
10. Enter an estimate of the voltage (or current) that the sensor is producing at this operating point into AnalogRef Val (CP-463). Record this value as point B reference voltage (or current) along side the sensor operating point B.
11. Set Analog Cal EN (CP-460) to "Off" (0) to disable further calibration.
12. Go to SCALING/SIGNAL SCALING/P1. Enter voltage (or current) that you recorded as the point A reference voltage (or current) into AI1 RA (CP-281). Enter the sensor operating point A (EU/Tm) that the sensor was producing during the point A calibration into EU@AI1 RA (CP-282). This could actually be a time-less unit, but is considered as EU/Tm scaling because it assumes speed representation for the velocity loop. Enter voltage (or current) that you recorded as the point B reference voltage (or current) into AI1 RB (CP-283). Enter the sensor operating point B (EU/Tm) that the sensor was producing during the point B calibration into EU@AI1 RB (CP-284).

Repeat this procedure for AI2 if necessary. Calibrate AI2 and use the corresponding AI2 parameters.

ANALOG INPUT TESTS P1/3

The Analog Input screen displays the Monitor Parameters that monitor the results of inputting a voltage.

AI1 Bits

Analog Input 1 Bits (MP-160) displays the present value in ADC bits of Auxiliary Board Analog Input 1 signal.

AI1 Signal

Analog Input 1 Signal (MP-161) displays the present value of the Auxiliary Board Analog Input 1 signal in either volts or milliamps relative to which setting (volts or current) has been entered in AI1 Mode (CP-280).

AI1 Mode

Analog Input 1 Mode (CP-280) identifies the mode of operation and the calibration that are used for the Auxiliary Board Analog Input 1 signal.

2 = Current
1 = Voltage (default)

AI2 Bits

Analog Input 2 Bits (MP-163) displays the present value in ADC bits of Auxiliary Board Analog Input 2 signal.

AI2 Signal

Analog Input 2 Signal (MP-164) displays the present value of the Auxiliary Board Analog Input 2 signal in either volts or milliamps, relative to which setting (volts or current) has been entered in AI2 Mode (CP-285).

AI2 Mode

Analog Input 2 Mode (CP-285) identifies the mode of operation and the calibration that are used for the Auxiliary Board Analog Input 2 signal.

2=Current
1=Voltage (default)

ANALOG OUTPUT TESTS   P2/3

The Analog Output screen displays the Monitor Parameters that monitor the Auxiliary Analog Output. Set the AO Parameter (CP-290) to "0 " and depending on the AO Mode (CP-291), either enter a voltage or a current in AO Direct (CP-465). Measure the voltage or the current on the output to confirm the setting. Be sure to return the AO Parameter to its previous value when the test is completed and set AO Direct back to "0".

AO Parameter

Analog Output Parameter (CP-290) identifies the Monitor or Control Parameter that is used for the Auxiliary Analog Output. When the Analog Output Parameter (CP-290) is set to "0", the value of AO DIRECT (CP-365) is used as the output.

AO Direct

Analog Out Direct (CP-465) is the value output (in volts or milliamps) at the Auxiliary Analog Board's analog output when the AO Parameter (CP-290) is set to a "0".

AO Bits

Analog Output Bits (MP-166) displays the present value, in DAC Bits, of the Auxiliary Analog Output.

AO Signal

Analog Output Signal (MP-167) displays the present value, in either volts or milliamps of the Auxiliary Analog Output, relative to AO Mode (CP-291).

AO Mode

Analog Output Mode (CP-291) identifies the mode of operation and calibration that are used for the Auxiliary Board Analog Output signal.

2 = Current
1 = Voltage (default)

ANALOG INPUT TESTS / CALIBRATION   P3/3

AI1 Mode

Analog Input 1 Mode (CP-280) identifies the mode of operation and the calibration that are used for the Auxiliary Board Analog Input 1 signal.

2 = Current
1 = Voltage (default)

AI2 Mode

Analog Input 2 Mode (CP-285) identifies the mode of operation and the calibration that are used for the Auxiliary Board Analog Input 2 signal.

2=Current
1=Voltage (default)

AO Mode

Analog Output Mode (CP-291) identifies the mode of operation and calibration that are used for the Auxiliary Board Analog Output signal.

2 = Current
1 = Voltage (default)

Analog Cal En

Analog Calibration Enable (CP-456) enables the calibration process for the auxiliary analog board. When Analog Cal En (CP-460) is set to “1” (On), the signal that is selected in Analog Cal Sel (CP-461) will be calibrated.

1 = Enabled
0 = Disabled (default)

Analog Cal Sel

Analog Calibration Select (CP-461) selects the signal (AI1, AI2) on the auxiliary analog board for calibration.

2 = Analog In 2 (Linespeed Pot)
1 = Analog In 1 (default) (Dancer)

Analog Cal Ref

Analog Calibration Reference (CP-462) determines which of the two calibration reference points (see list below) are to be calibrated.

2 = point B
1 = point A (default)

Analog Ref Val

Analog Reference Value (CP-463) is the value of measured data for the signal at the specified reference point (Analog Cal Ref, CP-462). Use a voltmeter for voltage mode operation to measure the voltage on the analog signal selected for calibration at the specified reference point. Enter the measured value in the Analog Ref Val (CP-463).

AO Bit Set

Analog Out Bit Set (CP-464) sets the output value in bits that are used to calibrate the Auxiliary Analog Board's analog output. Change (tune) this value until the actual output matches the value that you entered for Analog Ref Val (CP-463), for the selected point.

AnlgCal Ref A

Analog Calibration Reference A (MP-168) displays the Analog Ref Val (CP-463) for the signal (AI1, AI2), which was selected in Analog Cal Sel (CP-461) and which was stored during the calibration of point A.

AnlgCal Ref B

Analog Calibration Reference B (MP-169) displays the AnalogRef Val (CP-463) for the signal (AI1, AI2), which was selected in Analog Cal Sel (CP-461) and which was stored during the calibration of point B.

SERIAL COMMUNICATIONS TEST   P1/2

Use the Serial Communications Test screen to set up the Baud Rate, Frame Format and Record Format that will be used by the host computer. You can send a byte out and receive a byte on the RS-485 port. These are decimal numbers. If you want to send ASCII, you must use the decimal equivalent. Likewise, if an ASCII character is received, it will be displayed as the decimal equivalent (e.g., ‘A’ = 65). Use the SerCom Errs (MP-91) “help” screen to decipher any errors.

Device Address

Device Address (CP-470) assigns a serial communications address to the CX-1200. This number should be different from any other units that are on the serial link.

Baud Rate

The Baud Rate (CP-471) determines the serial communications data transfer rate (see list below) in bits/sec. With a 10 bit frame length, the number of frame/sec would be 1/10 the Baud Rate.

1 = 300 bps = 300 Baud	2 = 600 bps = 600 Baud	3 = 1200 bps = 1200 Baud
4 = 2400 bps = 2400 Baud	5 = 4800 bps = 4800 Baud	6 = 9600 bps = 9600 Baud (default)
7 = 19200 bps = 19.2 Kbaud		

Frame Format

Frame Format (CP-472) determines the parity, the number of data bits, and the number of stop bits for the serial communications.

1 = N,8,1 = No Parity, 8 data bits, 1 stop bit (10 bit frame-ASCII or Binary)
2 = E,7,1 = Even Parity, 7 data bits, 1 stop bit (10 bit frame-ASCII only)

Record Format

Record Format (CP-469) determines which type of data format (see list below) will be used for the serial communication.

3 = ASCII2   2 = ASCII   1 = BINARY

CRC Enable

If CRC Enable (CP-468) is set to “ON” (1), you must append a CRC value to all serial communications messages that are received by the CX-1200 (See *Serial Communications: Using Serial Communications*). The CX-1200 checks the CRC value against the the message contents (excluding the “STX”), then calculates a CRC value and appends it to all serial communications responses. If CRC Enable (CP-468) is set to “OFF” (0), the CX-1200 will ignore any CRC value that is appended to a message and will not append a CRC value to any serial communications responses.

1 = On (Enabled)   0 = Off (Disabled)

SerCom Char Out

When a new value is entered in SerCom Char Out (CP-473), it is transmitted out the RS-485 serial port at the Baud Rate (CP-471) and the Frame Format (CP-472). SerCom Char Out (CP-473) is a decimal number.

SerCom Char In

Serial Communications Character In (MP-90) displays the value of the last byte that was received by the Serial Communications port. SerCom Char In (MP-90) is displayed in a decimal format. SerCom Char In (MP-90) is used primarily for troubleshooting.

SerCom Errs

Serial Communications Errors (MP-91) displays all serial communications errors that occurred during the most recent transmission.

SERIAL COMM TEST / MESSAGE DISPLAY P2/2

Receive Buffer:

00 00 00 00 00 00
00 00 00 00 00 00
00 00 00 00 00 00

Transmit Buffer:

00 00 00 00 00 00
00 00 00 00 00 00
00 00 00 00 00 00

SerCom Errs

Serial Communications Errors (MP-91) displays all serial communications errors that occurred during the most recent transmission.

DEVICE STATUS P1/2

The Device Status screen displays the microprocessor related faults. Norm Pwr Ups (MP-154) indicates how many times power has been applied to the CX-1200 since the last "Clear-7" power-up. The Low Pwr Cntr (MP-155) shows the number of times the CX-1200 experienced low power before shutting down. If this number is greater than Norm Pwr Ups (MP-154), it can indicate that the line-power input has dipped below about 100 volts AC. However, this could also indicate that a "Clear-7" power-up was executed and the Low Pwr had not been reset. Therefore, it is important to reset the Low Pwr Cntr (MP-155) after a "Clear-7" power-up, to keep the numbers accurate. Use Clr Fault Cntrs (CP-491) to reset the Low Pwr Cntr (MP-155).

Last Reset

Last Reset (MP-150) displays a "1" in a bit to indicate the reason for the last reset. Refer to *Appendices: Appendix C* for the Last Reset (MP-150) bit map list. The Help screen for Last Reset (MP-150) also contains a bit map list.

Misc Intrpt

Miscellaneous Interrupts (MP-151) displays a "1" in a bit to indicate which of the various system interrupts may have caused the last reset. Refer to *Appendices: Appendix C* for the Misc Intrpt (MP-151) bit map list. The Help screen for Misc Intrpt (MP-151) also contains a bit map list.

Device Alms

Device Alarms (MP-152) displays the status of microprocessor or other hardware related alarms. Notification of a bad block selection is also included. Refer to *Appendices: Appendix C* for the Device Alarms (MP-152) bit map list. The Help screen for Device Alarms (MP-152) also contains a bit map list.

Norm Pwr Ups

Normal Power Ups (MP-154) displays the number of normal power-ups since the most recent "Clear-7" power-up . This value is reset only by a "Clear-7" power-up. Norm Pwr Ups (MP-154) is used primarily for troubleshooting.

Low Pwr Cntr

Low Power Counter (MP-155) displays the number of low power detections, including normal "Power Downs". You can reset this numeric value, but only in Clr Fault Cntrs (CP-491). Low Pwr Cntr (MP-155) is used primarily for troubleshooting.

Mem Err Cntr

Memory Error Counter (MP-156) displays the number of memory test failures that occurred during "Power Up". You can reset this numeric value, but only in Clr Fault Cntrs (CP-491). Mem Err Cntr (MP-156) is used primarily for troubleshooting.

WatchDogCntr

Watch Dog Counter (MP-157) displays the number of watch dog resets that were caused by Watchdog time-out. WatchDogCntr (MP-157) is used primarily for in troubleshooting. You can reset this numeric value, but only in 'Clr Fault Cntrs' (CP-491).

Clr Fault Cntrs

To reset all the system-fault counters except Norm Pwr Ups (MP-154), enter a "1" in Clear Fault Counters (CP-491). The

DEVICE STATUS   P2/2

Last Reset

Last Reset (MP-150) displays a “1” in a bit to indicate the reason for the last reset. Refer to *Appendices: Appendix C* for the Last Reset (MP-150) bit map list. The Help screen for Last Reset (MP-150) also contains a bit map list.

Misc Intrpt

Miscellaneous Interrupts (MP-151) displays a “1” in a bit to indicate which of the various system interrupts may have caused the last reset. Refer to *Appendices: Appendix C* for the Misc Intrpt (MP-151) bit map list. The Help screen for Misc Intrpt (MP-151) also contains a bit map list.

MiscIntrptCntr

Miscellaneous Interrupt Counter (MP-158) displays the number of miscellaneous interrupts that occurred as the result of bus errors, address errors, divide-by-0 errors, unexecuted instruction errors, general exceptions, and unexecuted and spurious interrupts. You can reset this numeric value, but only in Clr Fault Cntrs (CP-491). MiscIntrptCntr (MP-158) is used primarily for troubleshooting.

PC at Intrpt

Program Counter at Interrupt (MP-153) shows were the last interrupt of the microprocessor program counter occurred . If the CX-1200 repeatedly displays the “REST FAULT” error box, then record the “PC @Intrpt” value as well as the line just above it (which indicates the cause of the reset), before you press the clear key to continue. The program counter at interrupt is stored in the PC at Intrpt (MP-153) Monitor Parameter for review. A value of “2560” is normal.

Clr Fault Cntrs

To reset all the system-fault counters except Norm Pwr Ups (MP-154), enter a “1” in Clear Fault Counters (CP-491). The error and message status bar at the bottom of the screen will flash “Flts Cleared” and the value will return to “0”.

DEVICE MODEL & REVISION   P1/1

The Device Model and Revision screen displays the model of the CX-1200, the software number, the revision level of the software and the date that this software was released. The Contrex copyright is also displayed on this screen. If you call technical support for assistance, you may be asked for this information.

Model #

Model # (MP-97) displays the model number for this CX-1200. This model number is unique to the CX-1200 series of controllers.

REVISION

REVISION (MP-99) is the revision level of the software for this individual CX-1200.

RELEASE

RELEASE (MP-98) is the date that the software for this individual CX-1200 was released. The numeric, six digit format is: year, month, day.

—NOTES—

TROUBLESHOOTING

If you need to verify the integrity of the CX-1200 independently, refer to the *Troubleshooting/Diagnostics: Device Tests* section. If the information in this section does not solve your problem, consult technical support:

Contrex Technical Support (763) 424-8700 or (800) 342-4411

PARAMETER LOAD AT POWER-UP

This section contains instructions to restore either the default Control Parameter values or the back-up Control Parameter values. The procedures are:

Clear-7
Clear-8
Clear-9

CLEAR-7

Use the Clear-7 procedure to restore the Control Parameter's factory default settings, with the exception of these three Control Parameters: Contrast Value (CP-475), CO Offset (CP-273) and Serial Number (CP-495). The back-up settings for the Control Parameters are not altered.

NOTE: Clear-7 also restores the PLC to the factory default. The back-up for the PLC is not altered. The fault counters are not reset.

Norm Pwr Ups (MP-154) is reset to “1” (normal power-up) or “0” (if CPU reset occurs during power-up).

Job Sizes and Position Data are reset to “0”.

The Code Select line and the Large Number units in the “Status” screen are cleared.

To do the Clear-7 Procedure:

Press the Clear key and the “7” key, then continue to press the keys while you apply power to the CX-1200.

CLEAR-8

Use the Clear-8 procedure to restore the Control Parameters to the back-up settings, with the exception of these two Control Parameters: CO Offset (CP-273) and Serial Number (CP-495). This procedure uses the back-up settings which you have entered; the back-up settings are not reset to the factory default.

NOTE: Clear-8 also restores the PLC to the back-up settings which you have entered; the PLC back-up settings are not reset to the factory default.

The fault counters are not reset.
Job Sizes and Position Data are reset to “0”.

To do the Clear-8 Procedure:

Press the Clear key and the “8” key, then continue to press the keys while you apply power to the CX-1200.

CLEAR-9

Use the Clear-9 procedure to restore the Control Parameter's factory default settings. The back-up settings for the Control Parameters are also restored to the factory default.

NOTE: Clear-9 restores the PLC to the factory default. The back-up for the PLC is also restored to the factory default.

The fault counters are reset to “0”.

Norm Pwr Ups (MP-154) is reset to “1” (normal power-up) or “0” (if CPU reset occurs during power-up).

Job Sizes and Position Data are reset to “0”.

The Code Select line and the Large Number units in the “Status” screen are cleared.

To do the Clear-9 Procedure:

Press the Clear key and the “9” key, then continue to press the keys while you apply power to the CX-1200.

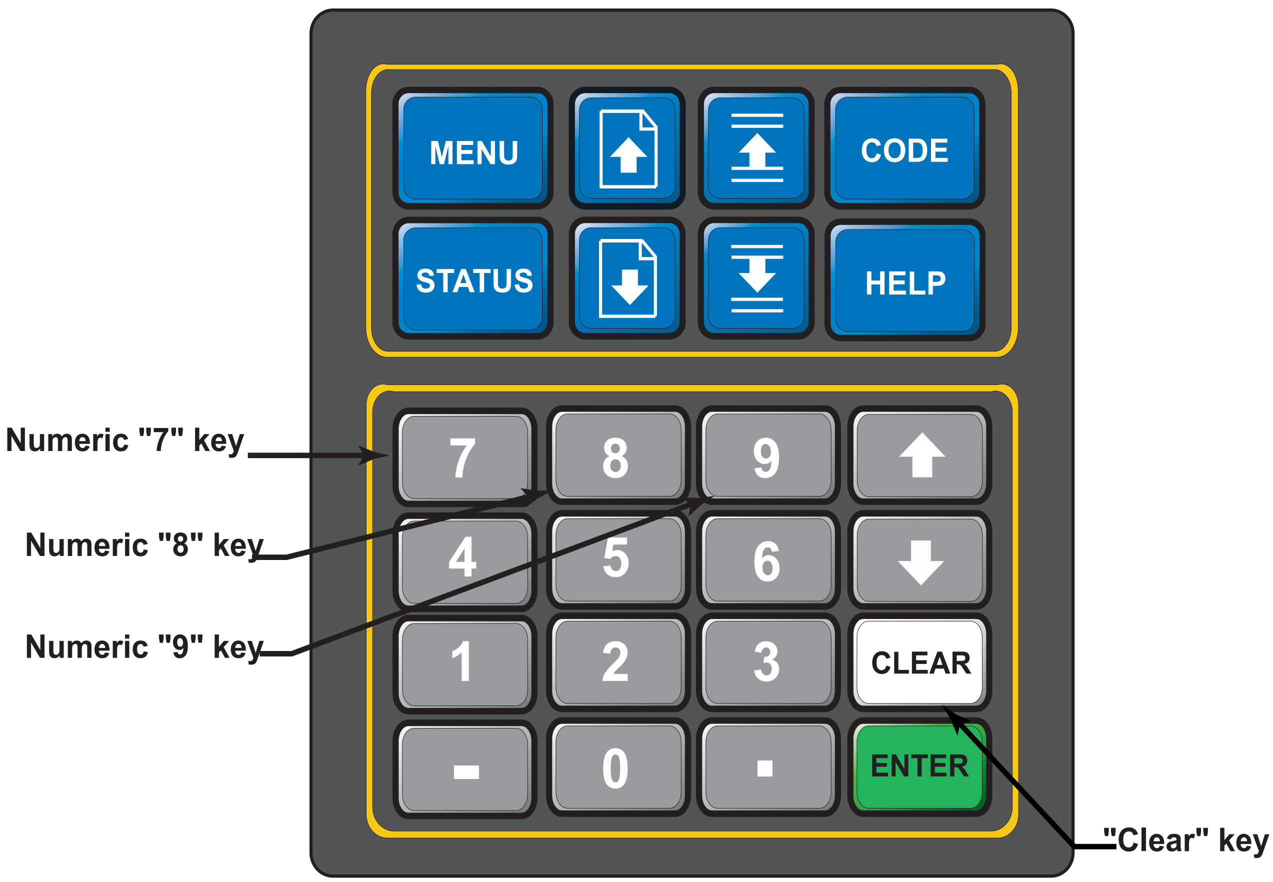


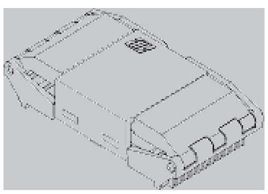
Figure 8-6 Parameter Load at Power-up Corresponding Keypad Numbers

EEPROM CHIP REPLACEMENT

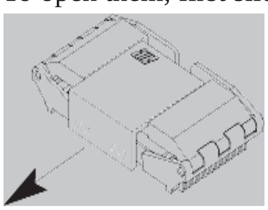
The EEPROM (Electrical Erasable Programmable Read Only Memory) chip, which is also referred to as the "Flash Memory", is the software for the CX-1200.

To replace the EEPROM chip:

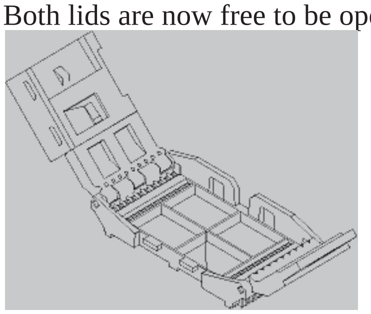
- Make a record of your current Control Parameter values; the replacement chip contains default values that will replace your current values when you perform the "Clear 9" step.
- Turn off the power to the CX-1200 and remove the back panel.
- Pull out the CPU board and locate the 44 pin PSOP Surface Mount Socket that houses the EEPROM chip.
- **Ground yourself - Static electricity can damage the EEPROM chip.**
- The PSOP Socket has a positive locking lid design. The lock is attached to the left lid and slides back and forth in a direction parallel to the hinge pins.



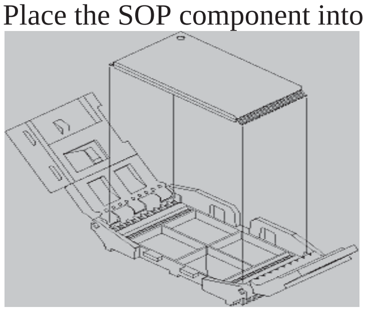
- To open them, first slide the lock sideways (approximately 1mm) to the unlocked position.



- Both lids are now free to be opened by rotating them on their respective hinges.



- Place the SOP component into the socket.



- The lids must be closed simultaneously to assure proper seating of the SOP component. If this is not observed, the component will shift off center in the socket resulting in an unsatisfatory electrical connection. Now, while maintaining a downward pressure on the lock, slide it sideways to its locked position.

- Replace the CPU board and the back panel.

- Press the “Clear” key and the “9” key, then continue to press the keys while you apply power to the CX-1200.

- The “Clear 9” procedure restores the factory default settings and automatically performs the Power Up diagnostic routines.

- Reenter the values for your Control Parameters.

—NOTES—

Appendices

APPENDIX A: CX-1200 SPECIFICATIONS

Electrical

AC Power Input:	115 VAC +15% -10% 48 to 62 Hertz 0.250 Amps Maximum 30 Watts Maximum or (switch selectable) 230 VAC +15% -10% 48 to 62 Hertz 0.125 Amps Maximum 30 Watts Maximum
Frequency Inputs(2):	Differential Mode (26LS32): 5 to 15 VDC Operating Voltage 200 mV Differential Input Voltage 100 mV Hysteresis Typical 2.0 kOhm, 1/8 W to 5 V Internal Pullup 0 to 180 kHertz Operating Frequency Quadrature Optically Isolated (Dig_Com) Single-Ended Mode: Current Sinking 5 to 15 VDC Operating Voltage 2.5 V Switching Threshold 100 mV Hysteresis Typical 2.0 kOhm, 1/8 W to 5 V Internal Pullup 0 to 180 kHertz Operating Frequency Quadrature Optically Isolated (Dig_Com)
Synchronizing Inputs(2):	Current Sinking 5 to 15 VDC Operating Voltage 3.15 V Rising Edge Threshold Maximum 0.90 V Falling Edge Threshold Minimum 2.0 kOhm, 1/8 W to 5 V Internal Pullup Optically Isolated (Dig_Com)
Digital Inputs(16):	Single-Ended (74HC14) Current Sinking 5 to 24 VDC Operating Voltage 3.15 V Rising Edge Threshold Maximum 0.90 V Falling Edge Threshold Minimum 1.0 V Hysteresis Typical 10.0 kOhm, 1/8 W to 5 V Internal Pullup 1 mSec Response Time (DI0 - DI7) 2 mSec Response Time (DI8 - DI15) Optically Isolated (Dig_Com)

(Continued)

Appendix A: CX-1200 Specifications (continued)

Digital Outputs(8):	NPN Darlington (ULN2003) Current Sinking 50 VDC Maximum Operating Voltage 1.0 V Saturation at 200 mA Typical 0.6 V Saturation at 1 mA Typical 200 mA Continuous/Channel 500 mA Peak/Channel (50% Duty Cycle) 750 mA Continuous Total All Channels Internal Freewheeling Diodes 2 mSec Update Rate Optically Isolated (Dig_Com)
Control Output to Drive:	±5 V to ±15 V Bipolar Analog Zero/Span Software Calibration 16 Bits Bipolar Resolution (15+Sign) 18 mA Maximum Drive Current Optically Isolated (CO_Com)
Aux. Power Output:	+12 VDC ±5% 150 mA Maximum Optically Isolated (Dig_Com)
Serial Communications:	RS485 Compatible 5 VDC Differential Operation 300 to 19200 Baud Rate Selectable Character Format Half Duplex Optically Isolated (Dig_Com)
Optional Analog I/O:	2 Input Channels/1 Output Channel 0 to 20 mA or ±12 VDC 80 kOhm Input Resistance Voltage Mode 243 Ohm Input Resistance Current Mode 500 Ohm Max Resistance Current Output 15 mA Max Current Voltage Output 16 Bits Resolution - Analog Output 14 Bits Resolution - Analog Input ±0.1% Drift Error Typical (50° C Range) Zero Monotonic Error Software Calibration NOVRAM Calibration Storage Optically Isolated (Dig_Com)

Physical

Construction:	NEMA4, 4X, 12, 13 IP65 Compatible Frontpanel 14 Line by 21 Character LCD Display Sealed Membrane Keypad Polycarbonate ABS Front Bezel Paint over Zync Plate CRS Enclosure

(Continued)

Appendix A: CX-1200 Specifications (continued)

Overall Dimensions:	19.6 cm (7.7 in) Bezel Height 10.2 cm (4.0 in) Bezel Width 17.8 cm (7.0 in) Total Depth
Panel Dimensions:	18.41 cm (7.25 in) Panel Height Cutout 9.27 cm (3.65 in) Panel Width Cutout 16.30 cm (6.30 in) Panel Inside Depth
Weight:	2.3 kilograms (5.1 Pounds)

Environmental

Operating Temperature:	0° to 55° C (32° to 131° F) Int. Enclosure 0° to 40° C (32° to 104° F) Ext. Enclosure
Storage Temperature:	-25° to 70° C (-13° to 158° F)
Environment:	The CX-1200 shall be installed in a pollution degree 2 macro-environment.
Relative Humidity:	0 to 95% Non-condensing
Altitude:	To 3,300 Feet (1000 Meters)

Performance

Setpoint Resolution:	6 Digits in Engineering Units
Speed Regulation:	0.01% Error in Lead Modes (>10Hz) 0.00% Error in Follower Modes (>10Hz)
Accel/Decel Ramps:	Settable in Time or Rate 0.1 to 3600.0 Seconds 0.001 to 999,999 EUs/T/Second Separate for Run, Direct, Jog, H-Stop and R-Stop
Sync Rate:	20 Pulses per Second
Limits:	Maximum Speed Minimum Speed Trim Authority Integral Limit
Alarms:	Zero Speed Maximum Feedback Maximum Accel/Decel No Response Programmable Custom Alms (6)

(Continued)

Appendix A: CX-1200 Specifications (continued)

PLC:	64 Program Instructions Total 9 Instruction Types 8 Digital Inputs (DI8-DI15) 8 Digital Outputs (DO0-DO7) 4 Timers 4 Counters 4 Latches
Setpoint Scaling Modes:	Direct Master Inverse Master Follower Inverse Follower
Digital Inputs:	F-Stop R-Stop H-Stop Run Jog Forward Jog Reverse Keypad Lockout Spare Block Select A Batch Reset Re-Learn Open Loop Position Reset Sync Disable Phase Advance Phase Retard
Digital Outputs:	Zero Speed Hi/Low Speed Alarm Sync Alarm Lead Sync Absent Foll Sync Absent Batch Done Fwd/Rvs Drive Enable
Control Loop Formats:	Velocity Position Open Loop
Closed Loop Algorithm:	PID + FF Adaptive or Self-Adjust Feedforward
Control Loop Response:	2mSec Speed Loop and PLC Functions
Block Parameters:	8 Switch Selectable Parameter Blocks Permissible Setpoint Mode Switching 16 Parameters per Block Full Control Parameter Selection

(Continued)

Appendix A: CX-1200 Specifications (continued)

Device Configuration:	Parameter Load and Store PLC Program Load and Store Status Screen Configuration Serial Communications Format Selectable Keypad Lockout Normal/Reverse Video Video Contrast Adjust Annunciator Enable Standard Alarm Mask
Diagnostics:	Memory Test Keypad Test Video Test I/O Signal Tests Serial Communications Test Annunciator Test
Help Screens:	Help Screen for all Parameters Displays Minimum, Maximum and Default Summary of Parameter Operation Retrieve Default or Backup Values Decode/Select of Bit Mapped Parameters

—NOTES—

APPENDIX B: FORMULAS

The equations used to scale the Frequency Input 1 signal are given by:

$$\text{MP-05} = \text{MP-01} * \frac{\text{CP-263}}{\text{CP-262}} * \frac{\text{X Seconds}}{\text{CP-209}}$$

written with parameter text:

$$\text{Ld EU/Tm} = \text{FI1 Hz} * \frac{\text{EU FI1}}{\text{Pulses FI1}} * \frac{\text{X Seconds}}{\text{Time Base}}$$

where X = 1 for CP-209 = 0, None
X = 1 for CP-209 = 1, Second
X = 60 for CP-209 = 2, Minute
X = 3600 for CP-209 = 3, Hour

FI1 EU/Tm (MP-05) given in EU/Tm is multiplied by the ratio (given by CP-220) to obtain the desired speed in follower applications.

$$\text{MP-02} = \text{MP-01} * \frac{\text{1 Rev}}{\text{CP-261}} * \frac{\text{60 Seconds}}{\text{Minute}}$$

written with parameter text:

$$\text{FI1 RPM} = \text{FI1 Hz} * \frac{1}{\text{PPR FI1}} * \frac{\text{60 Seconds}}{\text{Minute}}$$

$$\text{MP-10} = \text{Lead Counts} * \frac{\text{CP-260}}{\text{Count}} * \frac{\text{CP-263}}{\text{CP-262}}$$

written with parameter text:

$$\text{Ld Posn} = \text{Lead Cnts} * \frac{\text{X Pulses (CP-260)}}{\text{Count}} * \frac{\text{EU FI1}}{\text{Pulses FI1}}$$

where X = 1 for CP-260 = 1, Quad (quadrature mode)
X = 4 for CP-260 = 2, Incr (incremental mode)

Keep in mind that the scaling is included in the ratio calculation for more accurate results. This further justifies using integers when possible for the scaling numbers.

(Continued)

Appendix B: Formulas (continued)

The equations used to scale the Frequency Input 2 signal are given by:

$$\text{MP-06} = \text{MP-03} * \frac{\text{CP-268}}{\text{CP-267}} * \frac{\text{X Seconds}}{\text{CP-209}}$$

written with parameter text:

$$\text{Fb EU/Tm} = \text{FI2 Hz} * \frac{\text{EU FI2}}{\text{Pulses FI2}} * \frac{\text{X Seconds}}{\text{Time Base}}$$

where X = 1 for CP-209 = 0, None
X = 1 for CP-209 = 1, Second
X = 60 for CP-209 = 2, Minute
X = 3600 for CP-209 = 3, Hour

FI2 EU/Tm (MP-06) given in EU/Tm is multiplied by the ratio (given by CP-220) to obtain the desired speed in follower applications.

$$\text{MP-04} = \text{MP-03} * \frac{\text{1 Rev}}{\text{CP-266}} * \frac{\text{60 Seconds}}{\text{Minute}}$$

written with parameter text:

$$\text{FI2 RPM} = \text{FI2 Hz} * \frac{1}{\text{PPR FI2}} * \frac{\text{60 Seconds}}{\text{Minute}}$$

$$\text{MP-20} = \text{Follower Counts} * \frac{\text{X Pulses (CP-265)}}{\text{Count}} * \frac{\text{CP-268}}{\text{CP-267}}$$

written with parameter text:

$$\text{Fb Posn} = \text{FI2 Cnts} * \frac{\text{X Pulses (CP-265)}}{\text{Count}} * \frac{\text{EU FI2}}{\text{Pulses FI2}}$$

where X = 1 for CP-265 = 1, Quad (quadrature mode)
X = 4 for CP-265 = 2, Incr (incremental mode)

Keep in mind that the scaling is included in the ratio calculation for more accurate results. This further justifies using integers when possible for the scaling numbers.

The equations used to scale the Auxiliary Analog Input 1 signal are given by:

MP-162 EU = SS_AIN1 * MP-164 + SI_AIN1

written with parameter text:

AI1 EU = SS_AIN1 * AI1 Signal + SI_AIN1

where

$$\text{SS\_AIN1} = \frac{\text{CP-284} - \text{CP-282}}{\text{CP-283} - \text{CP-281}}$$ is the Scaling Slope

written with parameter text:

$$\text{SS\_AIN1} = \frac{\text{EU@AI1 RB} - \text{EU@AI1 RA}}{\text{AI1 RB} - \text{AI1 RA}}$$

$$\text{SI\_AIN1} = \frac{\text{CP-282} * \text{CP-283} - \text{CP-284} * \text{CP-281}}{\text{CP-283} - \text{CP-281}}$$ is the Scaling Intercept

written with parameter text:

$$\text{SI\_AIN1} = \frac{\text{EU@AI1 RA} * \text{AI1 RB} - \text{EU@AI1 RB} * \text{AI1 RA}}{\text{AI1 RB} - \text{AI1 RA}}$$

and AI1 Signal (MP-161) is assumed to be a calibrated value.

(Continued)

Appendix B: Formulas (continued)

The equations used to scale the Auxiliary Analog Input 1 signal are given by:

$$\text{MP-162 EU} = \text{SS\_AIN2} * \text{MP-161} + \text{SI\_AIN2}$$

written with parameter text:

$$\text{AI2 EU} = \text{SS\_AIN2} * \text{AI2 Signal} + \text{SI\_AIN2}$$

where

$$\text{SS\_AIN2} = \frac{\text{CP-289} - \text{CP-287}}{\text{CP-288} - \text{CP-286}}$$ is the Scaling Slope

written with parameter text:

$$\text{SS\_AIN2} = \frac{\text{EU@AI2 RB} - \text{EU@AI2 RA}}{\text{AI2 RB} - \text{AI2 RA}}$$

$$\text{SI\_AIN2} = \frac{\text{CP-282} * \text{CP-283} - \text{CP-284} * \text{CP-281}}{\text{CP-283} - \text{CP-281}}$$ is the Scaling Intercept

written with parameter text:

$$\text{SI\_AIN2} = \frac{\text{EU@AI2 RA} * \text{AI2 RB} - \text{EU@AI2 RB} * \text{AI2 RA}}{\text{AI2 RB} - \text{AI2 RA}}$$

and AI2 Signal (MP-164) is assumed to be a calibrated value.

Appendix B: Formulas (continued)

The equations used to scale the Auxiliary Analog output signal are given by:

MP-167 volts (or mA) = SS_AO * MP/CP (selected by CP-290) + SI_AO

written with parameter text:

AO Signal = SS_AO * MP/CP (selected by CP-290) + SI_AO

where

$$SS\_AO = \frac{\text{CP-294 - CP-292 volts (or mA)}}{\text{CP-295 - CP-293 in selected MP/CP units}}$$ is the Scaling Slope

written with parameter text:

$$SS\_AO = \frac{\text{AO RB - AO RA}}{\text{Val@AO RB - Val@AO RA}}$$

$$SI\_AO = \frac{\text{CP-292 * CP-295 - CP-294 * CP-293}}{\text{CP-295 - CP-293}}$$ is the Scaling Intercept

written with parameter text:

$$SI\_AO = \frac{\text{AO RA * Val@AO RB - AO RB * Val@AO RA}}{\text{Val@AO RB - Val@AO RA}}$$

The AO is assumed calibrated so that the actual voltage (or current) is reflected by AO Signal (MP-167).

—NOTES—

APPENDIX C: PARAMETER SUMMARY NUMERIC QUICK REFERENCE

MP-01 FI1 Hz

Frequency Input 1 Hertz (MP-01) displays the current frequency of the Frequency Input 1, in Hertz.

Minimum Value: -180000 Maximum Value: 180000
Units: Hertz

MP-02 FI1 RPM

Frequency Input 1 RPM (MP-02) displays the current speed of the Frequency Input 1 encoder in RPM, based on PPR FI1 (CP-261).

Minimum Value: -99999.9 Maximum Value: 99999.9
Units: RPM

MP-03 FI2 Hz

Frequency Input 2 Hz (MP-03) displays the current frequency of the Frequency Input 2, in Hertz.

Minimum Value: -180000 Maximum Value: 180000
Units: Hertz

MP-04 FI2 RPM

Frequency Input 2 RPM (MP-04) displays the current speed of the Frequency Input 2 encoder in RPM, based on PPR FI2 (CP-266).

Minimum Value: -99999.9 Maximum Value: 99999.9
Units: RPM

MP-05 Ld EU/Tm

Frequency Input 1 Engineering Units per Time (MP-05) displays the current speed of the Frequency Input 1 in the Engineering Units per Time (EU/Tm) relative to the Pulses FI1 (CP-262), EU FI1 (CP-263) and Time Base (CP-209). The placement of the decimal point is the same as the placement of the decimal point in EU FI1 (CP-263).

Minimum Value: -9999999 Maximum Value: 9999999
Units: EU/Tm

MP-06 Fb EU/Tm

Frequency Input 2 Engineering Units per Time (MP-06) displays the current speed of the Frequency Input 2 in the Engineering Units per Time (EU/Tm) relative to the Pulses FI2 (CP-267), EU FI2 (CP-268) and Time Base (CP-209). The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

Minimum Value: -9999999 Maximum Value: 9999999
Units: Counts

(Continued)

MP-10 Ld Posn

Lead Position (MP-10) displays the present value of the Lead Position in Engineering Units, as specified by Pulses FI1 (CP-262) and EU FI1 (CP-263). The placement of the decimal point is the same as the placement of the decimal point in EU FI1 (CP-263).

Minimum Value: 0 Maximum Value: 999999999
Units: EU

MP-11 LdJobSize

Lead Job Size (MP-11) displays the present value determined by the Lead Frequency and Lead Sync inputs. Displayed in EU's. It is the size of the very last job size that was encountered.

Minimum Value: 0 Maximum Value: 9999999
Units: EU

MP-12 LdJbSzVar

Lead Job Size Variance (MP-12) displays the maximum variance of the last 16 lead job sizes. Displayed in EU's.

Minimum Value: -999999 Maximum Value: 999999
Units: EU

MP-13 LdJbSzAvg

Lead Job Size Average (MP-13) displays a running average value of the last 16 lead job sizes determined by the Lead Frequency and Lead Sync inputs. Displayed in EU's.

Minimum Value: 0 Maximum Value: 9999999
Units: EU

MP-14 LdJbSzAct

Lead Job Size Active (MP-14) displays a running average value of the last 16 qualifying lead job sizes determined by the Lead Frequency and Lead Sync inputs. Displayed in EU's. This is the job size currently being used by the control algorithm.

Minimum Value: 0 Maximum Value: 9999999
Units: EU

MP-15 LdNetOfst

Lead Net Offset (MP-15) displays the resultant Net-Offset applied to the lead position after considering the LdSnsrDist (CP-340) and the LdSnsrOfst (CP-341) values. LdNetOfst (MP-15) is the final resultant offset inside a lead job size.

Minimum Value: -999999 Maximum Value: 999999
Units: EU

(Continued)

MP-20 Fb Posn

Feedback Position (MP-20) displays the present value of the Feedback Position in Engineering Units, as specified by Pulses FI2 (CP-267) and EU FI2 (CP-268). The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

Minimum Value: 0 Maximum Value: 999999999
Units: EU

MP-21 FbJobSize

Follower Job Size (MP-21) displays the present value determined by the Follower Frequency and Follower Sync inputs. Displayed in EU's. It is the size of the very last job size that was encountered.

Minimum Value: 0 Maximum Value: 9999999
Units: EU

MP-22 FbJbSzVar

Follower Job Size Variance (MP-22) displays the maximum variance of the last 16 follower job sizes. Displayed in EU's.

Minimum Value: -999999 Maximum Value: 999999
Units: EU

MP-23 FbJbSzAve

Follower Job Size Average (MP-23) displays a running average value of the last 16 follower job sizes determined by the Follower Frequency and Follower Sync inputs. Displayed in EU's.

Minimum Value: 0 Maximum Value: 9999999
Units: EU

MP-24 FbJbSzAct

Follower Job Size Active (MP-24) displays a running average value of the last 16 qualifying follower job sizes determined by the Follower Frequency and Follower Sync inputs. Displayed in EU's. This is the job size currently being used by the control algorithm.

Minimum Value: 0 Maximum Value: 9999999
Units: EU

MP-25 FbNetOfst

Follower Net Offset (MP-25) displays the resultant Net-Offset applied to the follower position after considering the FbSnsrDist (CP-350) and the FbSnsrOfst (CP-351) values. FbNetOfst (MP-25) is the final resultant offset inside a follower job size.

Minimum Value: -9999999 Maximum Value: 9999999
Units: EU

(Continued)

MP-29 SyncFlgDif

Sync Flag Difference (MP-29) displays the difference, in Follower EU's, between the position of the Lead and Follower sync pulses.

Minimum Value: -9999999 Maximum Value: 9999999
Units: EU

MP-30 ScaledRef

Scaled Reference (MP-30) displays the reference speed, in Engineering Units per Time. This is the calculated setpoint before the accel/decel ramps are applied. The placement of the decimal point is the same as the placement of the decimal point in Master SP (CP-210).

Minimum Value: -99999.9 Maximum Value: 99999.9
Units: EU/Tm

MP-31 RampedRef

Ramped Reference (MP-31) displays the speed command, in Engineering Units per Time. This is the output of the ramp calculations. When the ramp has been completed, the RampedRef (MP-31) should equal the ScaledRef (MP-30).

Minimum Value: -99999.9 Maximum Value: 99999.9
Units: EU/Tm

MP-32 VelError

Velocity Error (MP-32) displays the difference between the RampedRef (MP-31) and Fb EU/Tm (MP-6).
Displayed in EU/Tm.

Minimum Value: -99999.9 Maximum Value: 99999.9
Units: EU/Tm

MP-33 PosnErr

Position Error (MP-33) displays the value, in engineering units, of the accumulated position error between the lead (FI1) and the feedback (FI2) input signals. The placement of the decimal point is the same as the placement of the decimal point in EU FI2 (CP-268).

Minimum Value: 0 Maximum Value: 999999999
Units: EU

MP-34 Intgrl

Integral (MP-34) displays the value of the integral term (i.e., integrated error times the Ki constant) of the PID compensator. Intgrl (MP-34) is displayed in Volts. Intgrl (MP-34) is a conditioned error signal that serves to adjust the CO Volts (MP-37) to help achieve the desired speed. It is part of the PID error correction algorithm.

Minimum Value: -15.00 Maximum Value: 15.00
Units: Volts

(Continued)

MP-35 FeedFwd

Feedforward (MP-35) displays the estimated voltage command to the drive required achieve the commanded RampedRef (MP-31). It is usually the major portion of the CO Volts (MP-37) signal.

Minimum Value: -15.00 Maximum Value: 15.00
Units: Volts

MP-36 Trim Out

Trim Out (MP-36) displays the value of the output of the PID compensator. Trim Out is displayed in Volts. Trim Out is the sum of the conditioned error signals that, combined with the FeedFwd (MP-35), become the CO Volts (MP-37). Trim Out is the combination of all three terms of the PID error correction algorithm.

Minimum Value: -15.00 Maximum Value: 15.00
Units: Volts

MP-37 CO Volts

Control Output Volts (MP-37) displays the present value, in volts, of the Control Output (CO_Sig) signal to the drive. It is the combination of FeedFwd (MP-35) plus Trim Out (MP-36).

Minimum Value: -15.00 Maximum Value: 15.00
Units: Volts

MP-38 CO Bits

Control Output Bits (MP-38) displays the present value, in DAC bits, of the Control Output (CO_Sig) signal to the drive. CO Bits is the CO Volts (MP-37) expressed in DAC bits.

Minimum Value: -32768 Maximum Value: 32767
Units: Bits

MP-39 CO Max Bits

Control Output Maximum Bits (MP-39) reflects the maximum allowed output in units of DAC bits. The value of CO Max Volts (CP-271) determines this parameter, based on the conversion of 32767 bits = 15 VDC.

Minimum Value: 0 Maximum Value: 32767
Units: Bits

MP-40 Scaled Fb

Scaled Feedback (MP-40) displays the scaled feedback , which is scaled per ScFbDispEq (CP-250). The placement of the decimal point is the same as the placement of the decimal point in Mater SP (CP-210) in "Master" and Follower SP (CP-220) in "Ratio or Inverse Ratio".

Minimum Value: -9999999 Maximum Value: 9999999
Units: EU

(Continued)

MP-41 ScaleFactor

Scale Factor (MP-41) displays the calculated ratio between the LdJbSzAve (MP-13) and the FbJbSzAve (MP-23). This may be different than the scale factor actually being used by the control algorithm.

Minimum Value: 0 Maximum Value: 999999
Units: Ratio

MP-42 ActScaleFactor

Active Scale Factor (MP-42) displays the scale factor currently being utilized by the position control algorithm. The ActScaleFactor (MP-42) may not be the same as ScaleFactor (MP-41).

Minimum Value: 0 Maximum Value: 999999
Units: Ratio

MP-48 Kff

Kff (MP-48) is the feedforward gain for the follower. It translates a follower EU/Time into an approximate voltage output, which is then error-trimmed +/- to effect the desired speed. A reasonable accurate feedforward can minimize the need for error trim action, thus improving the response of the control loop. It is automatically adjusted for any change entered into CO Max Volts (CP-271), or Max Fb (CP-329). It is also adjusted automatically during feedforward Kff Auto En (CP-364) mode.

Minimum Value: 0.00 Maximum Value: 99999.99
Units: V/kiloRPM

MP-49 Cntrl Loop

Control Loop (MP-49) displays the present operating mode of the CX-1200. Only one type of loop can be active at a time. These modes are automatically selected depending on the present system State (MP-50).

3 = Psn Hld (H-Stop Position Loop)
2 = Position Loop
1 = Velocity Loop
0 = Open Loop

Minimum Value: 0 Maximum Value: 3
Units: Coded

(Continued)

MP-50 State

State (MP-50) displays the present system operating state of the CX-1200 (see list below). Only one operating state may be active at a time. To access either the "Run" or the "Jog" operating state, the F-Stop, R-Stop and H-Stop inputs must be closed.

9 = Not Defined
8 = Diagnostics
7 = Not Defined
6 = Not Defined
5 = Jog
4 = Not Defined
3 = Run
2 = H-Stop
1 = R-Stop
0 = F-Stop

Minimum Value: 0 Maximum Value: 9
Units: Coded

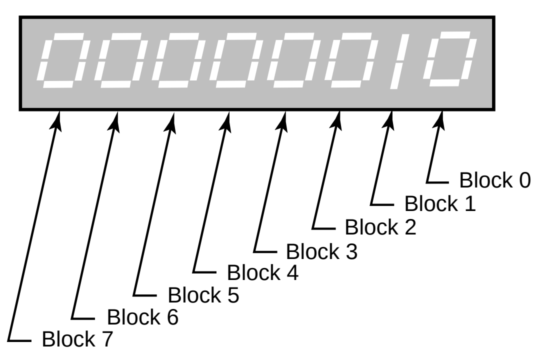
MP-51 Active Blk

Active Block (MP-51) displays the active block (0-7). The block can be selected and made active by the Block select bits (Blk Sel A,B.C), in the PLC Programming screen if Blk Sel Source (CP-478) is set to "1" (DigIn & PLC). Or the block can be selected and made active by the keypad if Blk Sel Source (CP-478) is set to "2" (Keypad Blk Sel).

Minimum Value: 0 Maximum Value: 7
Units: Coded

MP-52 InvalidBlks

Invalid Blocks (MP-52) displays the status of the blocks in the Block Setup screens. A "1" indicates that there is an error with the corresponding block (see graphic below). Generally, this indicates that an overflow condition can occur if the corresponding block is activated. In addition, since other parameters are used in conjunction with the Block Parameters that you selected, an error can result from a parameter that is not selected in Block Parameters. If a bad block is activated, the CX-1200 will execute an F-Stop until either the block error is corrected or a another block is activated.

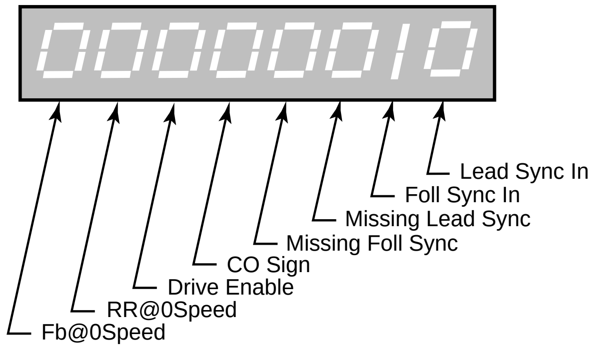


Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

MP-53 Misc Status

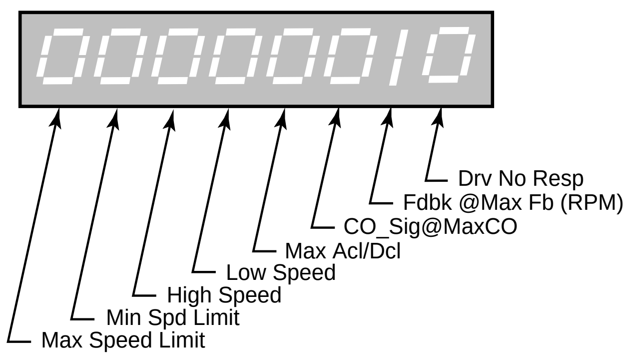
Miscellaneous Status (MP-53) displays various status conditions (see graphic below). A "1" in the Drive Enable bit indicates a drive enabled output. A "1" in any other bit location indicates an active condition.



Minimum Value: 00000000   Maximum Value: 11111111
Units: Coded

MP-54 Std Alms

Std Alarms (MP-54) displays various alarm conditions (see graphic below). A "1" in any bit location indicates an active condition.

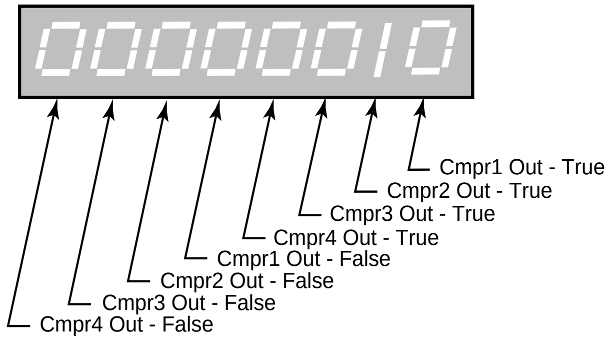


Minimum Value: 00000000   Maximum Value: 11111111
Units: Coded

(Continued)

MP-55 Custom Alms

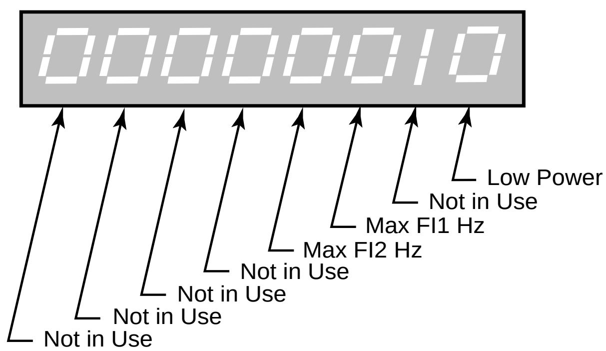
Custom Alarms (MP-55) displays the outputs of the PLC numerical comparators. A "1" in bit locations 0-3 indicates that the result of the compare (Cmprx Parm value vs. Cmprx Val) is true for the given Cmprx Type. A "1" in bit locations 4-7 indicates that the result of the compare (Cmprx Parm value vs. Cmprx Val) is false for the given Cmprx Type (the NOT is true). Refer to CP-380 through CP-395.



Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

MP-56 Misc Alarms

Misc Alarms (MP-56) displays various alarm conditions (see graphic below). A "1" in any bit location indicates an active condition.



Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

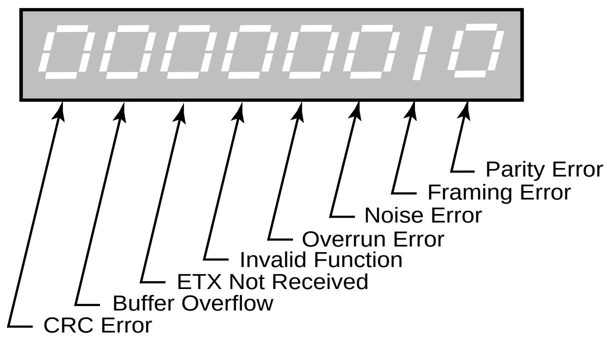
MP-90 SerCom Char In

Serial Communications Character In (MP-90) displays the value of the last byte that was received by the Serial Communications port. SerCom Char In (MP-90) is displayed in a decimal format. SerCom Char In (MP-90) is used primarily for troubleshooting.

Minimum Value: 0 Maximum Value: 255
Units: Binary Character

MP-91 SerCom Errs

Serial Communications Errors (MP-91) displays all serial communications errors that occurred during the most recent transmission.



Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

MP-94 ROM Test

ROM Test (MP-94) displays the result of the most recent ROM Test. ROM Test runs a checksum test on the CX-1200 program memory.

1 = Memory Test Fail
0 = Memory Test Pass

Minimum Value: 0 Maximum Value: 1
Units: Coded

MP-95 SRAM Test

SRAM Test (MP-95) displays the result of the most recent SRAM Test. SRAM Test runs a read/write test on the scratch-pad memory.

1 = Memory Test Fail
0 = Memory Test Pass

Minimum Value: 0 Maximum Value: 1
Units: Coded

(Continued)

MP-96 NV RAM Test

Non Volatile RAM Test (MP-96) displays the result of the most recent Non Volatile RAM Test. The test runs both a read/write and a checksum test on the nonvolatile memory. The parameter values, the PLC program and the backups are all stored in this memory.

1 = Memory Test Fail
0 = Memory Test Pass

Minimum Value: 0 Maximum Value: 1
Units: Coded

MP-97 Model

Model # (MP-97) displays the model number for this CX-1200. This model number is unique to the CX-1200 series of controllers.

Minimum Value: 1000 Maximum Value: 60000
Units: Model Number

MP-98 RELEASE

RELEASE (MP-98) is the date that the software for this individual CX-1200 was released. The numeric, six digit format is: year, month, day.

Minimum Value: 010106 Maximum Value: 999999
Units: Date

MP-99 REVISION

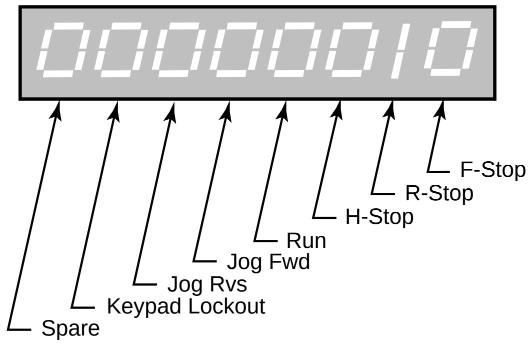
REVISION (MP-99) is the revision level of the software for this individual CX-1200.

Minimum Value: 0.50 Maximum Value: 99.99
Units: Rev Level

(Continued)

MP-100 DI 7..0

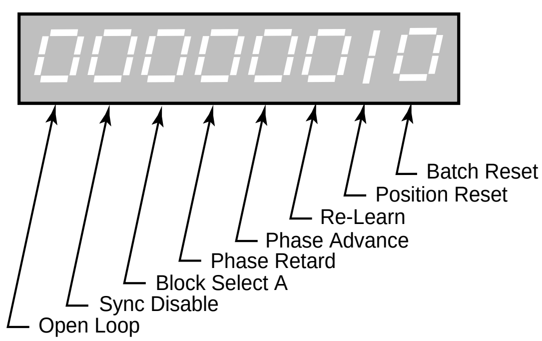
Digital Input 7..0 (MP-100) displays the value of the “J6” digital inputs. A ‘1’ in the bit location (see graphic below) indicates a “low voltage” condition on the corresponding input (which is consistent with a contact closure to common).



Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

MP-101 DI 15..8

Digital Input 15..8 (MP-101) displays the value of the “J7” digital inputs. A ‘1’ in the bit location (see graphic below) indicates a “low voltage” condition on the corresponding input (which is consistent with a contact closure to common). These eight Inputs can be set up in the PLC Programming screen to generate a One-Shot-Pulse on a high-to-low transition.

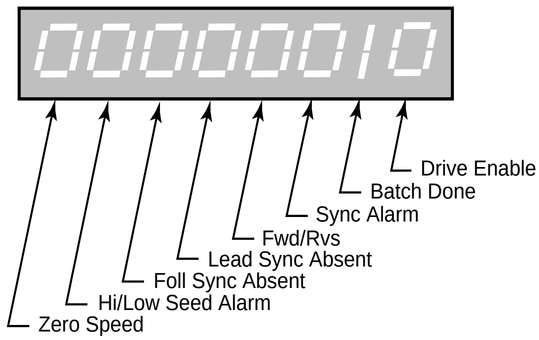


Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

MP-102   DO 7..0

Digital Output 7..0 (MP-102) displays the value of the "J2" digital outputs. A '1' in the bit location (see graphic below) indicates an active "low voltage" condition on the corresponding open collector output (which would sink DC current).



Minimum Value: 00000000   Maximum Value: 11111111
Units: Coded

MP-103   KeyPad Lockout

Keypad Lockout (MP-103) displays the Keypad Lockout status. The Keypad Lockout is active when "On" is displayed. When Keypad Lockout is active, Control Parameter values can not be changed, with the exception of the Control Parameters that are exempted by CP's 480-489. The Keypad Lockout is not active when "OFF" is displayed. When the Keypad Lockout is not active, any Control Parameter can be changed.

Minimum Value: 0   Maximum Value: 1
Units: Coded

MP-107   TMR4 TIME

Timer 4 Time (MP-107) displays the elapsed time, in seconds, for Timer 4 during the delay part of its operation.

Minimum Value: 0   Maximum Value: 86400
Units: Seconds

(Continued)

MP-108 PLC Mon 1 Val

PLC Monitor 1 Value (MP-108) displays both the description and the value of the PLC bit that was selected in PLC Monitor 1 (CP-405). Please note that a description of the PLC bit appears on the display line instead of the parameter name (PLC Mon 1 Val).

Minimum Value: 0 Maximum Value: 1
Units: Coded

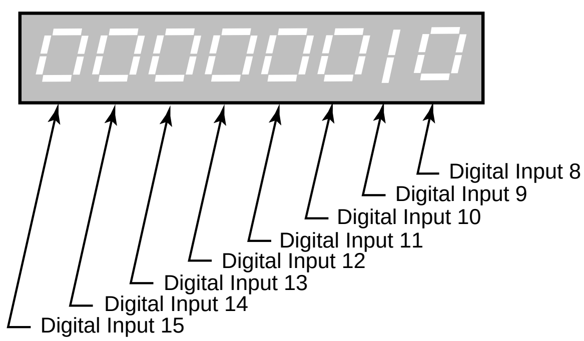
MP-109 PLC Mon 2 Val

PLC Monitor 2 Value (MP-109) displays both the description and the value of the PLC bit that was selected in PLC Monitor 2 (CP-406). Please note that a description of the PLC bit appears on the display line instead of the parameter name (PLC Mon 2 Val).

Minimum Value: 0 Maximum Value: 1
Units: Coded

MP-110 PLC 15-8

PLC 15-8 (MP-110) displays the status of PLC bits 15-8 (See graphic and list below). A "1" in any bit indicates that the input is "active". The digital inputs are active low.



Description	Default Function
Digital Input 8	Batch Reset
Digital Input 9	Position Reset
Digital Input 10	Re-Learn
Digital Input 11	Phase Advance
Digital Input 12	Phase Retard
Digital Input 13	Block Select A
Digital Input 14	Sync Disable
Digital Input 15	Open Loop

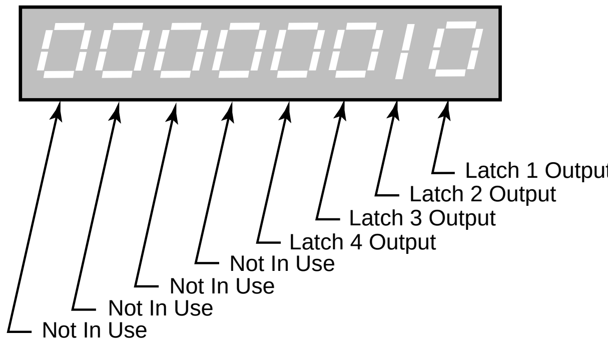
Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

Appendix C: Parameter Summary Numeric Quick Reference (continued)

MP-111 PLC 23-16

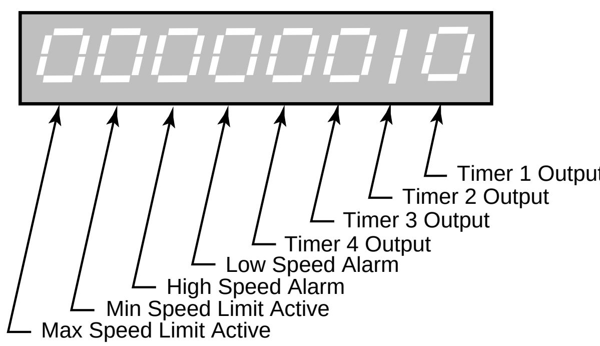
PLC 23-16 (MP-111) displays the status of the internal PLC status bits 23-16 (See graphic below). A "1" in any bit indicates that the bit is "active".



Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

MP-112 PLC 31-24

PLC 31-24 (MP-112) displays the status of the internal PLC status bits 31-24 (See graphic below). A "1" in any bit indicates that the bit is "active"



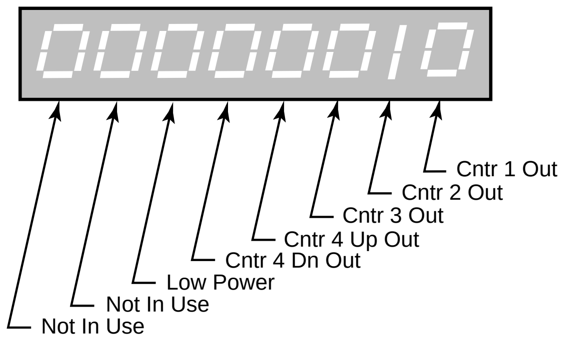
Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

Appendix C: Parameter Summary Numeric Quick Reference (continued)

MP-113 PLC 39-32

PLC 39-32 (MP-113) displays the status of the internal PLC status bits 39-32 (See graphic below). A "1" in any bit indicates that the bit is "active"

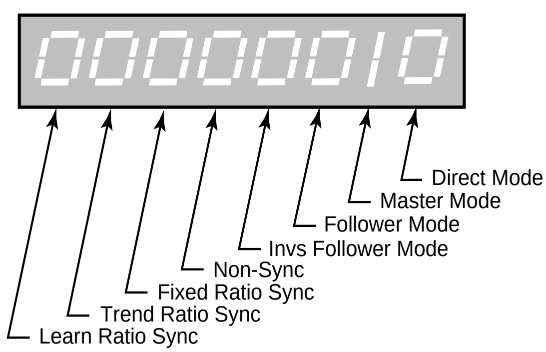


Bit Name	Description
Cntr1 Out	Counter 1 Output
Cntr2 Out	Counter 2 Output
Cntr3 Out	Counter 3 Output
Cntr4UpO	Counter 4 Up counter Output
Cntr4DnO	Counter 4 Down counter Output
Low Power	Low Power Indication
Not In Use	
Not In Use	

Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

MP-114 PLC 47-40

PLC 47-40 (MP-114) displays the status of the internal PLC status bits 47-40 (See graphic below). A "1" in any bit indicates that the bit is "active"



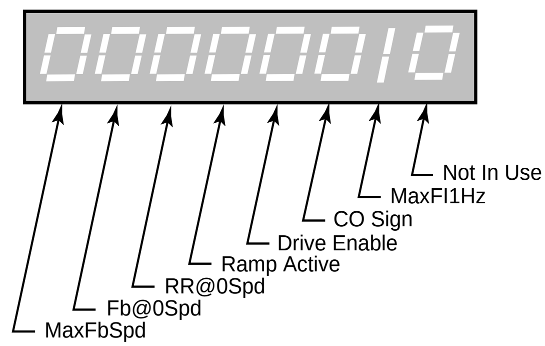
Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

Appendix C: Parameter Summary Numeric Quick Reference (continued)

MP-115 PLC 55-48

PLC 55-48 (MP-115) displays the status of the internal PLC status bits 55-48 (See graphic below). A “1” in any bit indicates that the bit is “active”.



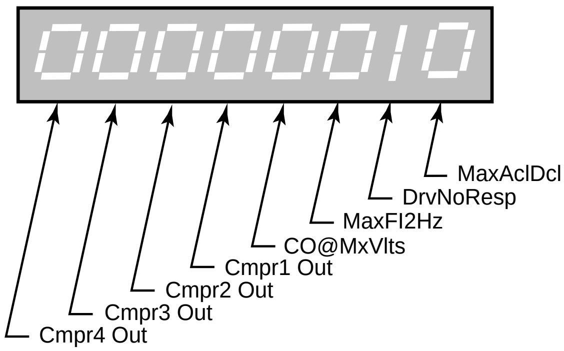
Bit Name	Description
Not In Use	
MaxFI1Hz	
CO Sign	Control Output sign is negative (-)
DrvEn	Drive Enable
RmpActive	Ramp Active
RR@0Spd	RampedRef (MP-31) less than Zero Speed (CP-332)
Fb@0Spd	Feedback is less than Zero Speed (CP-332)
MaxFbSpd	Feedback at Max Fb (CP-329)

Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

MP-116 PLC 63-56

PLC 63-56 (MP-116) displays the status of the internal PLC status bits 63-56 (See graphic below). A "1" in any bit indicates that the bit is "active".



Bit Name	Description
MaxAclDcl	Feedback at Maximum Accel/Decel
DrvNoRsp	Drive/Motor NOT Responding (CP-373)
MaxFI2Hz	Feedback is >= Maximum Frequency = 180 KHz
CO@MaxVlts	CO Volts (MP-37) at CO Max Volts (CP-271)
Cmpr1 Out	Comparator 1 Output
Cmpr2 Out	Comparator 2 Output
Cmpr3 Out	Comparator 3 Output
Cmpr4 Out	Comparator 4 Output

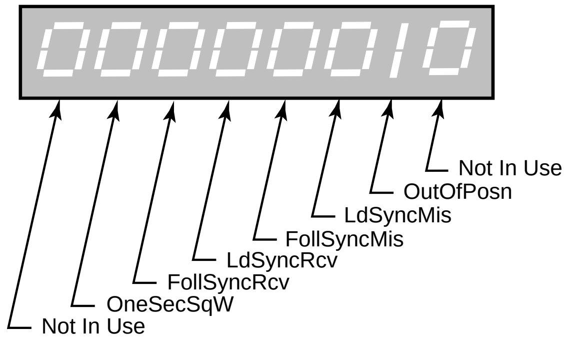
Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

Appendix C: Parameter Summary Numeric Quick Reference (continued)

MP-117 PLC 71-64

PLC 71-64 (MP-117) displays the status of the internal PLC status bits 71-64.

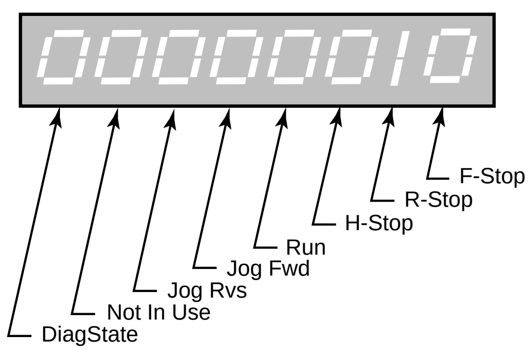


Bit Name	Description
Not In Use	
OutOfPosn	Out of Position
LdSyncMis	Lead Sync pulse is Missing
FollSyncMis	Follower Sync pulse is Missing
LdSyncRcv	Lead Sync pulse Received
FollSyncRcv	Follower Sync pulse Received
OneSecSqW	One Second Square Wave Output
Not In Use	

Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

MP-118 PLC 79-72

PLC 79-72 (MP-118) displays the status of the internal PLC status bits 79-72 (See graphic below). A "1" in any bit indicates that the bit is "active". These bits are only used to monitor the operating state of the CX-1200.

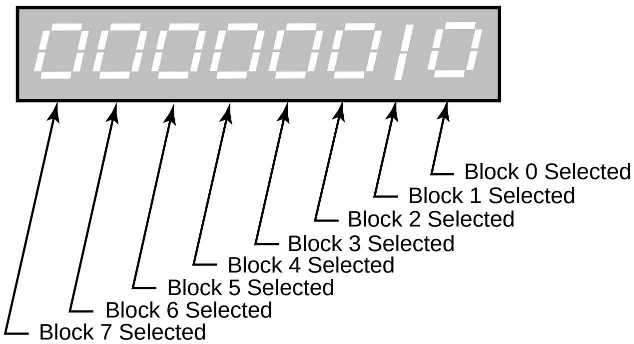


Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

MP-119 PLC 87-80

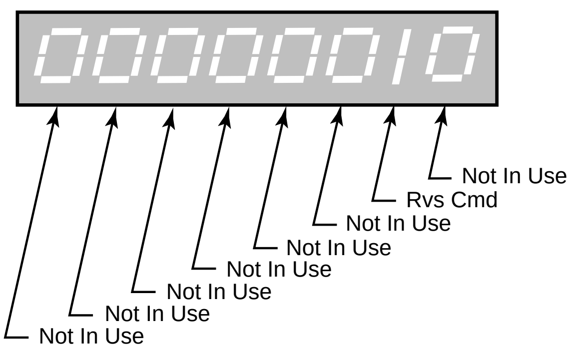
PLC 87-80 (MP-119) displays the status of the internal PLC status bits 87-80 (See graphic below). A "1" in any bit indicates that the bit is "active". These bits are only used to monitor the parameter block that is active.



Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

MP-120 PLC 95-88

PLC 95-88 (MP-120) displays the status of the internal PLC status bits 95-88. None of these bits are presently active. They are reserved for future use.



Bit Name	Description
Not In Use	
Rvs Cmd	Reverse direction command indicated
Not In Use	
Not In Use	
Not In Use	
Not In Use	
Not In Use	
Not In Use	

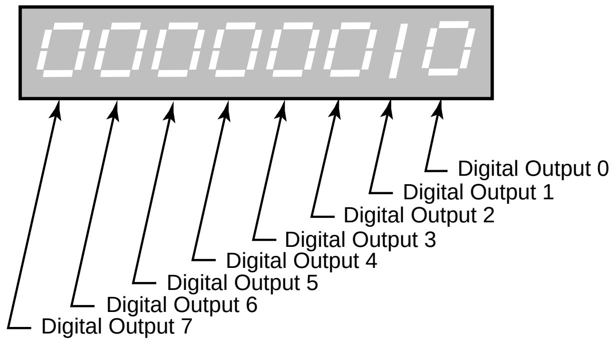
Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

Appendix C: Parameter Summary Numeric Quick Reference (continued)

MP-121 PLC 107-100

PLC 107-100 (MP-121) displays the status of PLC bits 107-100 (See graphic and list below). A "1" in any bit indicates that the output is "active". The digital outputs are active low (current sinking).

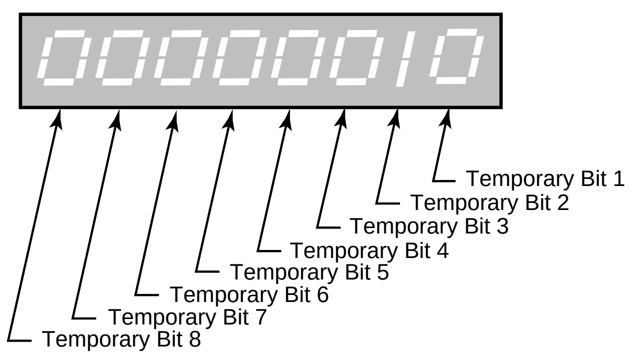


Bit Name	Description
Digital Output 0	Drive Enable
Digital Output 1	Batch Done
Digital Output 2	Sync Alarm
Digital Output 3	Fwd/Rvs
Digital Output 4	Lead Sync Absent
Digital Output 5	Foll Sync Absent
Digital Output 6	Hi/Low Speed Alarm
Digital Output 7	Zero Speed

Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

MP-122 PLC 115-108

PLC 115-108 (MP-122) displays the status of the internal PLC control bits 115-108 (See graphic below). A "1" in any bit indicates that the bit is "active". These internal bits (control relays) can be used as global "control relays". For example, they can be used to create one-shots or latches. They can also be used to simplify programming.

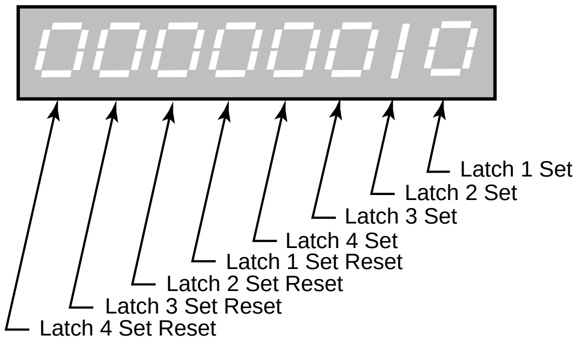


Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

MP-123   PLC 123-116

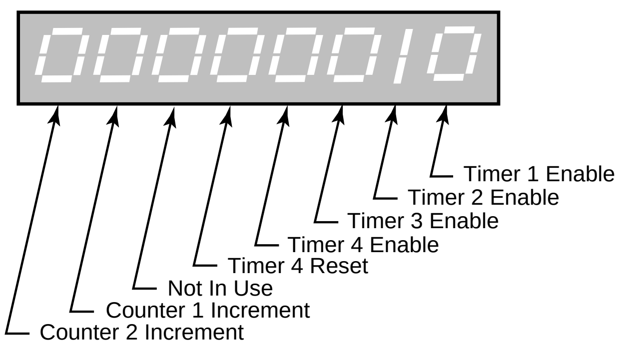
PLC 123-116 (MP-123) displays the status of the internal PLC control bits 123-116 (See graphic below). A "1" in any bit indicates that the bit is "active".



Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

MP-124   PLC 131-124

PLC 131-124 (MP-124) displays the status of the internal PLC control bits 131-124 (See graphic below). A "1" in any bit indicates that the bit is "active".

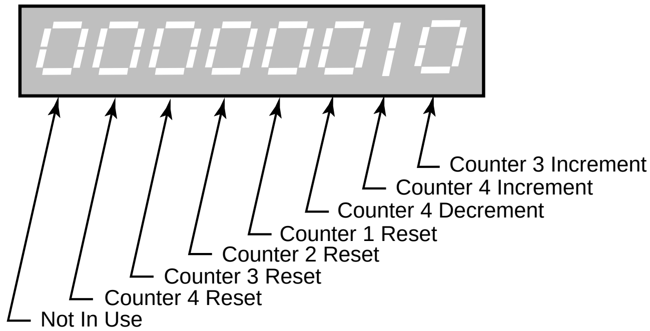


Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

MP-125 PLC 139-132

PLC 139-132 (MP-125) displays the status of the internal PLC control bits 139-132 (See graphic below). A "1" in any bit indicates that the bit is "active".

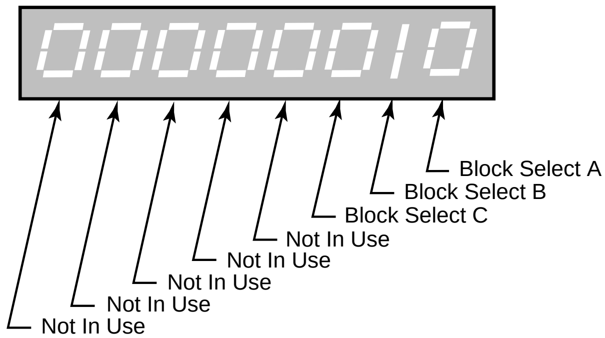


Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

MP-126   PLC 147-140

PLC 147-140 (MP-126) displays the status of the internal PLC control bits 147-140 (See graphic below).   A "1" in any bit indicates that the bit is "active". Blk Sel A, B, C select the block that is active, if Blk Sel Source (CP-378) has been set to "1" (DgIn). The chart below indicates which block has been selected, based on the Block Select A, B or C inputs.



Blk Sel C	B	A	Block Selected
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	0	0	4
1	0	1	5
1	1	0	6
1	1	1	7

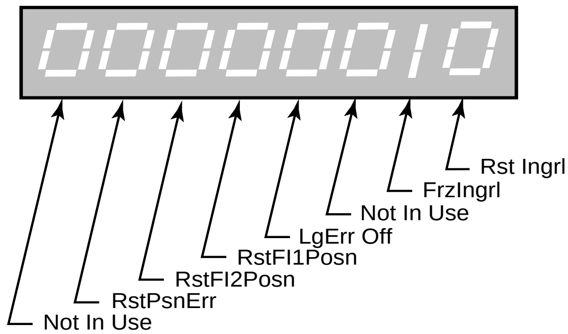
Bit Name	Description
Blk Sel A	Block Select A
Blk Sel B	Block Select B
Blk Sel C	Block Select C
Not In Use	
Not In Use	
Not In Use	
Not In Use	
Not In Use	

Minimum Value: 00000000   Maximum Value: 11111111
Units: Coded

(Continued)

MP-127 PLC 155-148

PLC 155-148 (MP-127) displays the status of the internal PLC control bits 155-148 (See graphic below). A “1” in any bit indicates that the bit is “active”.



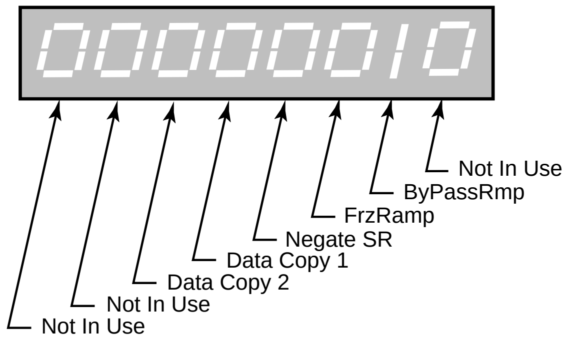
Bit Name	Description
Rst Ingrl	Reset Integral to zero
FrzIntgrl	Freeze Integral (Freeze at current value)
Not In Use	
LgErr Off	Large Error Recovery Disabled
RstFI1Posn	Reset FI1 Position to zero
RstFI2Posn	Reset FI2 Position to zero
RstPsnErr	Reset Position Error to zero
Not In Use	

Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

MP-128 PLC 163-156

PLC 163-156 (MP-128) displays the status of the internal PLC control bits 163-156 (See graphic below). A "1" in any bit indicates that the bit is "active".



Bit Name	Description
Not In Use	
ByPassRmp	Bypass Ramp
FrzRamp	Freeze Ramp
Negate SR	Negate Scaled Reference, change sign of ScaledRef (MP-30)
Data Copy 1	
Data Copy 2	
Not In Use	
Not In Use	

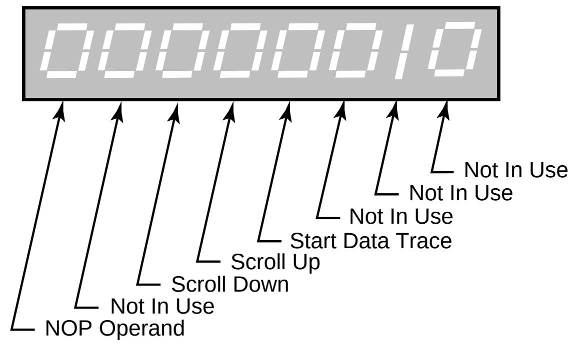
Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

Appendix C: Parameter Summary Numeric Quick Reference (continued)

MP-129 PLC 171-164

PLC 171-164 (MP-129) displays the status of the internal PLC control bits 171-164. (See graphic below). A "1" in any bit indicates that the bit is "active".

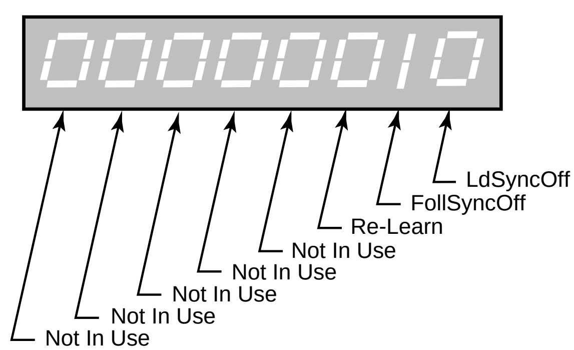


Bit Name	Description
Not In Use	
Not In Use	
Not In Use	
StrtTrace	Start Data Trace
Scroll Up	Remote Scroll Up (CP-400, 401)
Scroll Down	Remote Scroll Down (CP-400, 401)
Not In Use	
NOP Opnd	No Operation Operand

Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

MP-130 PLC 179-172

PLC 179-172 (MP-130) displays the status of the internal PLC control bits 179-172. (See graphic below). A "1" in any bit indicates that the bit is "active".

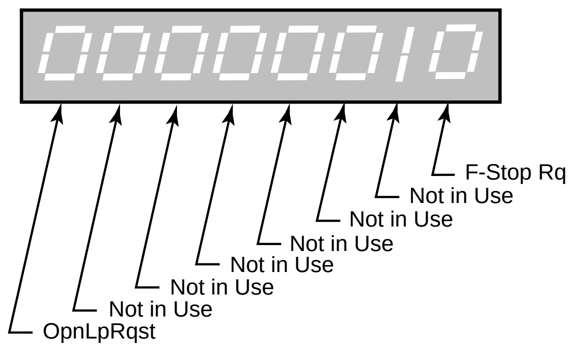


Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

MP-131 PLC 187-180

PLC 187-180 (MP-131) displays the status of the internal PLC control bits 187-180. (See graphic below). A "1" in any bit indicates that the bit is "active".

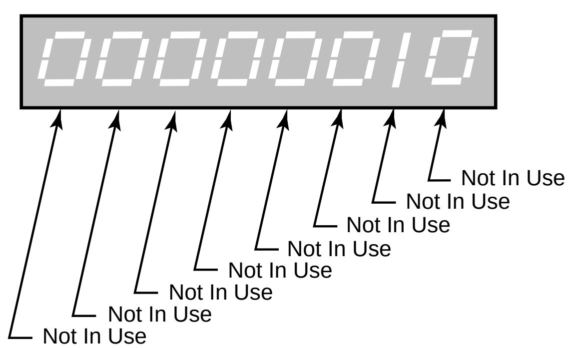


Bit Name	Description
F-Stop Rq	Request State change to F-Stop State
Not in Use	
Not in Use	
Not in Use	
Not in Use	
Not in Use	
Not in Use	
OpnLpRqst	Request Open Loop control

Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

MP-132 PLC 195-188

PLC 195-188 (MP-132) displays the status of the internal PLC control bits 195-188. (See graphic below). A "1" in any bit indicates that the bit is "active".



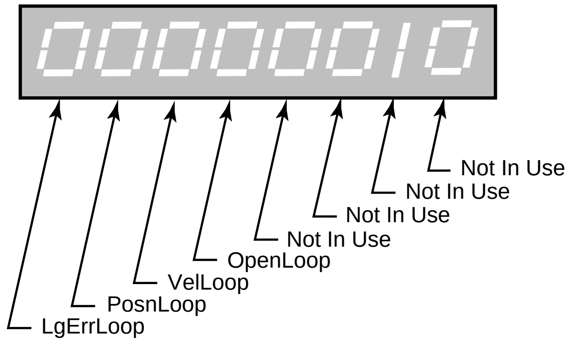
Minimum Value: 00000000 Maximum Value: 11111111
Units: Coded

(Continued)

Appendix C: Parameter Summary Numeric Quick Reference (continued)

MP-133   PLC 203-196

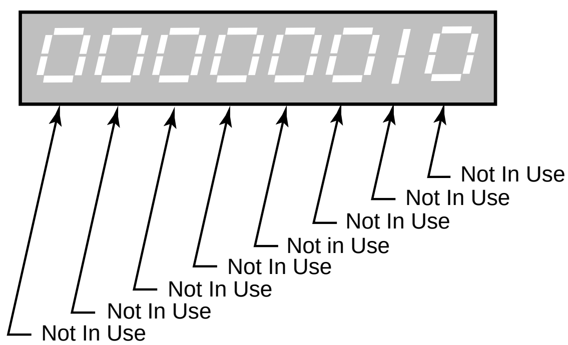
PLC 203-196 (MP-133) displays the status of the internal PLC control bits 203-196 (See graphic below).   A “1” in any bit indicates that the bit is “active”.



Minimum Value: 00000000   Maximum Value: 11111111
Units: Coded

MP-134   PLC 211-204

PLC 211-204 (MP-134) displays the status of the internal PLC control bits 211-204. (See graphic below).   A “1” in any bit indicates that the bit is “active”.

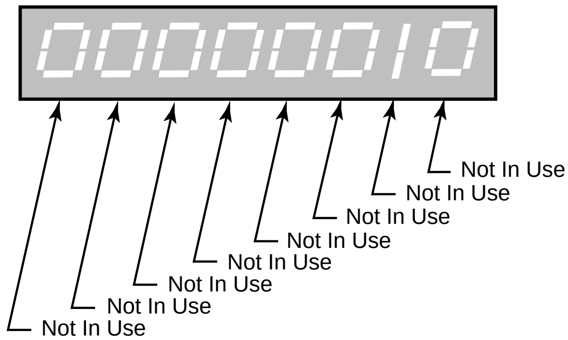


Minimum Value: 00000000   Maximum Value: 11111111
Units: Coded

(Continued)

MP-135 PLC 219-212

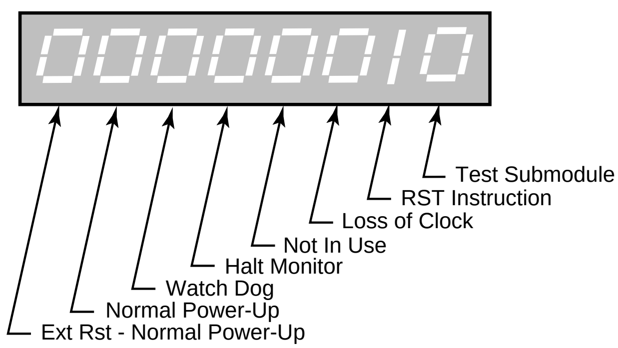
PLC 219-212 (MP-135) displays the status of the internal PLC control bits 219-212. (See graphic below). A "1" in any bit indicates that the bit is "active".



Minimum Value: 00000000 Maximum Value: 00001111
Units: Coded

MP-150 Last Reset

Last Reset (MP-150) displays a "1" in a bit to indicate the reason for the last reset.

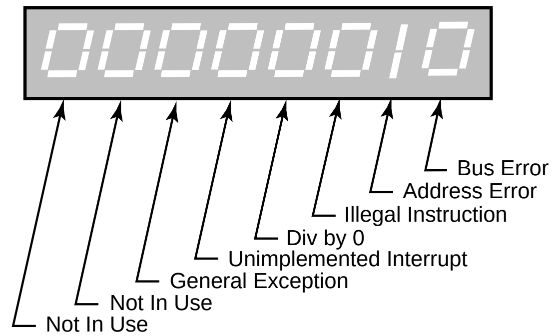


Minimum Value: 00000000 Maximum Value: 11110111
Units: Coded

(Continued)

MP-151   Misc Intrpt

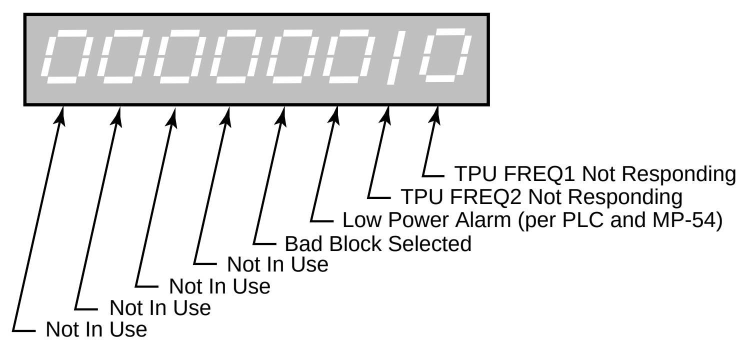
Miscellaneous Interrupts (MP-151) displays a "1" in a bit to indicate which of the various system interrupts may have caused the last reset.



Minimum Value: 00000000   Maximum Value: 00111111
Units: Coded

MP-152   Device Alms

Device Alarms (MP-152) displays the status of microprocessor or other hardware related alarms. Notification of a bad block selection is also included .



Minimum Value: 00000000   Maximum Value: 00001111
Units: Coded

MP-153   PC at Intrpt

Program Counter at Interrupt (MP-153) shows where the last interrupt of the microprocessor occurred . If the CX-1200 repeatedly displays the "RESET FAULT" error box, then record the "PC @Intrpt" value as well as the line just above it (which indicates the cause of the reset), before you press the clear key to continue. The program counter at interupt is stored in the Program Counter at Interrupt (MP-153) Monitor Parameter for review. A value of "2560" is normal.

Minimum Value: 2560   Maximum Value: 524288
Units: Address

(Continued)

MP-154 Norm Pwr Ups

Normal Power Ups (MP-154) displays the number of normal power-ups since the most recent "Clear-7" power-up . This value is reset only by a "Clear-7" power-up. Norm Pwr Ups (MP-154) is used primarily for troubleshooting.

Minimum Value: 1 Maximum Value: 65535
Units: Counts

MP-155 Low Pwr Cntr

Low Power Counter (MP-155) displays the number of low power detections, including normal "Power Downs". You can reset this numeric value, but only in Clr Fault Cntrs (CP-491). Low Pwr Cntr (MP-155) is used primarily for troubleshooting.

Minimum Value: 0 Maximum Value: 65535
Units: Counts

MP-156 Mem Err Cntr

Memory Error Counter (MP-156) displays the number of memory test failures that occurred during "Power Up". You can reset this numeric value, but only in Clr Fault Cntrs (CP-491). Mem Err Cntr (MP-156) is used primarily for troubleshooting.

Minimum Value: 0 Maximum Value: 65535
Units: Counts

MP-157 WatchDogCntr

Watch Dog Counter (MP-157) displays the number of watch dog resets that were caused by watchdog time-out. WatchDogCntr (MP-157) is used primarily for troubleshooting. You can reset this numeric value, but only in Clr Fault Cntrs (CP-491).

Minimum Value: 0 Maximum Value: 65535
Units: Counts

MP-158 MiscIntrptCntr

Miscellaneous Interrupt Counter (MP-158) displays the number of miscellaneous interrupts that occurred as the result of bus errors, address errors, divide-by-0 errors, unexecuted instruction errors, general exceptions, and unexecuted and spurious interrupts. You can reset this numeric value, but only in Clr Fault Cntrs (CP-491). MiscIntrptCntr (MP-158) is used primarily for troubleshooting.

Minimum Value: 0 Maximum Value: 65535
Units: Counts

(Continued)

MP-160 AI1 Bits

Analog Input 1 Bits (MP-160) displays the present value in ADC bits of Auxiliary Board Analog Input 1 signal.

Minimum Value: -8192 Maximum Value: 8192
Units: Bits

MP-161 AI1 Signal

Analog Input 1 Signal (MP-161) displays the present value of the Auxiliary Board Analog Input 1 signal in either volts or milliamps relative to which setting (volts or current) has been entered in AI1 Mode (CP-280).

Minimum Value: -12.00 Maximum Value: 20
Units: Volt or Milliamps

MP-162 AI1 EU

Analog Input 1 EU (MP-162) displays the present value of the Auxiliary Board Analog Input 1 signal in Engineering Units (EU) as relative to the AI1 RA (CP-281), EU@AI1 RA (CP-282), AI1 RB (CP-283) and EU@AI1 RB (CP-284). The placement of the decimal point is the same as the placement of the decimal point in EU@AI1 RA (CP-282).

Minimum Value: -999999 Maximum Value: 999999
Units: EU

MP-163 AI2 Bits

Analog Input 2 Bits (MP-163) displays the present value in ADC bits of Auxiliary Board Analog Input 2 signal.

Minimum Value: -8192 Maximum Value: 8191
Units: Bits

MP-164 AI2 Signal

Analog Input 2 Signal (MP-164) displays the present value of the Auxiliary Board Analog Input 2 signal in either volts or milliamps, relative to which setting (volts or current) has been entered in AI2 Mode (CP-285).

Minimum Value: -12.00 Maximum Value: 20
Units: Volt or Milliamps

MP-165 AI2 EU

Analog Input 2 EU (MP-165) displays the present value of the Auxiliary Board Analog Input 2 signal in Engineering Units (EU) relative to the AI2 RA (CP-286), EU@AI2 RA (CP-287), AI2 RB (CP-288) and EU@AI2 RB (CP-289). The placement of the decimal point is the same as the placement of the decimal point in EU@AI2 RA (CP-286).

Minimum Value: -999999 Maximum Value: 999999
Units: EU

(Continued)

MP-166   AO Bits

Analog Output Bits (MP-166) displays the present value, in DAC Bits, of the Auxiliary Analog Output.

Minimum Value: -32768   Maximum Value: 32767
Units: Bits

MP-167   AO Signal

Analog Output Signal (MP-167) displays the present value, in either volts or milliamps of the Auxiliary Analog Output, relative to AO Mode (CP-291).

Minimum Value: -12.00   Maximum Value: 20
Units: Volt or Milliamps

MP-168   AnlgCal Ref A

Analog Calibration Reference A (MP-168) displays the Analog Ref Val (CP-463) for the signal (AI1, AI2), which was selected in Analog Cal Sel (CP-461) and which was stored during the calibration of point A.

Minimum Value: -13.00   Maximum Value: 25
Units: Volt or Milliamps

MP-169   AnlgCal Ref B

Analog Calibration Reference B (MP-169) displays the AnalogRef Val (CP-463) for the signal (AI1, AI2), which was selected in Analog Cal Sel (CP-461) and which was stored during the calibration of point B.

Minimum Value: -13.00   Maximum Value: 25
Units: Volt or Milliamps

MP-178   PosnErrCnt

Position Error Count (MP-178) displays PosnErr (MP-33) in lines.

Minimum Value: -500000000   Maximum Value: 500000000
Units: Lines

MP-179   SyncFlgDifCnt

Sync Flag Difference Count (MP-179) displays SyncFlgDif (MP-29) in lines.

Minimum Value: -500000000   Maximum Value: 500000000
Units: Lines

MP-180   LdPsnCnt

Lead Position Count (MP-180) displays Ld Posn (MP-10) in lines.

Minimum Value: -500000000   Maximum Value: 500000000
Units: Lines

(Continued)

MP-182 LdJSCnt

Lead Job Size Count (MP-182) displays LdJobSize (MP-11) in lines.

Minimum Value: -500000000 Maximum Value: 500000000
Units: Lines

MP-183 LdJSAvgCnt

Lead Job Size Average Count (MP-183) displays LdJbSzAvg (MP-14) in lines.

Minimum Value: -500000000 Maximum Value: 500000000
Units: Lines

MP-184 LdJSVarCnt

Lead Job Size Variance Count (MP-184) displays LdJbSzVar (MP-12) in lines.

Minimum Value: -500000000 Maximum Value: 500000000
Units: Lines

MP-190 FbPsnCnt

Follower Position Count (MP-190) displays Fb Posn (MP-20) in lines.

Minimum Value: -500000000 Maximum Value: 500000000
Units: Lines

MP-192 FbJSCnt

Follower Job Size Count (MP-192) displays the FbJobSize (MP-21) in lines.

Minimum Value: -500000000 Maximum Value: 500000000
Units: Lines

MP-193 FbJSAvgCnt

Follower Job Size Average Count (MP-193) displays FbJbSzAvg (MP-24) in lines.

Minimum Value: -500000000 Maximum Value: 500000000
Units: Lines

MP-194 FbJSVarCnt

Follower Job Size Variance Count (MP-194) displays FbJbSzVar (MP-22) in lines.

Minimum Value: -500000000 Maximum Value: 500000000
Units: Lines

(Continued)

CP-201 Setpoint X

Setpoint X (CP-201) displays the name and value of the setpoint that corresponds with the mode of operation selected in RUN Mode (CP-202). The setpoint could be the Master SP (CP-210), the Follower SP (CP-220) or the Direct SP (CP-230). Setpoint X acts as a quick access to the setpoint value. In addition to changing a setpoint value in the setpoint screens, you can also change the value of the active setpoint by entering a new value in Setpoint X (CP-201).

Minimum Value: -9999999	Maximum Value: 9999999
Default Value: 0.0	Units: EU/Tm

CP-202 Run Mode

Run Mode (CP-202) sets the mode of operation and the subsequent Setpoint, that are used when your system is in "Run". The Setpoint and mode of operation combined, determine the Reference Speed and, if applicable, the Reference Position. The modes of operation are:

4 = Inv Foll Mode
3 = Follower Mode
2 = Master Mode (default)
1 = Direct Mode

Minimum Value: 1	Maximum Value: 4
Default Value: 2	Units: Coded

CP-203 Sync Mode

Sync Mode (CP-203) selects the algorithm to be used when RUN Mode (CP-202) is set for Follower or Inverse Follower. 0 = Non-Sync Mode the position follower only, sync pulses are ignored by the control algorithm. 1 = Fixed Mode the follower setpoint is the ratio/scale factor. 2 = Trend Mode the follower setpoint is altered by the control algorithm to allow for continuously changing job sizes. 3 = Learn Mode learns the job spaces and the scale factor, also modifies the follower setpoint.

3 = Learn
2 = Trend
1 = Fixed (default)
0 = Off

Minimum Value: 0	Maximum Value: 3
Default Value: 0	Units: Coded

CP-204 Sync Logic

Sync Logic (CP-204) allows selection of the direction taken when making a sync-correction. Closest makes the correction in the direction of the closest lead sync mark. Forward always makes the correction in the forward direction toward the lead sync mark. And Back always makes the correction back to the lagging lead sync mark.

3 = Backward
2 = Forward
1 = Closest (default)

Minimum Value: 1	Maximum Value: 3
Default Value: 1	Units: Coded

(Continued)

CP-205 LdSyncDvd

Lead Sync Divide (CP-205) can be used to reduce the sync rate of the CX-1200 for those processes that may need the maximum sync rate of 20 pulses per second. The lead sync pulses are divided by the LdSyncDvd (CP-205) value before being submitted to the synchronization routine.

Minimum Value: 1	Maximum Value: 255
Default Value: 1	Units: Coded

CP-206 FbSyncDvd

Feedback Sync Divide (CP-206) can be used to reduce the sync rate of the CX-1200 for those processes that may need the maximum sync rate of 20 pulses per second. The follower sync pulses are divided by the FbSyncDvd (CP-206) value before being submitted to the synchronization routine.

Minimum Value: 1	Maximum Value: 255
Default Value: 1	Units: Coded

CP-207 LdOfstSource

Lead Offset Source (CP-207) identifies the source of the Lead Sensor Offset, which may be used to set a distance offset to the lead position. Lead Offset Sources are:

3 = Analog Input 2
2 = Analog Input 1
1 = Lead Sensor Offset (CP-341) (default)

Minimum Value: 1	Maximum Value: 3
Default Value: 1	Units: Coded

CP-208 FbOfstSource

Follower Offset Source (CP-208) identifies the source of the Follower Sensor Offset, which may be used to set a distance offset to the follower position. Follower Offset Sources are:

3 = Analog Input 2
2 = Analog Input 1
1 = Follower Sensor Offset (CP-351) (default)

Minimum Value: 1	Maximum Value: 3
Default Value: 1	Units: Coded

CP-209 Time Base

Time Base (CP-209) is the denominator, which represents the time (Tm) in the EU/Tm equation. The equation scales the Frequency Inputs (FI1 and FI2) to EU/Tm.

3 = per Hour
2 = per Minute (default)
1 = per Second

(Continued)

Minimum Value: 1	Maximum Value: 3
Default Value: 2	Units: Coded

CP-210 Master SP

Master Setpoint (CP-210) is the speed at which you want your system to operate (while in Run) when the Run Mode (CP-202) is set to "2” (Master Mode).

Minimum Value: -9999999	Maximum Value: 9999999
Default Value: 0.0	Units: EU/Tm

CP-211 Max SP Mstr

Maximum Setpoint Master (CP-211) is an upper limit to the Master SP (CP-210). It will prevent higher entries in Master SP (CP-210).

Minimum Value: 0	Maximum Value: 9999999
Default Value: 9999999	Units: EU/Tm

CP-212 Min SP Mstr

Minimum Setpoint Master (CP-212) is a lower limit to the Master SP (CP-210). It will prevent lower entries in Master SP (CP-210).

Minimum Value: 0	Maximum Value: 9999999
Default Value: 0	Units: EU/Tm

CP-220 Follower SP

Follower Setpoint (CP-220) is the speed at which you want your system to operate (while in Run) when the Run Mode (CP-202) is set to "3” (Follower Mode).

Minimum Value: 1.000	Maximum Value: 999999
Default Value: 0	Units: Ratio

CP-221 Max SP Fol

Maximum Setpoint Master (CP-221) is an upper limit to the Follower SP (CP-220). It will prevent higher entries in Follower SP (CP-220).

Minimum Value: 0	Maximum Value: 999999
Default Value: 999999	Units: Ratio

CP-212 Min SP Fol

Minimum Setpoint Follower (CP-222) is a lower limit to the Master SP (CP-210). It will prevent lower entries in Master SP (CP-210).

(Continued)

Minimum Value: 0	Maximum Value: 999999
Default Value: 0	Units: Ratio

CP-230 Direct SP

Direct Setpoint (CP-230) is active only in Direct Mode (CP202=0). It sends a voltage value directly to the Control Output (CO_Sig) terminal. Run/Stop commands are recognized, but no other control function is active. All encoder signals are ignored.

Minimum Value: -15.0	Maximum Value: 15
Default Value: 0.0	Units: Volts

CP-231 Acl Tm Drct

Acceleration Time Direct (CP-231) is the time, in seconds, that it takes to accelerate from 0 to the CO Max Volts (CP-271) voltage, while operating in the Direct Mode.

Minimum Value: 0	Maximum Value: 3600
Default Value: 3.000	Units: Seconds

CP-232 Dcl Tm Drct

Deceleration Time Direct (CP-232) is the time, in seconds, that it takes to decelerate from the CO Max Volts (CP-271) voltage to 0 volts, while operating in the Direct Mode.

Minimum Value: 0	Maximum Value: 3600
Default Value: 3.000	Units: Seconds

CP-240 Jog SP

Jog Setpoint (CP-240) is the speed, in EU/Tm, at which Jog ramps when it is activated. The Jog ramp rates are referenced to this speed.

Minimum Value: 0	Maximum Value: 999999
Default Value: 200	Units: EU/Tm

CP-241 Acl Tm Jog

Acceleration Time Jog (CP-241) is the time, in seconds, to accelerate from 0 to the Jog SP (CP-240).

Minimum Value: 0.0	Maximum Value: 3600
Default Value: 1.000	Units: Seconds

CP-242 Acl Rt Jog

Acceleration Rate Jog (CP-242) is the rate, in EU/Tm per second, that it takes to accelerate when Jog is activated.

(Continued)

Minimum Value: 0	Maximum Value: 9999999
Default Value: 200.0	Units: EU/Tm/S

CP-243 Dcl Tm Jog

Deceleration Time Jog (CP-243) is the time, in seconds, that it takes to decelerate from Jog SP (CP-240) to 0, when the Jog Input is deactivated or when switching between “Jog Fwd” and “Jog Rvs”.

Minimum Value: 0.0	Maximum Value: 3600
Default Value: 0.500	Units: Seconds

CP-244 Dcl Rt Jog

Deceleration Rate Jog (CP-244) is the rate, in EU/Tm per second, that is used when the Jog input is deactivated or when switching between “Jog Fwd” and “Jog Rvs”.

Minimum Value: 0	Maximum Value: 9999999
Default Value: 400.0	Units: EU/Tm/S

CP-245 Jog Loop Mode

Jog Loop Mode (CP-245) identifies the type of control loop (see list below) that is used during Jog.

1 = Velocity Loop (default)
0 = Open Loop

Minimum Value: 0	Maximum Value: 1
Default Value: 1	Units: Coded

CP-250 ScFbDispEq

Scaled Feedback Display Equation (CP-250) selects the equation used to display Scaled Fb (MP-40).

3 = Inverse Ratio (of the FI1 to FI2 input frequency)
2 = Ratio (of the FI2 to FI1 input frequency)
1 = Master (derived directly from FI2) (default)

Minimum Value: 1	Maximum Value: 3
Default Value: 1	Units: Coded

CP-260 Cnt Mode FI1

Count Mode FI1 (CP-260) identifies the type of encoder that is connected to Frequency Input 1. The “Quad x4” setting is for a quadrature encoder that gives 4 counts per pulse and also gives direction information. The Incremental selection is for a single channel encoder, which gives 1 count per pulse but does not give direction information.

2 = Incremental
1 = Quad x4 (default)

(Continued)

Minimum Value: 1	Maximum Value: 2
Default Value: 1	Units: Coded

CP-261 PPR FI1

Pulses Per Revolution Frequency In 1 (CP-261) is the number of pulses in one revolution of the encoder device that is connected to Frequency Input 1. The value may be called Counts, Lines, or Pulses by various encoder manufacturers. Do NOT multiply by four for quadrature encoders.

Minimum Value: 1	Maximum Value: 60000
Default Value: 60	Units: Pulses/Rev

CP-262 FI1 Pulses

FI1 Pulses (CP-262) is used to scale the Frequency Input 1 in EU's and EU/Tm. Enter the number of pulses that corresponds to the number of EU's that are entered in EU FI1 (CP-263).

Minimum Value: 1	Maximum Value: 999999
Default Value: 60	Units: Pulses

CP-263 EU FI1

EU FI1 (CP-263) is used to scale the Frequency Input 1 in EU's and EU/Tm. Enter the number of EU's that corresponds to the number of pulses that are entered in FI1 Pulses (CP-262).

Minimum Value: 0.0001	Maximum Value: 999999
Default Value: 1.0	Units: EU

CP-264 LdSyncPolarity

Lead Sync Polarity (CP-264) is a selection that determines the polarity trigger direction of the Lead Sync pulses. The Lead Sync input can be programmed to trigger on signals going from a low to high voltage level (positive going) or from a high to low voltage level (negative going).

2 = Falling edge triggered (negative going)
1 = Rising edge triggered (positive going) (default)

Minimum Value: 1	Maximum Value: 2
Default Value: 1	Units: Coded

CP-265 Cnt Mode FI2

Count Mode FI2 (CP-265) identifies the type of encoder that is connected to Frequency Input 2. The "Quad x4" setting is a for quadrature encoder that gives 4 counts per pulse and also gives direction information. The Incremental selection is for a single channel encoder which gives 1 count per pulse but does not give direction information.

2 = Incremental
1 = Quad x4 (default)

(Continued)

Minimum Value: 1	Maximum Value: 2
Default Value: 1	Units: Coded

CP-266 PPR FI2

Pulses Per Revolution FI2 (CP-266) is the number of pulses that are produced during one revolution of the encoder (or motor or any other rotating part of your machine) that is connected to Frequency Input 2. This value is only used to calculate RPM information for FI2 RPM (MP-04).

Minimum Value: 1	Maximum Value: 60000
Default Value: 60	Units: Pulses/Rev

CP-267 FI2 Pulses

Frequency Input 2 Pulses (CP-267) is used to scale the Frequency Input 2 in EU's and EU/Tm. Enter the number of pulses that corresponds to the number of EU's that are entered in EU FI2 (CP-268).

Minimum Value: 1	Maximum Value: 999999
Default Value: 60	Units: Pulses

CP-268 EU FI2

EU Frequency Input 2 (CP-268) is used to scale the Frequency Input 2 in EU's and EU/Tm. Enter the number of EU's that corresponds to the number of pulses that are entered in FI2 Pulses (CP-267).

Minimum Value: 0.0001	Maximum Value: 999999
Default Value: 1.0	Units: EU

CP-269 FbSyncPolarity

Feedback Sync Polarity (CP-269) is a selection that determines the polarity trigger direction of the Feedback Sync pulses. The Feedback Sync input can be programmed to trigger on signals going from a low to high voltage level (positive going) or from a high to low voltage level (negative going).

2 = Falling edge triggered (negative going)
1 = Rising edge triggered (positive going) (default)

Minimum Value: 1	Maximum Value: 2
Default Value: 1	Units: Coded

CP-270 CO Mode

Control Output Mode (CP-270) affects the range of Control Output (CO_Sig) analog signal sent out to the drive.

3 = Unipolar Reversible
2 = Bipolar (default)
1 = Unipolar

(Continued)

Minimum Value: 1	Maximum Value: 3
Default Value: 2	Units: Coded

CP-271 CO Max Volts

Control Output Maximum Volts (CP-271) sets the upper limit on the voltage sent to the drive. Bipolar operation assumes plus or minus this value. It should be set equal, or lower, than the input specifications of the drive.

Minimum Value: 0.1	Maximum Value: 15
Default Value: 10.0	Units: Volts

CP-272 CO Plrty

Control Output Polarity (CP-272) determines whether a positive, or negative, signal voltage will operate the drive in the forward direction, under the most basic normal operation.

2 = Negated (neg=fwd)
1 = Normal (pos=fwd) (default)

Minimum Value: 1	Maximum Value: 2
Default Value: 1	Units: Coded

CP-273 CO Offset

Control Output Offset (CP-273) adjusts for small variations in the specifications of certain IC devices on this particular controller board. Usually a very small number, it serves to true up the 0 volts end point of the output voltage scale. It is preset at the factory, and should not need field adjustments.

Minimum Value: -1.00	Maximum Value: 1
Default Value: 0.00	Units: Volts

CP-280 AI1 Mode

Analog Input 1 Mode (CP-280) identifies the mode of operation and the calibration that are used for the Auxiliary Board Analog Input 1 signal.

2 = Current
1 = Voltage (default)

Minimum Value: 1	Maximum Value: 2
Default Value: 1	Units: Coded

CP-281 AI1 RA

Analog Input 1 Reference A (CP-281) is used to scale the Auxiliary Board Analog Input 1 in EU. Enter the value for reference point A that corresponds to the EU that are entered in EU@AI1 RA (CP-282).

Minimum Value: -15.0	Maximum Value: 25
Default Value: 0.0	Units: Volts or milliamps

CP-282 EU@AI1 RA

EU @ Analog Input 1 Reference A (CP-282) is used to scale the Auxiliary Board Analog Input 1 in EU. Enter the number

(Continued)

of EU for point A that corresponds to the reference value that is entered in AI1 RA (CP-281).

Minimum Value: -9999999	Maximum Value: 9999999
Default Value: 0.0	Units: EU

CP-283 AI1 RB

Analog Input 1 Reference B (CP-283) is used to scale the Auxiliary Board Analog Input 1 in EU. Enter the value for reference point B that corresponds to the EU's that are entered in EU@AI1 RB (CP-284).

Minimum Value: -15.0	Maximum Value: 25
Default Value: 10.0	Units: Volts or milliampere

CP-284 EU@AI1 RB

EU@Analog Input 1 Reference B (CP-284) is used to scale the Auxiliary Board Analg Input 1 in EU. Enter the number of EU's for point A that corresponds to the reference value that is entered in AI1 RB (CP-283).

Minimum Value: -9999999	Maximum Value: 9999999
Default Value: 100.0	Units: EU

CP-285 AI2 Mode

Analog Input 2 Mode (CP-285) identifies the mode of operation and the calibration that are used for the Auxiliary Board Analog Input 2 signal.

2=Current
1=Voltage (default)

Minimum Value: 1	Maximum Value: 2
Default Value: 1	Units: Coded

CP-286 AI2 RA

Analog Input 2 Reference A (CP-286) is used to scale the Auxiliary Board Analog Input 2 in EU. Enter the Analog Input 2 signal value for reference point A that corresponds to the EU that are entered in EU@AI2 RA (CP-287).

Minimum Value: -15.0	Maximum Value: 25
Default Value: 0.0	Units: Volts or milliamperes

CP-287 EU@AI2 RA

EU @ Analog Input 2 Reference A (CP-287) is used to scale the Auxiliary Board Analog Input 2 in EU. Enter the number of EU's for point A that corresponds to the reference value that is entered in AI2 RA (CP-286).

Minimum Value: -9999999	Maximum Value: 9999999
Default Value: 0.0	Units: EU

CP-288 AI2 RB

(Continued)

Analog Input 2 Reference B (CP-288) is used to scale the Auxiliary Board Analog Input 2 in EU. Enter the Analog Input 2 signal value for reference point B that corresponds to the EU's that are entered in EU@AI2 RB (CP-289).

Minimum Value: -15.0	Maximum Value: 25
Default Value: 10.0	Units: Volts or milliamps

CP-289 EU@AI2 RB

EU at Analog Input 2 Reference B (CP-289) is used to scale the Auxiliary Board Analog Input 2 in EU. Enter the number of EU for point B that corresponds to the reference value that is entered in AI2 RB (CP-288).

Minimum Value: -9999999	Maximum Value: 9999999
Default Value: 100.0	Units: EU

CP-290 AO Parameter

Analog Output Parameter (CP-290) identifies the Monitor or Control Parameter that is used for the Auxiliary Analog Output. When the Analog Output Parameter (CP-290) is set to "0", the value of AO DIRECT (CP-365) is used as the output.

Minimum Value: 0	Maximum Value: 429
Default Value: 31	Units: Parameter Code

NOTE: The following Monitor and Control Parameters are not available for the Analog Output Parameter (CP-290):

MP-17 .... AnlgCal Ref A
MP-18 .... AnlgCal Ref B
MP-22 .... CO Max Bits
MP-23 ..... CO DAC Range
MP-24 .... AO Bits
MP-25 .... AO Signal
MP-26 .... DI 7..0
MP-27 .... DI 15..8
MP-29 ... KeyPad Lockout
MP-38 .... Ld EU/Tm
MP-45 .... Cntrl Loop
CP-290 .... AO Parameter

CP-291 AO Mode

Analog Output Mode (CP-291) identifies the mode of operation and calibration that are used for the Auxiliary Board Analog Output signal.

(Continued)

2 = Current
1 = Voltage (default)

Minimum Value: 1 Maximum Value: 2
Default Value: 1 Units: Coded

CP-292 AO RA

Analog Output Reference A (CP-292) scales the Auxiliary Board Analog Output from the units of the selected parameter to the units of the output, generally measured in volts or milliamps.

Minimum Value: -15.0 Maximum Value: 20
Default Value: -10.0 Units: Volts or Milliamps

CP-293 Val@AO RA

Value @ Analog Output Reference A (CP-293) scales the Auxiliary Board Analog Output from the units of the selected parameter to the units of the output; generally measured in volts or milliamps. Enter the parameter value that corresponds to AO RA (CP-292).

Minimum Value: -9999999 Maximum Value: 9999999
Default Value: -2000 Units: Parameter Value

CP-294 AO RB

Analog Output Reference B (CP-294) scales the Auxiliary Board Analog Output from the units of the selected parameter to the units of the output; generally measured in volts or milliamps. Enter the parameter value that corresponds to VAL@AO RB (CP-295).

Minimum Value: -15.0 Maximum Value: 20
Default Value: 10.0 Units: Volts or Milliamps

CP-295 Val@AO RB

Value at Analog Output Reference B (CP-295) scales the Auxiliary Board Analog Output from the units of the selected parameter to the units of the output, (generally measured in volts or milliampere). Enter the parameter value that corresponds to AO RB (CP-294).

Minimum Value: -9999999 Maximum Value: 9999999
Default Value: 2000 Units: Parameter Value

CP-300 Ref Ramps

The acceleration rate for the application selected are determined by the Acl Tm RUN (CP-301) and the Ref Ramps (CP-300). The deceleration rate (from a faster speed to a slower speed) for the application selected, are determined by the Dcl Tm RUN (CP-303) and the Ref Ramps (CP-300).

Minimum Value: 0.001 Maximum Value: 9999999
Default Value: 100 Units: EU/Tm

(Continued)

CP-301 Acl Tm RUN

Acceleration Time RUN (CP-301) is the time that it takes to accelerate from 0 to the Ref Ramps (CP-300). Time is consistant with Ref Ramps (CP-300) and Acl Rt RUN (CP-302).

Minimum Value: 0.5	Maximum Value: 3600
Default Value: 10.00	Units: Seconds

CP-302 Acl Rt RUN

Acceleration Rate RUN (CP-302) is the acceleration rate that the speed changes from 0 to the Ref Ramps (CP-300). Rate is consistant with Ref Ramps (CP-300) and Acl Tm RUN (CP-301).

Minimum Value: 0	Maximum Value: 9999999
Default Value: 10.00	Units: Web EU/Tm/Sec

CP-303 Dcl Tm RUN

Deceleration Time RUN (CP-303) is the time that it takes to decelerate from Ref Ramps (CP-300) speed to 0. Time is consistant with Ref Ramps (CP-300) and Dcl Rt RUN (CP-304).

Minimum Value: 0.5	Maximum Value: 3600
Default Value: 10.00	Units: Seconds

CP-304 Dcl Rt RUN

Deceleration Rate RUN (CP-304) is the deceleration rate that the speed changes from Ref Ramps (CP-300) speed to 0, while operating in App Select (CP-202) 1, 2, 4 or 5. Rate is consistant with Ref Ramps (CP-300) and Dcl Tm RUN (CP-303).

Minimum Value: 0	Maximum Value: 9999999
Default Value: 10.00	Units: Web EU/Tm/Sec

CP-305 Ramp Thd

When the difference between the ScaledRef (MP-30) and the RampedRef (MP-31) is greater than Ramp Thd (CP-305), the ramp will work normally. When the difference between the ScaledRef (MP-30) and the RampedRef (MP-31) is less than or equal to Ramp Thd (CP-305), the ramp will be bypassed. This avoids ramp delays for small speed changes but still allows a ramp for large speed or for large Master SP (CP-210) changes.

Minimum Value: 0	Maximum Value: 999999
Default Value: 1.0	Units: EU/Tm

CP-310 Dcl Tm RStp

Deceleration Time R-Stop (CP-310) is the time, in seconds, that it takes to decelerate from the Ref Ramps (CP-300) speed to 0, during R-Stop.

Minimum Value: 0.5	Maximum Value: 3600
Default Value: 10.00	Units: Seconds

(Continued)

CP-311 Dcl Rt RStp

Deceleration Rate R-Stop (CP-311) is the deceleration rate that is used for R-Stop.

Minimum Value: 0	Maximum Value: 9999999
Default Value: 10.00	Units: Web EU/Tm/Sec

CP-312 Dcl Tm HStp

Deceleration Time H-Stop (CP-312) is the time, in seconds, that it takes to decelerate from the Ref Ramps (CP-300) speed to 0, during H-Stop.

Minimum Value: 0.5	Maximum Value: 3600
Default Value: 10.00	Units: Seconds

CP-313 Dcl Rt HStp

Deceleration Rate H-Stop (CP-313) is the deceleration rate that is used for H-Stop.

Minimum Value: 0	Maximum Value: 9999999
Default Value: 10.00	Units: Web EU/Tm/Sec

CP-320 Kp VL

Kp Velocity Loop (CP-320) is the proportional gain constant for the PID velocity loop. An increase in Kp VL (CP-320) creates a quicker response and a smaller error. However, a value that is too large will cause instability. If the integral term is used, (i.e., Ki VL not equal to zero) then a nonzero Kp VL can actually improve the loop response and decrease the overshoot to some extent.

Minimum Value: 0	Maximum Value: 200
Default Value: 100	Units: Constant

CP-321 Ki VL

Ki Velocity Loop (CP-321) is the integral constant for the PID loop. Integral action provides for zero steady state error. Increase Ki VL (CP-321) for a faster convergence to zero error. However, a value that is too large will cause instability.

Minimum Value: 0	Maximum Value: 200
Default Value: 60	Units: Constant

CP-322 Kd VL

Kd Velocity Loop (CP-322) is the derivative constant for the PID loop. Derivative action attempts to damp out overshoot. Its effect is highly dependent on Kp VL and Ki VL, but, generally, too large a value causes instability.

Minimum Value: 0	Maximum Value: 200
Default Value: 120	Units: Constant

CP-323 DerivThd VL

(Continued)

Derivative Threshold Velocity Loop (CP-323) is the minimum speed error that is required before the derivative term in the PID velocity algorithm gains influence. Increase the DerivThd VL (CP-323) to prevent the derivative term from acting on signal noise.

Minimum Value: 0	Maximum Value: 99999
Default Value: 5	Units: EU/Tm

CP-325 Kp PL

Kp PL (CP-325) is the proportional gain constant for the PID position loop. Increasing Kp PL (CP-325) will have a quicker the response and a smaller position error. However, a value that is too large could result in overshoot and instability. You can eliminate most or all of the error in the position loop with the proportional term (Kp PL). Use an integral only if Kp PL (CP-325) alone can not eliminate the error to your specification.

Minimum Value: 0	Maximum Value: 200
Default Value: 130	Units: Constant

CP-326 Ki PL

Ki PL (CP-326) is the integral constant for the PID position loop. Integral action provides for zero steady state error. Increase Ki PL (CP-326) for a faster convergence to zero error. However, a value that is too large will cause instability. Use Ki PL (CP-326) first to eliminate the error to your specification. If this produces unacceptable results, then decrease Kp PL (CP-325) and introduce the integral by gradually increasing Ki PL (CP-326).

Minimum Value: 0	Maximum Value: 200
Default Value: 120	Units: Constant

CP-327 Kd PL

Kd PL (CP-327) is the derivative constant for the PID position loop. Derivative action damps out overshoots, however, its effect is limited and is highly dependent on Kp PL (CP- 325), Ki PL (CP- 326) and the given process dynamics. A value that is too large can cause instability.

Minimum Value: 0	Maximum Value: 200
Default Value: 60	Units: Constant

CP-328 DerivThd PL

Derivative Threshold PL (CP-328) is the minimum speed error that is required before the derivative term in the PID algorithm gains influence. Increase the DerivThd PL (CP-328) to prevent the derivative term from acting on signal noise.

Minimum Value: 0	Maximum Value: 99999
Default Value: 0.5	Units: EU

CP-329 Max Fb

Maximum Feedback (CP-329) and CO Max Volts (CP-271) are used to calculate a rough approximation for Kff (MP-48). When a new Max FB (CP-329) value is entered, then Kff reflects a new value also .

Minimum Value: 0.1	Maximum Value: 130000
Default Value: 2000	Units: EU/Tm

CP-330 Max Spd Lmt

(Continued)

The Maximum Speed Limit (CP-330) is the maximum positive and negative limit applied to the ScaledRef (MP-30) while operating in “Run” mode.

Minimum Value: 0	Maximum Value: 9999999
Default Value: 5000	Units: EU/Tm

CP-331 Min Spd Lmt

The Minimum Speed Limit (CP-331) is the minimum positive and negative limit applied to the ScaledRef (MP-30) while operating in “Run” mode. The ramp accelerates to the Min Spd Lmt (CP-331) if the reference speed is less than the Min Spd Lmt (CP-331).

Minimum Value: 0	Maximum Value: 9999999
Default Value: 0	Units: EU/Tm

CP-332 Zero Speed

When the magnitude of the Fb EU/Tm (MP-06) is less than or equal to Zero Speed (CP-332), the Fb @ 0Spd bit (54) in the PLC is set to “1”. This value, as well as the PLC Fb @ 0Spd bit condition, is used in other transparent internal calculations that are based on feedback information.

Minimum Value: 0	Maximum Value: 100000
Default Value: 5.00	Units: EU/Tm

CP-333 Trim Authority

The trim contribution to the DAC output is limited to positive and negative Trim Authority (CP-333).

Minimum Value: 1	Maximum Value: 100
Default Value: 100.0	Units: Percent

CP-334 Integral Limit

The integral contribution to the trim term is limited to the positive and negative Integral Limit (CP-334). Integral Limit (CP-334) can decrease the effects of integral windup or it can limit the maximum effect of the integral term.

Minimum Value: 1	Maximum Value: 100
Default Value: 100.0	Units: Percent

CP-335 LdSyncBand

Lead Sync Band (CP-335) sets a “dead-band” around the sync-mark position to allow for irregular sync marks. If the actual sync pulse occurs inside this “dead-band”, the CX-1200 will presume an “in-sync” status, and therefore make no sync-correction. A sync correction will be made if the sync pulse occurs outside this band. The band is defined as ± the value entered.

Minimum Value: 0	Maximum Value: 9999999
Default Value: 0.0	Units: EU

CP-336 FbSyncBand

(Continued)

Feedback Sync Band (CP-336) sets a “dead-band” around the sync-mark position to allow for irregular sync marks. If the actual sync pulse occurs inside this “dead-band”, the CX-1200 will presume an “in-sync” status, and therefore make no sync-correction. A sync correction will be made if the sync pulse occurs outside this band. The band is defined as ± the value entered.

Minimum Value: 0	Maximum Value: 9999999
Default Value: 0.0	Units: EU

CP-337 InPosnBand

In Position Band (CP-337) sets a limit on the magnitude of the PosnErr (MP-33) allowed before the CX-1200 will use the Sync Logic (CP-204) setting to resolve the position error. If the magnitude of the Position Error is greater than the In Position Band value the CX-1200 will follow the Sync Logic setting to resolve the position error.

Minimum Value: 0.01	Maximum Value: 9999999
Default Value: 1	Units: EU

CP-340 LdSnsrDist

Lead Sensor Distance (CP-340) may be used to inform the CX-1200 of the distance from the critical contact point to the Lead Sync sensor. Applied to the lead position only during sync pulse acceptance into the control algorithm.

Minimum Value: -999999	Maximum Value: 9999999
Default Value: 0	Units: EU

CP-341 LdSnsrOfst

Lead Sensor Offset (CP-341) may be used to set a distance offset to the lead position. This offset becomes effective immediately upon entry. Values entered will rollover at a job size, or be resolved to be within a job size.

Minimum Value: -999999	Maximum Value: 9999999
Default Value: 0.00	Units: EU

CP-347 TrendJSChg%

Trend Job Size Change % (CP-347) sets a limit for the maximum allowable change to the Lead and Follower Job Size Average values (MP-14, MP-24) that will be accepted by the CX-1200 control algorithm. This limit is applied to each job size average independently before they are used by the CX-1200 control loop.

Minimum Value: 0	Maximum Value: 100
Default Value: 10	Units: Percent

CP-348 NonSyncErrRecEn

NonSync Error Recovery Enable(CP-348) may be used to enable or disable position error recovery upon transition into RUN state when Sync Mode (CP-203) is set for non-Sync. If disabled the CX-1200 will perform a position reset,

(Continued)

resolving the position error to zero, upon entry into RUN state when in non-Sync follower mode.

1 = Enabled (position error will be recovered)
0 = OFF = Disabled (default)

Minimum Value: 0 Maximum Value: 1
Default Value: 0 Units: Coded

CP-350 FbSnsrDist

Follower Sensor Distance (CP-350) may be used to inform the CX-1200 of the distance from the critical contact point to the Follower Sync sensor. Applied to the follower position only during sync pulse acceptance into the control algorithm.

Minimum Value: -999999 Maximum Value: 9999999
Default Value: 0 Units: EU

CP-351 FbSnsrOfst

Follower Sensor Offset (CP-351) may be used to set a distance offset to the follower position. This offset becomes effective immediately upon entry. Values entered will rollover at a job size, or be resolved to be within a job size.

Minimum Value: -999999 Maximum Value: 9999999
Default Value: 0.00 Units: EU

CP-356 PhaseSource

Phase Source (CP-356) identifies the source of the Non-Sync Phase, which may be used to set a distance offset to the non-sync follower position. Phase Sources are:

3 = Analog Input 2
2 = Analog Input 1
1 = NonSyncPhase (CP-357) (default)

Minimum Value: 1 Maximum Value: 3
Default Value: 1 Units: Coded

CP-357 NonSyncPhase

Non-Sync Phase (CP-357) may be used to set a distance offset to the non-sync follower position. This phase offset becomes effective immediately upon entry.

Minimum Value: -999999 Maximum Value: 9999999
Default Value: 0.00 Units: EU

(Continued)

CP-360 Loop Update

Loop Update (CP-360) is the time interval between the Control Output (CO_Sig) calculations. This interval sets the sampling rate of the PID control loop.

3 = 100 mSec Update
2 = 10 mSec Update
1 = 1 mSec Update (default)

Minimum Value: 1	Maximum Value: 3
Default Value: 1	Units: Coded

CP-361 Sig Fltr Sel

Signal Filter Select (CP-361) selects the signal to route through a low pass filter. The effect is visible on the speed value. Only one filter routine is available, and should be used on the most erratic input signal. While the damped signal will permit smoother control action, note that it will introduce a small delay in response to the original signal variations.

4 = Analog In 2
3 = Frequency In 2
2 = Analog In 1
1 = Frequency In 1
0 = Not Used (default)

Minimum Value: 0	Maximum Value: 4
Default Value: 0	Units: Coded

CP-362 SigFltrTmConst

Signal Filter Time Constant (CP-362) sets the time constant in milliseconds for the signal filter.

Minimum Value: 2	Maximum Value: 500
Default Value: 10	Units: Milliseconds

CP-363 KffAdjUpdt

Kff Adjust Update (CP-363) sets the sampling period for the Kff calculation when it is enabled. KffAdjUpdt (CP-363) is the time interval between each new Kff calculation and the automatic store to the Kff parameters depending on whether Kff Auto En (CP-364) is enabled.

6 = 10 Min Update
5 = 1 Min Update
4 = 10 Sec Update
3 = 1 Sec Update (default)
2 = 500 mSec Update
1 = 250 mSec Update

Minimum Value: 1	Maximum Value: 6
Default Value: 3	Units: Coded

(Continued)

CP-364 Kff Auto En

Kff Automatic Enable (CP-364) enables the CX-1200 automatic adjustment of Kff (MP-48) at the specified KffAdjUpdt (CP-363) interval in RUN with the loop closed.

1 = ON = Enabled
0 = OFF = Disabled (default)

Minimum Value: 0	Maximum Value: 1
Default Value: 0	Units: Coded

CP-367 LgErrThld

Large Error Threshold (CP-367) sets a threshold for the magnitude of Posn Err (MP-33) allowed before the CX-1200 will utilize its special 'Large Position Error Correction' algorithm. The CX-1200 will enter the LPECA when the magnitude of the position error is greater than the value entered for LgErrThld (CP-367). The CX-1200 will return to its normal position loop when the magnitude of the position error is less than or equal to 1/4 the value entered for LgErrThld (CP-367).

Minimum Value: 0	Maximum Value: 999999
Default Value: 999999	Units: EU

CP-368 LgErrGain

Large Error Gain (CP-368) sets the rate of position error recovery while the CX-1200 is utilizing the 'Large Position Error Correction' algorithm. Larger gain will result in faster recovery.

Minimum Value: 1	Maximum Value:100
Default Value: 20	Units: %/Sec

CP-369 OverSpdAllow

Over Speed Allowance (CP-369) sets a limit for the maximum speed ratio allowed while the CX-1200 is recovering position error using the 'Large Position Error Correction' algorithm. This limits how much faster than the lead, the follower is allowed to go. Example: a value of 50% would allow the follower to go 1.5 times the lead speed in order to recover the position error.

Minimum Value: 1	Maximum Value: 100
Default Value: 50	Units: %

CP-370 Min Fb Alm

Minimum Feedback Alarm (CP-370) signals an under-speed condition. When the magnitude of the Fb EU/Tm (MP-06) is less than or equal to MinFb Alm (CP-370), then the LoSpdAlm bit (28) in the PLC is set to "1". You can output this alarm for indication or action, or you can use the alarm logically in the PLC.

Minimum Value: 0	Maximum Value: 9999999
Default Value: 0	Units: EU/Tm

(Continued)

CP-371 Max Fb Alm

Maximum Feedback Alarm (CP-371) signals an over-speed condition. When the magnitude of the Fb EU/Tm (MP-39) is greater than or equal to Max Fb Alm (CP-371), then the MaxFb Spd bit (55) in the PLC is set to “1”. You can output this alarm for indication or action, or you can use the alarm logically in the PLC.

Minimum Value: 0	Maximum Value: 9999999
Default Value: 2000	Units: EU/Tm

CP-372 Max Acl/Dcl

When either the feedback acceleration or the deceleration is greater than or equal to Maximum Accel/Decel (CP-372), then the MaxAclDcl bit (56) in the PLC is set to “1” . You can output this alarm for indication or action, or you can use the alarm logically in the PLC.

Minimum Value: 0	Maximum Value: 9999999
Default Value: 2000	Units: EU/Sec^2

CP-373 NO Resp Time

When the CO_Sig output signal is greater than 1/16 CO Max Volts (CP-271) and the Fb EU/Tm (MP-06) is less than Zero Speed (CP-332) for longer than the No Response Time (CP-373), then the DrvNoRsp bit (57) is set to “1”. If this scenario occurs, it is generally an indication that the feedback has been lost. It can also indicate that the drive is not enabled (or faulted out), that the CO_Sig output signal is not getting to the drive or that there may be a physical obstruction preventing motion.

Minimum Value: 0.010	Maximum Value: 600
Default Value: 1.000	Units: Seconds

CP-374 Posn Alarm

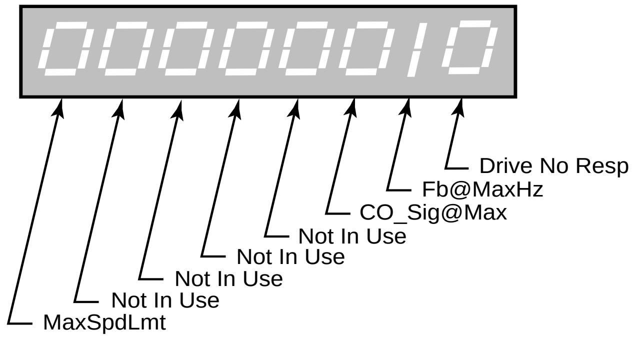
Position Alarm (CP-374) sets a threshold for the magnitude of position error above which the Position Alarm PLC bit is set = 1. In other words...if the magnitude of PosErr (CP-33) is greater than or equal to the value set for Posn Alarm (CP-374), then the Position Alarm PLC bit (65) will be set.

Minimum Value: 0.001	Maximum Value: 9999999
Default Value: 999999	Units: EU/Tm

(Continued)

CP-375 Std Alm Msk

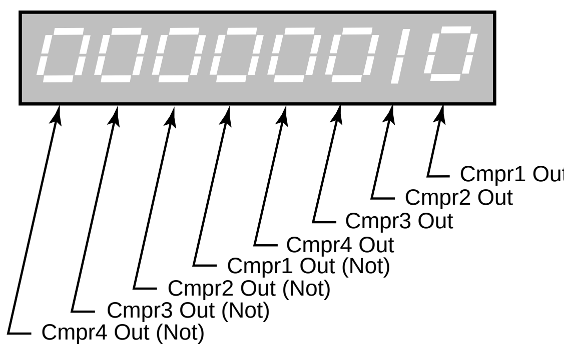
The Standard Alarm Mask (CP-375) allows you to mask out specific alarms so that they will not cause the 'Alm' indicator to flash (in the lower left-hand corner of the CX-1200 screen) by entering a "0" in the corresponding bit position (see figure below). You can also activate any of these alarm conditions by entering a "1" in the corresponding bit position.



Minimum Value: 00000000 Maximum Value: 11111111
Default Value: 00000000 Units: Coded

CP-376 CustAlm Msk

Custom Alarm Mask (CP-376) allows you to mask out the compare results so that they will not cause the 'Alm' indicator to flash (in the lower left-hand corner of the CX-1200 screen) by entering a "0" in the corresponding bit position (see figure below). You can also activate any of these compare conditions by entering a "1" in the corresponding bit position.



Minimum Value: 00000000 Maximum Value: 11111111
Default Value: 00000000 Units: Coded

(Continued)

CP-380 Cmpr1 Parm

Enter a Monitor Parameter code in Compare 1 Parameter (CP-380) that will act on the value in Cmpr1 Val (CP-388), by using the comparison type that you entered in Cmp1 Type (CP-384). If the comparison that is established by these three parameters is “true”, then the PLC sets the Cmpr1 Out bit (60) in the PLC to “1”, which can be used to trigger a user defined indicator.

Minimum Value: 1	Maximum Value: 199
Default Value: 32 (VelError)	Units: Parameter Code

NOTE: The following Monitor Parameters are not available for the Cmpr1 Parm (CP-380), Cmpr2 Parm (CP-381), Cmpr3 Parm (CP-382) or Cmpr4 Parm (CP-383):

MP-12 LdJobSpcVar	MP-13 LdJbSzAvg	MP-22 FbJobSpcVar
MP-23 FbJbSzAvg	MP-41 ScaleFactor	MP-42 ActScaleFactor
MP-49 Cntrl Loop	MP-52 InvalidBlks	MP-53 Misc Status
MP-54 Std Alarms	MP-55 Custom Alms	MP-56 Misc Alarms
MP-90 SerCom Char In	MP-91 SerCom Errs	MP-94 ROM Test
MP-95 SRAM Test	MP-96 NV RAM Test	MP-97 MODEL #
MP-98 RELEASE	MP-99 REVISION	MP-100 DI 7..0
MP-101 DI 15..8	MP-102 DO 7..0	MP-103 KeyPad Lockout
MP-108 PLC Mon 1 Val	MP-109 PLC Mon 2 Val	MP-110 PLC 15-8
MP-111 PLC 23-16	MP-112 PLC 31-24	MP-113 PLC 39-32
MP-114 PLC 47-40	MP-115 PLC 55-48	MP-116 PLC 63-56
MP-117 PLC 71-64	MP-118 PLC 79-72	MP-119 PLC 87-80
MP-120 PLC 95-88	MP-121 PLC 107-100	MP-122 PLC 115-108
MP-123 PLC 123-116	MP-124 PLC 131-124	MP-125 PLC 139-132
MP-126 PLC 147-140	MP-127 PLC 155-148	MP-128 PLC 163-156
MP-129 PLC 171-164	MP-130 PLC 179-172	MP-131 PLC 187-180
MP-132 PLC 195-188	MP-133 PLC 203-196	MP-134 PLC 211-204
MP-135 PLC 219-212	MP-150 Last Reset	MP-151 Misc Intrpt
MP-152 Device Alms	MP-153 PC at Intrpt	MP-156 Mem Err Cntr
MP-157 WatchDogCntr	MP-158 MiscIntrptCntr	MP-168 AnlgCal Ref A
MP-169 AnlgCal Ref B	MP-184 LdJSVarCnt	MP-194 FbJSVarCnt

CP-381 Cmpr2 Parm

Enter a Monitor Parameter code in Compare 2 Parameter (CP-381) that will act on the value in Cmpr2 Val (CP-389), by using the comparison type that you entered in Cmp2 Type (CP-385). If the comparison that is established by these three parameters is “true”, then the PLC sets the Cmpr2 Out bit (61) in the PLC to “1”, which can be used to trigger a user defined indicator.

Minimum Value: 1	Maximum Value: 199
Default Value: 33 (PosnErr)	Units: Parameter Code

NOTE: Refer to the "NOTE" in CP-380.

CP-382 Cmpr3 Parm

Enter a Monitor Parameter in Compare 3 Parameter (CP-382) that will act on the value in Cmpr3 Val (CP-390), by using the comparison type that you entered in Cmp3 Type (CP-386). If the comparison that is established by these three parameters is “true”, then the PLC sets the Cmpr3 Out bit (62) in the PLC to “1” , which can be used to trigger a user defined indicator.

Minimum Value: 1	Maximum Value: 199
Default Value: 37 (CO Volts)	Units: Parameter Code

NOTE: Refer to the "NOTE" in CP-380.

(Continued)

CP-383 Cmpr4 Parm

Enter a Monitor Parameter in Compare 4 Parameter (CP-382) that will act on the value in Cmpr4 Val (CP-391), by using the comparison type that you entered in Cmpr4 Type (CP-387). If the comparison that is established by these three parameters is “true”, then the PLC sets the Cmpr4 Out bit (63) in the PLC Programming screen to “1”, which can be used to trigger a user defined indicator.

Minimum Value: 1 Maximum Value: 199
Default Value: 36 (Trim Out) Units: Parameter Code

NOTE: Refer to the "NOTE" in CP-380.

CP-384 Cmpr1 Type

Use Cmpr1 Type (CP-384) to establish the type of comparison (see list below) that will compare the Monitor Parameter that you entered in Cmpr1 Parm (CP-380) to the value that you entered in Cmpr1 Val (CP-388). If you require a comparison that is not listed, then set the Cmpr1 Out bit in the PLC to “Ld Not”. This programs the comparison type to become a “Not” statement For example, to program “Magnitude Less Than” (<) use “NOT” Magnitude greater than or equal to (>=).

6 = ‘mag =’ if Magnitude of parm selected by Cmpr1 Parm = Cmpr1 Val, Cmpr1 Out = 1
5 = ‘mag >=’ if Magnitude of parm selected by Cmpr1 Parm >= Cmpr1 Val, Cmpr1 Out = 1
4 = ‘mag >’ if Magnitude of parm selected by Cmpr1 Parm > Cmpr1 Val, Cmpr1 Out = 1
3 = ‘=’ if value of parm selected by Cmpr1 Parm = Cmpr1 Val, Cmpr1 Out = 1
2 = ‘>=’ if value of parm selected by Cmpr1 Parm >= Cmpr1 Val, Cmpr1 Out = 1
1 = ‘>’ if value of parm selected by Cmpr1 Parm > Cmpr1 Val, Cmpr1 Out = 1

Minimum Value: 1 Maximum Value: 6
Default Value: 4 Units: Coded

CP-385 Cmpr2 Type

Use Cmpr2 Type (CP-385) to establish the type of comparison (see list below) that will compare the Monitor Parameter that you entered in Cmpr2 Parm, (CP-381) to the value that you entered in Cmpr2 Val (CP-389). If you require a comparison that is not listed, then set the Cmpr2 Out bit in the PLC to “Ld Not”. This programs the comparison type to become a “Not” statement For example, to program “Magnitude Less Than ” (<) use “NOT ” Magnitude greater than or equal to (>=).

6 = ‘mag =’ if Magnitude of parm selected by Cmpr2 Parm) = Cmpr2 Val, Cmpr2 Out = 1
5 = ‘mag >=’ if Magnitude of parm selected by Cmpr2 Parm) >= Cmpr2 Val, Cmpr2 Out = 1
4 = ‘mag >’ if Magnitude of parm selected by Cmpr2 Parm) > Cmpr2 Val, Cmpr2 Out = 1
3 = ‘=’ if value of parm selected by Cmpr2 Parm) = Cmpr2 Val, Cmpr2 Out = 1
2 = ‘>=’ if value of parm selected by Cmpr2 Parm) >= Cmpr2 Val, Cmpr2 Out = 1
1 = ‘>’ if value of parm selected by Cmpr2 Parm) > Cmpr2 Val, Cmpr2 Out = 1

Minimum Value: 1 Maximum Value: 6
Default Value: 4 Units: Coded

(Continued)

CP-386 Cmpr3 Type

Use Cmpr3 Type (CP-386) to establish the type of comparison (see list below) that will compare the Monitor Parameter that you entered in Cmpr3 Parm (CP-382) to the value that you entered in Cmpr3 Val (CP-390). If you require a comparison that is not listed, then set the Cmpr3 Out bit in the PLC to "Ld Not". This programs the comparison type to become a "Not" statement For example, to program "Magnitude Less Than" (<) use "NOT" Magnitude greater than or equal to(>=).

6 = 'mag =' if Magnitude of parm selected by Cmpr3 Parm) = Cmpr3 Val, Cmpr3 Out = 1
5 = 'mag >=' if Magnitude of parm selected by Cmpr3 Parm) >= Cmpr3 Val, Cmpr3 Out = 1
4 = 'mag >' if Magnitude of parm selected by Cmpr3 Parm) > Cmpr3 Val, Cmpr3 Out = 1
3 = '=' if value of parm selected by Cmpr3 Parm) = Cmpr3 Val, Cmpr3 Out = 1
2 = '>=' if value of parm selected by Cmpr3 Parm) >= Cmpr3 Val, Cmpr3 Out = 1
1 = '>' if value of parm selected by Cmpr3 Parm) > Cmpr3 Val, Cmpr3 Out = 1

Minimum Value: 1	Maximum Value: 6
Default Value: 4	Units: Coded

CP-387 Cmpr4 Type

Use Cmpr4 Type (CP-387) to establish the type of comparison (see list below) that will compare the Monitor Parameter that you entered in Cmpr4 Parm (CP-383) to the value that you entered in Cmpr4 Val (CP-391). If you require a comparison that is not listed, then set the Cmpr4 Out bit in the PLC to "Ld Not". This programs the comparison type to become a "Not" statement For example, to program "Magnitude Less Then " (<) use "NOT " Magnitude greater than or equal to (>=).

6 = 'mag =' if Magnitude of parm selected by Cmpr4 Parm) = Cmpr4 Val, Cmpr4 Out = 1
5 = 'mag >=' if Magnitude of parm selected by Cmpr4 Parm) >= Cmpr4 Val, Cmpr4 Out = 1
4 = 'mag >' if Magnitude of parm selected by Cmpr4 Parm) > Cmpr4 Val, Cmpr4 Out = 1
3 = '=' if value of parm selected by Cmpr4 Parm) = Cmpr4 Val, Cmpr4 Out = 1
2 = '>=' if value of parm selected by Cmpr4 Parm) >= Cmpr4 Val, Cmpr4 Out = 1
1 = '>' if value of parm selected by Cmpr4 Parm) > Cmpr4 Val, Cmpr4 Out = 1

Minimum Value: 1	Maximum Value: 6
Default Value: 5	Units: Coded

CP-388 Cmpr1 Val

Enter a value in Cmpr1 Val (CP-388) that will be compared to the Monitor Parameter in Cmpr1 Parm (CP-380), using the comparison type that you entered in Cmpr1 Type (CP-384). If the comparison that is established by these three parameters is "true", then the PLC sets the Cmpr1 Out bit (60) in the PLC to "1" .

Minimum Value: -9999999	Maximum Value: 9999999
Default Value: 2000	Units: same as the selected MP

CP-389 Cmpr2 Val

Enter a value in Cmpr2 Val (CP-389) that will compared to the Monitor Parameter in Cmpr2 Parm (CP-381), using the comparison type that you entered in Cmpr2 Type (CP-385). If the comparison that is established by these three parameters is "true", then the PLC sets the Cmpr2 Out bit (61) in the PLC screen to "1".

Minimum Value: -9999999	Maximum Value: 9999999
Default Value: 200	Units: same as the selected MP

(Continued)

CP-390 Cmpr3 Val

Enter a value in Cmpr3 Val (CP-390) that will be compared to the Monitor Parameter in Cmpr3 Parm (CP-382), using the comparison type that you entered in Cmpr3 Type (CP-386). If the comparison that is established by these three parameters is "true", then the PLC sets the Cmpr3 Out bit (62) in the PLC to "1".

Minimum Value: -9999999	Maximum Value: 9999999
Default Value: 200	Units: same as the selected MP

CP-391 Cmpr4 Val

Enter a value in Cmpr4 Val (CP-391) that will be compared to the Monitor Parameter in Cmpr4 Parm (CP-383), using the boundary type that you entered in Cmpr4 Type (CP-387). If the comparison that is established by these three parameters is "true", then the PLC sets the Cmpr4 Out bit (63) in the PLC to "1" .

Minimum Value: -9999999	Maximum Value: 9999999
Default Value: 72	Units: same as the selected Monitor Parameter

CP-396 Copy Source 1

Copy Source 1 (CP-396) identifies the CP or MP whose value is copied to Copy Dest 1 (CP-397) when a 0 to 1 transition occurs in the Data Copy 1 PLC bit (160).

Minimum Value: 1	Maximum Value: 667
Default Value: 230	Units: CP or MP

CP-397 Copy Dest 1

Copy Dest 1 (CP-397) identifies the CP that takes on the value of the CP or MP identified by Copy Source 1 (CP-396) when a 0 to 1 transition occurs in the Data Copy 1 PLC bit (160).

Minimum Value: 201	Maximum Value: 667
Default Value: 230	Units: CP or MP

CP-398 Copy Source 2

Copy Source 2 (CP-398) identifies the CP or MP whose value is copied to Copy Dest 2 (CP-399) when a 0 to 1 transition occurs in the Data Copy 2 PLC bit (161).

Minimum Value: 1	Maximum Value: 667
Default Value: 235	Units: CP or MP

CP-399 Copy Dest 2

Copy Dest 2 (CP-399) identifies the CP that takes on the value of the CP or MP identified by Copy Source 2 (CP- 398) when a 0 to 1 transition occurs in the Data Copy 2 PLC bit (161).

Minimum Value: 201	Maximum Value: 667
Default Value: 235	Units: CP or MP

(Continued)

CP-400 Rmt Scroll

In Remote Scroll (CP-400), enter the number of the Control Parameter that you want the Remote Scroll Up PLC bit (168) or the Remote Scroll Dn PLC bit (169) to increment or decrement by 1 least significant digit, at the Rmt Scroll Rate (CP-401). To disable the function, set Rmt Scroll (CP-400) to "0" .

Minimum Value: 0	Maximum Value: 449
Default Value: 351	Units: Parameter CP

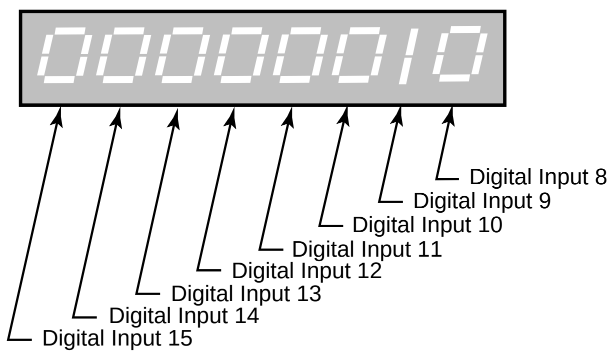
CP-401 Rmt Scroll Rate

Remote Scroll Rate (CP-401) is the number of times per second, that the Control Parameter that you entered in Rmt Scroll (CP-400) is either incremented or decremented by 1 least significant digit , when the Remote Scroll Up PLC bit (168) or the Remote Scroll Dn PLC bit (169) is active.

Minimum Value: 1	Maximum Value: 100
Default Value: 10	Units: Increments/Decrements

CP-402 DI 1 Shot

Use the Digital Input 1 Shot (CP-402) to create a one scan pulse (one-shot) as the result of a high-to-low (open-to-closed) transition on any or all of the PLC dedicated inputs. To generate a 1-scan pulse for an inactive high to an active low transition, enter a "1" in the bit location of corresponding digital input. In the example below, the "1" has been entered in Digital Input 9.

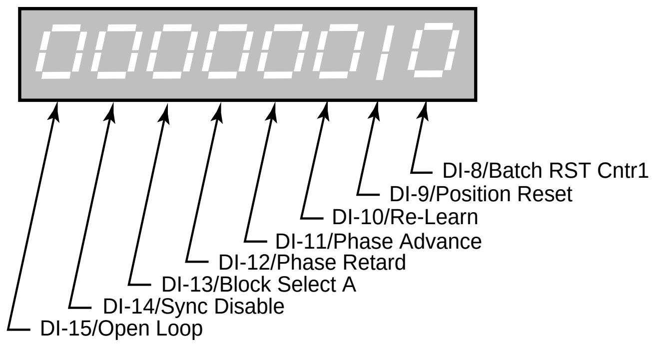


Minimum Value: 00000000	Maximum Value: 11111111
Default Value: 00000000	Units: Coded

(Continued)

CP-403 DI Set

Digital Input Set (CP-403) simulates an “ACTIVE” condition on any or all of the PLC dedicated Digital Inputs (DI 15-8). DI Set (CP-403) is logically OR’ed with the actual DI 15..8 (MP-101) bits to form the PLC 15-8 (MP-110) bits. The PLC 15-8 (MP-110) bits are used by the PLC logic. The value of DI Set (CP-403) will not effect the actual DI 15..8 (MP-101) value, rather, DI 15..8 (MP-101) reflects the present status of the actual inputs. Enter a “1” in a bit location to simulate an active condition on the corresponding input. DI 15 to DI 8 get mapped into Bit 7 to Bit 0. Refer to the graphic below.



Minimum Value: 00000000	Maximum Value: 11111111
Default Value: 00000000	Units: Coded

CP-405 PLC Monitor 1

PLC Monitor 1 (CP-405) determines which PLC bit will be monitored in PLC Mon 1 Val (MP-108). The PLC Mon 1 Val (MP-108) displays the name of the bit rather than “PLC Mon 1 Val”. To select a PLC bit to monitor, enter the number of the bit or by use the Scroll keys (^ or v) to scroll through the list. This bit can be monitored in any screen when the code select line set to PLC Mon 1 Val (MP-108).

Minimum Value: 0	Maximum Value: 223
Default Value: 12	Units: PLC Bits

(Continued)

CP-406 PLC Monitor 2

PLC Monitor 2 (CP-406) determines which PLC bit will be monitored in PLC Mon 2 Val (MP-109). The PLC Mon 2 Val (MP-109) displays the name of the bit rather than "PLC Mon 2 Val". To select a PLC bit to monitor, enter the number of the bit or by use the Scroll keys (^ or v) to scroll through the list. This bit can be monitored in any screen when the code select line set to PLC Mon 2 Val (MP-109).

Minimum Value: 0	Maximum Value: 223
Default Value: 13	Units: PLC Bits

CP-407 PLC Bit Set

PLC Bit Set (CP-407) forces a PLC bit to be set to "1". Enter the number of the bit that you want to set to "1". PLC Bit Set (CP-407) tests your PLC program rather than commanding a direct operation. The bit is set prior to the PLC program execution but after all the inputs, comparisons, timers and counters have had their status bits set up. However, the PLC could clear this bit and unpredictable results can occur. Do not attempt to set a PLC bit that is controlled by an OUT instruction in the PLC program. If you need to force an output, use Diag DO in the diagnostics screen.

Minimum Value: 0	Maximum Value: 223
Default Value: 3	Units: PLC Bits

CP-408 PLC Bit Clear

PLC Bit Clear (CP-408) forces a PLC bit to be reset to "0". Enter the number of the bit that you want to clear. PLC Bit Clear (CP-408) tests your PLC program rather than commanding a direct operation. The bit is cleared prior to the PLC program execution but after all the inputs, comparisons, timers and counters have set up their status bits. However, the PLC could set this bit and unpredictable results can occur. Do not attempt to clear a PLC bit that is controlled by an OUT instruction in the PLC program. If you need to force an output, use Diag DO in the DIG I/O Test diagnostics screen.

Minimum Value: 0	Maximum Value: 223
Default Value: 2	Units: PLC Bits

CP-410 Tmr1 Delay

Timer 1 Delay (CP-410) is the time, in seconds, from which Timer 1 becomes enabled (Tmr1 En bit going from 0 to 1) until the Tmr1 Out bit (24) in the PLC is activated = 1. When the Tmr1 En bit (124) returns to "0", the Tmr1 Out bit (24) is reset to "0" and the delay-time is reset to "0".

Minimum Value: 0	Maximum Value: 86400
Default Value: 1.000	Units: Seconds

CP-411 Tmr1 on Tm

Timer 1 on Time (CP-411) is the time, in seconds, from which Tmr 1 Out is activated (= 1) until Tmr1 Out is deactivated (back to 0). When the Tmr1 En bit (124) returns to "0", the Tmr1 Out bit (24) is reset = 0 and the on- time is reset to "0". If you want Timer 1 on-time to be infinite ("On" until Tmr1 is disabled with Tmr1 En = 0), then enter a value of -1 into Tmr1 on Tm (CP-411).

Minimum Value: -1	Maximum Value: 86400
Default Value: -1	Units: Seconds

(Continued)

CP-412 Tmr2 Delay

Timer 2 Delay (CP-412) is the time in seconds from which Timer 2 becomes enabled (Tmr2 En bit going from 0 to 1) until the Tmr2 Out bit (25) in the PLC activated = 1. When the Tmr2 En bit (125) returns to “0”, the Tmr2 Out bit (25) is reset to “0” and the delay-time is reset to “0”.

Minimum Value: 0	Maximum Value: 86400
Default Value: 1.000	Units: Seconds

CP-413 Tmr2 on Tm

Timer 2 on Time (CP-413) is the time, in seconds, from which Tmr 2 Out is activated (= 1) until Tmr2 Out is de-activated (back to 0). When the Tmr2 En bit (125) returns to “0”, the Tmr2 Out bit (25) is reset = 0 and the on- time is reset to “0”. If you want Tmr2 on-time to be infinite (“On” until Tmr2 is disabled with Tmr2 En = 0), then enter a value of -1 into Tmr2 on Tm (CP-413).

Minimum Value: -1	Maximum Value: 86400
Default Value: -1	Units: Seconds

CP-414 Tmr3 Delay

Timer 3 Delay (CP-414) is the time, in seconds, from which Timer 3 becomes enabled (Tmr3 En bit going from 0 to 1) until the Tmr3 Out bit (26) in the PLC is activated = 1. When the Tmr3 En bit (126) returns to “0”, the Tmr3 Out bit (26) is reset to “0” and the delay-time is reset to “0”.

Minimum Value: 0	Maximum Value: 86400
Default Value: 1.000	Units: Seconds

CP-415 Tmr3 on Tm

Timer 3 on Time (CP-415) is the time, in seconds, from which Tmr3 Out is activated (= 1) until Tmr3 Out is deactivated (back to 0). When the Tmr3 En bit (126) returns to “0”, the Tmr3 Out bit (24) is reset = 0 and the on- time is reset to “0”. If you want Timer 3 on-time to be infinite (“On” until Tmr3 is disabled with Tmr3 En = 0), then enter a value of -1 into Tmr3 on Tm (CP-415).

Minimum Value: -1	Maximum Value: 86400
Default Value: -1	Units: Seconds

CP-416 Tmr4 Delay

Timer 4 Delay (CP-416) is the time, in seconds, from Timer 4 becoming enabled (Tmr4 En bit going from “0” to “1”) toTmr4 Out bit (27) in the PLC going active = 1. If Tmr4 becomes disabled, the delay-time is retained so the timing can continue when Tmr4 is re-enabled. The Tmr4Rst bit (128) in the PLC must be used to reset the delay time to “0”.

Minimum Value: 0	Maximum Value: 86400
Default Value: 1.000	Units: Seconds

(Continued)

CP-417 Tmr4 on Tm

Timer 4 on Tm (CP-417) is the time, in seconds, from Tmr4 Out going active (= 1) until Tmr4 Out going inactive (back to "0"). When Tmr4 becomes disabled, the on-time is retained so the timing can continue when Tmr4 is re-enabled. The Tmr4 Rst bit (128) in the PLC must be used to reset the on-time to "0". If you want Tmr4 on-time to be infinite ("On" until Tmr4 is reset with Tmr4 Rst = 1), then enter a value of "-1" in Tmr4 on Tm (CP-417).

Minimum Value: -1	Maximum Value: 86400
Default Value: -1	Units: Seconds

CP-420 Cntr1 Trig

When the Cntr1 Cnt (CP-421) is greater than or equal to Counter 1 Trigger (CP-420), then the Cntr1 Out bit (32) in the PLC is set to "1". If the count is less than Counter 1 Trigger, then Cntr1 Out bit (32) will be "0".

Minimum Value: 0	Maximum Value: 10000000
Default Value: 10	Units: Counts

CP-421 Cntr1 Cnt

Counter 1 Count (CP-421) is the current count for "Counter 1". The CX-1200 automatically increments it one count for every "0" to "1" transition of the Cntr1 Inc bit (130). Counter 1 Count is the default batch counter. Either use the Scroll keys or enter a new number to change this value. When the PLC program sets Cntr1 Rst bit (135) to "1", then the Cntr1 Cnt (CP-421) resets to "0" .

Minimum Value: 0	Maximum Value: 10000000
Default Value: 0	Units: Counts

CP-422 Cntr2 Trig

When the Cntr2 Cnt (CP-423) is greater than or equal to Counter 2 Trigger (CP-422), then the Cntr2 Out bit (33) in the PLC is set to "1". If the count is less than, the Counter 2 Trigger, the Cntr2 Out bit (33) will be "0".

Minimum Value: 0	Maximum Value: 10000000
Default Value: 10	Units: Counts

CP-423 Cntr2 Cnt

Counter 2 Count (CP-423) is the current count for "Counter 2". The CX-1200 automatically increments it one count for every "0" to "1" transition of the Cntr2 Inc bit (131). Either use the Scroll keys or enter a new number to change this value. When the PLC program sets Cntr2 Rst bit (136) to "1", then the Cntr2 Cnt (CP-423) resets to "0" .

Minimum Value: 0	Maximum Value: 10000000
Default Value: 0	Units: Counts

CP-424 Cntr3 Trig

When the Cntr3 Cnt (CP-425) is greater than or equal to Counter 3 Trigger (CP-424), then the Cntr3 Out bit (34) in the PLC is set to "1". If the count is less than, the Counter 3 Trigger, the Cntr3 Out bit (34) will be "0".

Minimum Value: 0	Maximum Value: 10000000
Default Value: 10	Units: Counts

(Continued)

CP-425 Cntr3 Cnt

Counter 3 Count (CP-425) is the current count for "Counter 3". The CX-1200 automatically increments it one count for every "0" to "1" transition of the Cntr3 Inc bit (132). Either use the Scroll keys or enter a new number to change this value. When the PLC program sets Cntr3 Rst bit (137) to "1", then the Cntr3 Cnt (CP-425) resets to "0" .

Minimum Value: 0	Maximum Value: 10000000
Default Value: 0	Units: Counts

CP-426 Cntr4TrigUp

When Cntr4 Cnt (CP-427) is greater than or equal to Counter 4 Trigger Up (CP-426), then the Cntr4 UpOut bit (35) in the PLC is set to "1". If the count is less than, the Counter 4 Trigger Up, the Cntr4UpO bit (35) will be "0".

Minimum Value: 0	Maximum Value: 10000000
Default Value: 10	Units: Counts

CP-427 Cntr4Cnt

Counter 4 Count (CP-427) is the current count for "Counter 4". The CX-1200 automatically increments it one count for every "0" to "1" transition of the Cntr4 Inc bit (133). The CX-1200automatically decrements it one count for every "0" to "1" transition of the Cntr Dec bit (134). Either use the Scroll keys or enter a new number to change this value. When the PLC program sets Cntr4 Rst bit (138) to "1", then the Cntr4 Cnt (CP-427) resets to the value of Cntr4Preset (CP-429).

Minimum Value: 0	Maximum Value: 10000000
Default Value: 0	Units: Counts

CP-428 Cntr4TrigDn

When Cntr4 Cnt (CP-427) is less than or equal to Counter 4 Trigger Down (CP-428), then the Cntr4DnO bit (36) in the PLC is set to "1". If the count is less than, the Counter 4 Trigger Down, the Cntr4 DnO bit (36) will be "0".

Minimum Value: 0	Maximum Value: 10000000
Default Value: 0	Units: Counts

CP-429 Cntr4Preset

When the Cntr4 Rst bit in the PLC Programming screen is set to " 1", then Cntr4 Cnt (CP-327) is set to and held at the Counter 4 Preset (CP-429) value. If you need a transition preset , then create a one-shot or, when possible, use the DI 1 Shot (CP-402) mask.

Minimum Value: 0	Maximum Value: 10000000
Default Value: 0	Units: Counts

CP-430 DN Write Parm 1

Enter the number of a Control Parameter to be written to with the DeviceNet poll command in the I/O Assembly Queue.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: CP

(Continued)

CP-431 DN Write Parm 2

Enter the number of a Control Parameter to be written to with the DeviceNet poll command in the I/O Assembly Queue.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: CP

CP-432 DN Write Parm 3

Enter the number of a Control Parameter to be written to with the DeviceNet poll command in the I/O Assembly Queue.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: CP

CP-433 DN Write Parm 4

Enter the number of a Control Parameter to be written to with the DeviceNet poll command in the I/O Assembly Queue.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: CP

CP-434 DN Read Parm 1

Enter the number of a Control Parameter or Monitor Parameter to be read with the DeviceNet poll command in the I/O Assembly Queue.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: CP or MP

CP-435 DN Read Parm 2

Enter the number of a Control Parameter or Monitor Parameter to be read with the DeviceNet poll command in the I/O Assembly Queue.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: CP or MP

CP-436 DN Read Parm 3

Enter the number of a Control Parameter or Monitor Parameter to be read with the DeviceNet poll command in the I/O Assembly Queue.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: CP or MP

CP-437 DN Read Parm 4

Enter the number of a Control Parameter or Monitor Parameter to be read with the DeviceNet poll Command in the I/O Assembly Queue.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: CP or MP

(Continued)

CP-438 DN MAC ID

DN MAC ID is the DeviceNet Media Access Control Identifier. The MAC ID is used to assign a uniqe identifier or address to each node on the network. Assign a different MAC ID to each CX-1200 device on the network from 0 to 63.

Minimum Value: 0	Maximum Value: 63
Default Value: 63	Units: ID

CP-439 DN Baud Rate

The DN Baud Rate is the network data or transfer rate. Enter the number from the listing below that corresponds to the desired baud rate:

1 = 125k bps
2 = 250k bps
3 = 500k bps

Minimum Value: 1	Maximum Value: 3
Default Value: 1	Units: Coded

CP-440 Lg Number Parm

Use Large Number Parameter (CP-440) to select the parameter that displays in the large number display in the Status screen (refer to the status screen in *Operation: Screen Operation*). You can also use the Code key to access and change CP-440 in the Status screen.

Minimum Value: 1	Maximum Value: 479 (restricted)
Default Value: 40	Units: Parameter Code

CP-441 Status Line 1

Use Status Line 1 (CP-441) to select the parameter that displays on the first line (under the Large Number Display) of the Status screen (refer to the status screen in *Operation: Screen Operation*). You can also use the Code key to access and change CP-441 in the Status screen.

Minimum Value: 1	Maximum Value: 667
Default Value: 201	Units: Parameter Code

CP-442 Status Line 2

Use Status Line 2 (CP-442) to select the parameter that displays on the second line (under the Large Number Display) of the Status screen (refer to the status screen in *Operation: Screen Operation*). If you want this line to remain blank, enter a “0” in CP-442. You can also use the Code key to access and change CP-442 in the Status screen.

Minimum Value: 0	Maximum Value: 667
Default Value: 50	Units: Parameter Code

CP-443 Status Line 3

Use Status Line 3 (CP-443) to select the parameter that displays on the third line (under the Large Number Display) of the Status screen (refer to the status screen in *Operation: Screen Operation*). If you want this line to remain blank, enter a “0” in CP-443. You can also use the Code key to access and change CP-443 in the Status screen.

Minimum Value: 0	Maximum Value: 667
Default Value: 7	Units: Parameter Code

(Continued)

CP-444 Status Line 4

Use Status Line 4 (CP-444) to select the parameter that displays on the fourth line (under the Large Number Display) of the Status screen (refer to the status screen in *Operation: Screen Operation*). If you want this line to remain blank, enter a "0" in CP-444. You can also use the Code key to access and change CP-444 in the Status screen.

Minimum Value: 0	Maximum Value: 667
Default Value: 17	Units: Parameter Code

CP-445 Status Line 5

Use Status Line 5 (CP-445) to select the parameter that displays on the fifth line (under the Large Number Display) of the Status screen (refer to the status screen in *Operation: Screen Operation*). If you want this line to remain blank, enter a "0" in CP-445. You can also use the Code key to access and change CP-445 in the Status screen.

Minimum Value: 0	Maximum Value: 667
Default Value: 83	Units: Parameter Code

CP-446 Status Line 6

Use Status Line 6 (CP-446) to select the parameter that displays sixth line (under the Large Number Display) of the Status screen (refer to the status screen in *Operation: Screen Operation*). If you want this line to remain blank, enter a "0" in CP-446. You can also use the Code key to access and change CP-446 in the Status screen.

Minimum Value: 0	Maximum Value: 667
Default Value: 84	Units: Parameter Code

(Continued)

CP-449 Lg Number Units

Use Large Number Units (CP-449) to select the EU text that displays immediately below the Large Number Display on the Status screen (refer to the status screen in *Operation: Screen Operation*). Enter a numeric code that identifies the EU for the Control Parameter displayed in the Large Number Parameter (CP-440). Refer to the numeric code list below. The Help screen for CP-449 also contains a partial list of numeric code options. In addition, you can also scroll through the numeric code options by accessing CP-449 with the Code key while you are in the in the Status screen.

0 = <BLANK>	1 = RPM (default)	2 = Hertz
3 = KHz	4 = EU/sec	5 = EU/min
6 = EU/hr	7 = Units/sec	8 = Units/min
9 = Units/hr	10 = Inches/sec	11 = Inches/min
12 = Feet/sec	13 = Feet/min	14 = Feet/hr
15 = Yards/min	16 = Yards/hr	17 = CM/sec
18 = CM/min	19 = Meters/min	20 = Meters/hr
21 = Gal/sec	22 = Gal/min	23 = Gal/hr
24 = Liters/sec	25 = Liters/min	26 = Liters/hr
27 = Sec/unit	28 = Sec/inch	29 = Sec/foot
30 = Sec/CM	31 = Sec/gal	32 = Sec/liter
33 = Min/unit	34 = Min/inch	35 = Min/foot
36 = Min/yard	37 = Min/CM	38 = Min/meter
39 = Min/gal	40 = Min/liter	41 = Hr/unit
42 = Hr/foot	43 = Hr/yard	44 = Hr/meter
45 = Hr/gal	46 = Hr/liter	47 = Feet/foot
48 = Ratio	49 = Percent (%)	50 = Seconds
51 = Minutes	52 = Hours	53 = EU
54 = EU/Tm	55 = EU/Tm/sec	56 = Units
57 = Inches	58 = Feet	59 = Yards
60 = Centimeters	61 = Meters	62 = Gallons
63 = Liters	64 = lb	65 = Counts
66 = Pulses	67 = Lines	68 = Revs
69 = Degrees	70 = Pulses/Rev	71 = Pulses/EU
72 = Volts	73 = Milliamps	74 = Bits
75 = Bits/sec	76 = Volts/kiloEU	77 = oz
78 = psi	79 = newton	80 = Custom (user defined through the serial com)

Minimum Value: 0	Maximum Value: 80
Default Value:1 RPM (default)	Units: Coded

CP-450 Diagnostics En

When Diagnostics Enable (CP-450) is set to "1" (On or enabled), the digital inputs will not recognize their normal function and the digital outputs can be controlled by Diag DO (CP-452). In addition, the CO_Sig Control Output can be tested. When you enter diagnostics, Diag DO (CP-452) is forced equal to the current DO 7..0 (MP-102) so that there is no unexpected change in the outputs. Change the outputs through Diag DO (CP-452) while performing the diagnostics.

Warning: The actuator may energize if you change Diag DO (CP-452). Stand clear of the system.

1 = On
0 = Off (default)

Minimum Value: 0	Maximum Value: 1
Default Value: 0	Units: Coded

(Continued)

Appendix C: Parameter Summary Numeric Quick Reference (continued)

CP-451 Diag DO Shift

When in Diagnostics State, Diagnostics Digital Out Shift (CP-451) may be used to activate the digital outputs one at a time.

Warning: The actuator may energize if you change Diag DO (CP-452). Stand clear of the system.

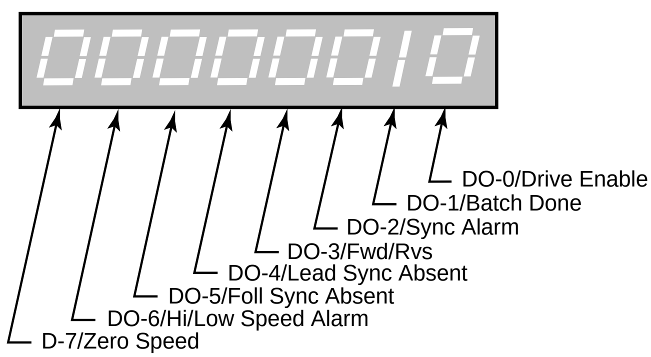
8 = Zero Speed	Activated
7 = Hi/Low Spd Alm	Activated
6 = Foll Sync Absent	Activated
5 = Lead Sync Absent	Activated
4 = Fwd/Rvs	Activated
3 = Sync Alarm	Activated
2 = Batch Done	Activated
1 = Drive Enable	Activated
0 = Off (default)	

Minimum Value: 0 Maximum Value: 8
Default Value: 0 Units: Coded

CP-452 Diag DO

Diagnostic Digital Out (CP-452) controls the digital outputs when Diagnostics En (CP-450) is set to "1" (On or enabled) during diagnostics. It is an 8 Bit Binary number with 1 bit per output. If the bit is a "1", then the corresponding output is pulled "low". When you enter diagnostics, Diag DO (CP-452) is forced equal to the current DO 7..0 (MP-102) so that there is no unexpected change in the outputs. Change the outputs through Diag DO (CP-452) while performing the diagnostics.

Warning: The actuator may energize if you change Diag DO (CP-452). Stand clear of the system.



Minimum Value: 00000000 Maximum Value: 11111111
Default Value: 00000000 Units: Coded

(Continued)

CP-453 Diag DAC Test

Diagnostic DAC Test (CP-453) selects and enables the type of output control that is used for the diagnostic Control Output DAC test.

2 = Immediate Output
1 = Continuous Ramp
0 = Disabled (default)

Minimum Value: 0	Maximum Value: 2
Default Value: 0	Units: Coded

CP-454 Diag DAC Volts

Diagnostic DAC Volts (CP-454) is the maximum voltage output (either positive or negative) at the Control Output DAC during a non zero diagnostic DAC test . The voltage corresponds to Diag DAC Bits (CP-455).

Minimum Value: -15	Maximum Value: 15
Default Value: 0	Units: Volts

CP-455 Diag DAC Bits

Diagnostic DAC Bits (CP-455) is the maximum value in bits written (either positive or negative) to the Control Output DAC during a non zero diagnostic DAC test (CP-453) and when Diag En (CP-450) is set to “1” (On or enabled). The value corresponds to Diag DAC Volts (CP-454).

Minimum Value: -32768	Maximum Value: 32767
Default Value: 0	Units: Bits

CP-456 Diag Rmp Tm

Diagnostic Ramp Time (CP-456) is the time, in seconds, from 0 volts to either positive or negative Diag DAC Volts (CP-454) during a diagnostic DAC test with a ramp.

Minimum Value: 0	Maximum Value: 600
Default Value: 10.000	Units: Seconds

CP-460 Analog Cal En

Analog Calibration Enable (CP-456) enables the calibration process for the auxiliary analog board. When Analog Cal En (CP-460) is set to “1” (On), the signal that is selected in Analog Cal Sel (CP-461) will be calibrated.

1 = Enabled
0 = Disabled (default)

Minimum Value: 0	Maximum Value: 1
Default Value: 0	Units: Coded

(Continued)

CP-461 Analog Cal Sel

Analog Calibration Select (CP-461) selects the signal (AI1, AI2) on the auxiliary analog board for calibration.

2 = Analog In 2
1 = Analog In 1 (default)

Minimum Value: 1	Maximum Value: 2
Default Value: 1	Units: Coded

CP-462 Analog Cal Ref

Analog Calibration Reference (CP-462) determines which of the two calibration reference points (see list below) are to be calibrated.

2 = point B
1 = point A (default)

Minimum Value: 1	Maximum Value: 2
Default Value: 1	Units: Coded

CP-463 Analog Ref Val

Analog Reference Value (CP-463) is the value of measured data for the signal at the specified reference point (Analog Cal Ref, CP-462). Use a voltmeter for voltage mode operation to measure the voltage on the analog signal selected for calibration at the specified reference point. Enter the measured value in the Analog Ref Val (CP-463).

Minimum Value: -6.0	Maximum Value: 6
Default Value: 0	Units: Volts

CP-464 AO Bit Set

Analog Out Bit Set (CP-464) sets the output value in bits that are used to calibrate the Auxiliary Analog Board's analog output. Change (tune) this value until the actual output matches the value that you entered for Analog Ref Val (CP-463), for the selected point.

Minimum Value: -32768	Maximum Value: 32767
Default Value: 0	Units: Bits

CP-465 AO Direct

Analog Out Direct (CP-465) is the value output (in volts or milliamps) at the Auxiliary Analog Board's analog output when the AO Parameter (CP-290) is set to a “0”.

Minimum Value: -15.0	Maximum Value: 20
Default Value: 0.0	Units: Volts or Milliamps

(Continued)

CP-468 CRC Enable

If CRC Enable (CP-468) is set to “ON” (1), you must append a CRC value to all serial communications messages that are received by the CX-1200 (See *Serial Communications: Using Serial Communications*). The CX-1200 checks the CRC value against the the message contents (excluding the “STX”), then calculates a CRC value and appends it to all serial communications responses. If CRC Enable (CP-468) is set to “OFF” (0), the CX-1200 will ignore any CRC value that is appended to a message and will not append a CRC value to any serial communications responses.

1 = On (Enabled)
0 = Off (Disabled)

Minimum Value: 0	Maximum Value: 1
Default Value: 1	Units: None

CP-469 Record Format

Record Format (CP-469) determines which type of data format (see list below) will be used for the serial communication.

3 = ASCII2
2 = ASCII
1 = BINARY

Minimum Value: 1	Maximum Value: 3
Default Value: 1	Units: Coded

CP-470 Device Address

Device Address (CP-470) assigns a serial communications address to the CX-1200. This number should be different from any other units that are on the serial communications link.

Minimum Value: 1	Maximum Value: 99
Default Value: 1	Units: Address

CP-471 Baud Rate

The Baud Rate (CP-471) determines the serial communications data transfer rate (see list below) in Bits/sec. With a 10 bit frame length, the number of frame/sec would be 1/10 the Baud Rate.

1 = 300 bps = 300 Baud
2 = 600 bps = 600 Baud
3 = 1200 bps = 1200 Baud
4 = 2400 bps = 2400 Baud
5 = 4800 bps = 4800 Baud
6 = 9600 bps = 9600 Baud (default)
7 = 19200 bps = 19.2k Baud

Minimum Value: 1	Maximum Value: 7
Default Value: 6	Units: Coded

(Continued)

CP-472 Frame Format

Frame Format (CP-472) determines the parity, the number of data bits, and the number of stop bits for the serial communications.

1 = N,8,1 = No Parity, 8 data bits, 1 stop bit (10 bit frame - ASCII or Binary) (default)
2 = E,7,1 = Even Parity, 7 data bits, 1 stop bit (10 bit frame-ASCII only)

Minimum Value: 1	Maximum Value: 2
Default Value: 1	Units: Coded

CP-473 SerCom Char Out

When a new value is entered in SerCom Char Out (CP-473), it is transmitted out the RS-485 serial port at the Baud Rate (CP-471) and the Frame Format (CP-472). SerCom Char Out (CP-473) is a decimal number.

Minimum Value: 0	Maximum Value: 255
Default Value: 0	Units: Decimal Character

CP-474 Video Mode

Video Mode (CP-474) determines how the LCD Screen Display will be displayed, per the list below:

3 = Standard Video w/Border
2 = Reverse Video
1 = Standard Video(default)

Minimum Value: 1	Maximum Value: 3
Default Value: 1	Units: Coded

CP-475 Contrast Value

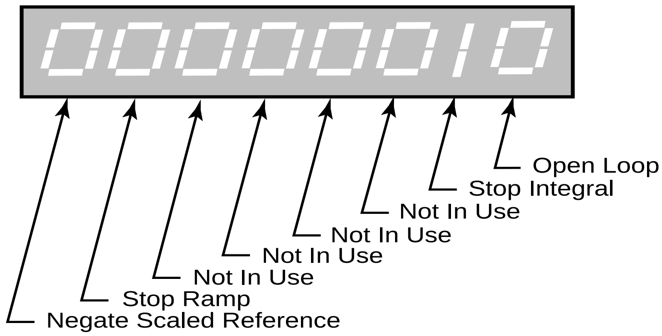
Contrast Value (CP-475) determines the contrast for the LCD Screen Display. The higher values darken the pixels and lower values lighten the pixels.

Minimum Value: 8	Maximum Value: 32
Default Value: 18	Units: Contrast Integer

(Continued)

CP-477 Cntrl Latch

Control Latch (CP-477) allows you to set or "latch in" certain operating conditions that are specific to the CX-1200. Enter "1" in the bit that corresponds to the control condition(s) that you want active (see graphic below). The condition(s) will remain active till the bit is reset to 0. These requests are logically OR'd with the PLC bits that set the same condition. In the sample below, "Open Loop" is active:



Minimum Value: 0	Maximum Value: 255
Default Value: 0	Units: Coded

CP-478 Blk Sel Source

Block Select Source (CP-478) determines whether the active block will be selected by the digital inputs and PLC, by Keypad Blk Sel (CP-479) or by Cntr4 Cnt.

3 = Cntr4 Cnt
2 = KyPd = Keypad Blk Sel
1 = DgIn = Digital Inputs/PLC (default)

Minimum Value: 1	Maximum Value: 2
Default Value: 1	Units: Coded

CP-479 Keypad Blk Sel

The Keypad Block Select (CP-479) determines which block will be active when Blk Sel Source (CP-478) is set to “2” (KyPd).

Minimum Value: 0	Maximum Value: 7
Default Value: 0	Units: Parameter Code

(Continued)

CP-480 KyPdLk Mask

Key Pad Lock Mask (CP-480) sets the level of keypad lockout when the Keypad Lockout input is active (low). Each level allows certain Control Parameters to be changed (or masked out from the lockout) even though keypad lockout is active. A value of "1" or higher allows the Control Parameters that are selected by Unlock CP A-H (CP-481 to CP-488) to be changed, with the keypad lockout active. When set to "3" (Blk Vals), the block values can be changed as well as the Main List Block Parameter Values and the unlocked Control Parameters. When set to "4" (UnLckBlk), the block values of the block selected by Unlock Block (CP-489) can be changed as well as the main list block parameter values and the unlocked Control Parameters, when the selected block is active.

4 = UnLckBlk = Block Values of the Block Selected by Unlock Block (CP-489) and the Unlocked CP's.
3 = Blk Vals = All BlockValues (CP-540-567) and the Unlocked CP's are allowed to change.
2 = Setpnts = Setpoints (CP-210, 220, 230, 240) and the Unlocked CP's are allowed to change.
1 = UnlckCP = CP's selected by the Unlock CP A - F are allowed to changed.
0 = Total Lockout (default).

Minimum Value: 0	Maximum Value: 4
Default Value: 0	Units: Coded

CP-481 Unlock CP A

Unlock Control Parameter A (CP-481) determines which Control Parameter can change, even when the keypad lockout is active. For the Unlock CP A (CP-481) to function, KyPdLk Mask (CP-480) must be set to something other than "0" (All Lock). Enter "0" in Unlock CP A (CP-481) to disable it from selecting any Control Parameter.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: Parameter Code

CP-482 Unlock CP B

Unlock Control Parameter B (CP-482) determines which Control Parameter can change, even when the keypad lockout is active. For the Unlock CP B (CP-482) to function, KyPdLk Mask (CP-480) must be set to something other than "0" (All Lock). Enter "0" in Unlock CP B (CP-482) to disable it from selecting any Control Parameter.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: Parameter Code

CP-483 Unlock CP C

Unlock Control Parameter C (CP-483) determines which Control Parameter can change, even when the keypad lockout is active. For the Unlock CP C (CP-483) to function, KyPdLk Mask (CP-480) must be set to something other than "0" (All Lock). Enter "0" in Unlock CP C (CP-483) to disable it from selecting any Control Parameter.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: Parameter Code

CP-484 Unlock CP D

Unlock Control Parameter D (CP-484) determines which Control Parameter can change, even when the keypad lockout is active. For the Unlock CP D (CP-484) to function, KyPdLk Mask (CP-480) must be set to something other than "0" (All Lock). Enter "0" in Unlock CP D (CP-484) to disable it from selecting any Control Parameter.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: Parameter Code

(Continued)

CP-485 Unlock CP E

Unlock Control Parameter E (CP-485) determines which Control Parameter can change, even when the keypad lockout is active. For the Unlock CP E (CP-485) to function, KyPdLk Mask (CP-480) must be set to something other than "0" (All Lock). Enter "0" in Unlock CP E (CP-485) to disable it from selecting any Control Parameter.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: Parameter Code

CP-486 Unlock CP F

Unlock Control Parameter F (CP-486) determines which Control Parameter can change, even when the keypad lockout is active. For the Unlock CP F (CP-486) to function, KyPdLk Mask (CP-480) must be set to something other than "0" (All Lock). Enter "0" in Unlock CP F (CP-486) to disable it from selecting any Control Parameter.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: Parameter Code

CP-487 Unlock CP G

Unlock Control Parameter G (CP-487) determines which Control Parameter can change, even when the keypad lockout is active. For the Unlock CP G (CP-487) to function, KyPdLk Mask (CP-480) must be set to something other than "0" (All Lock). Enter "0" in Unlock CP G (CP-487) to disable it from selecting any Control Parameter.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: Parameter Code

CP-488 Unlock CP H

Unlock Control Parameter H (CP-488) determines which Control Parameter can change, even when the keypad lockout is active. For the Unlock CP H (CP-488) to function, KyPdLk Mask (CP-480) must be set to something other than "0" (All Lock). Enter "0" in Unlock CP H (CP-488) to disable it from selecting any Control Parameter.

Minimum Value: 0	Maximum Value: 667
Default Value: 0	Units: Parameter Code

CP-489 Unlock Block

Unlock Block (CP-489) determines which block of Control Parameters can change values, even though keypad lockout is active. The main list block parameter values are also allowed to be changed when the selected Unlock Block is active and KyPdLk Mask (CP-480) is set to 'UnlckBlk' (4). For the Unlock Block (CP-489) to function, KyPdLk Mask (CP-480) must be set to "4"

Minimum Value: 0	Maximum Value: 7
Default Value: 7	Units: Block Number

(Continued)

CP-490 Memory Test

To test the physical memory, either enter the number associated with the test (see list below) in Memory Test (CP-490) or go to the Help screen for Memory Test (CP-490) and choose the test. The test result will flash in the error and message status bar at the bottom of the screen and is also summarized in the Diagnostics/Device Tests Memory screen. The test results are also available through Monitor Parameters MP-94, MP-95, MP-96.

4 = Test ALL MEMORY
3 = Test NVRAM
2 = Test SRAM
1 = Test ROM
0 = Test Done *

Minimum Value: 0	Maximum Value: 4
Default Value: 0	Units: Coded

CP-491 Clr Fault Cntrs

To reset all the system-fault counters except Norm- Pwr-Ups (MP-84), enter a “1” in Clear Fault Counters (CP-491). The error and message status bar at the bottom of the screen will flash “Flts Cleared” and the value will return to “0”.

Minimum Value: 0	Maximum Value: 1
Default Value: 0	Units: Coded

CP-492 Video Test

To start the Video Test, enter “1” in Video Test (CP-492). Then use the page up/down keys to page through tests. Press the Menu key to exit the tests and return to the previous screen.

Minimum Value: 0	Maximum Value: 1
Default Value: 0	Units: Coded

CP-495 Serial Number

Serial Number (CP-495) is the serial number from the DeviceNet card in this CX-1200 controller. If the card was factory installed, the Serial Number should already be entered. If the card is being field installed, enter the Serial Number from the label on the card or recorded in the DeviceNet Card Technical Manual.

CP-496 Load Parms

Use Load Parameters (CP-496) to retrieve (load) parameter values from either the factory or the default backup list. You can specify which parameter values to load form the back up, per the list below. It is easier to select the Load Parameters values through the “Help” screen, however, you can enter the corresponding number directly into the Load Parm (CP-496). A message will flash in the error and message status bar at the bottom of the screen to indicate the completion of the operation . The Load Parameters operation will not function while the CX-1200 is in “RUN”.

6 = Load Dflts BlockCP	Load Factory Defaults into CP-400 through CP-667
5 = Load Dflts Main CP	Load Factory Defaults into CP-201 through CP-494
4 = Load Dflts All Cp	Load Factory Defaults into CP-201 through CP-667
3 = Load Backup BlockCP	Load Backup into CP-500 through CP-667
2 = Load Backup Main CP	Load Backup into CP-201 through CP-494
1 = Load Backup All Cps	Load Backup into CP-201 through CP-667
0 = No Change	

Minimum Value: 0	Maximum Value: 6
Default Value: 0	Units: Coded

(Continued)

CP-497 Load PLC Prgm

Use Load PLC Program (CP-497) to retrieve (load) either the backup for the PLC program which you have saved or the factory default PLC program. Enter "1" to load the backup PLC program or enter "2 " to load the factory default PLC program. You can also select the one of the two values through the Help screen. The loaded program is compiled and a message will flash in the error and message status bar at the bottom of the screen to indicate the completion of the operation. The Load PLC Program operation will not function while the CX-1200 is in "RUN".

2 = Load Dflt PLC Prg	Load Factory Default PLC program
1 = Load Backup PLC Prg	Load Backup PLC program
0 = No Change	

Minimum Value: 0	Maximum Value: 2
Default Value: 0	Units: Coded

CP-498 Save Parms

Use Save Parameters (CP-498) to save the current parameter values to the backup. You can specify which parameter values to save as back up, per the list below Either enter the corresponding number directly into the Save Parameters (see list below) or select the Save Parameters values through the Help screen. A message (Saved2 BkUp) will flash in the error and message status bar at the bottom of the screen to indicate the completion of the operation.

3 = Save Block CP's	Save CP-500 through CP-667 to Backup
2 = Save Main CP's	Save CP-201 through CP-494 to Backup
1 = Save All CP's	Save CP-201 through CP-667 to Backup
0 = No Change	

Minimum Value: 0	Maximum Value: 3
Default Value: 0	Units: Coded

CP-499 Save PLC Prgm

Enter a "1" in Save PLC Program (CP-499) to save the current PLC program to the backup. A message (Saved2 BkUp) will flash in the error and message status bar at the bottom of the screen to indicate the completion of the operation.

1 = Save PLC Program to Backup
0 = No Change

Minimum Value: 0	Maximum Value: 1
Default Value: 0	Units: Coded

CP-500 to CP-515 Block Parm 1 - Block Parm 16

Use the Block Parameters 1-16 (CP-500 to CP-515) to select the Control Parameters that will be controlled by the BLK0 Val1 - BLK7 Val 16 values (CP-540 to CP-667). When you enter a new parameter number in a block parameter, the text that appears immediately below the block parameter will change accordingly. Enter a "0" to clear the block parameters that are not in use. There are eight blocks; each contains up to sixteen Control Parameters.

Minimum Value: 0	Maximum Value: 349
Default Value: 110	Units: Parameter Code

(Continued)

CP-540 to CP-667 Blk0 Val 1 - Blk7 Val 16

Use the Block Values (CP-540 to CP-667) to define or change the values of the Control Parameters that you assigned to the Block Parameters (CP-500 to CP-515). This allows you to assign up to eight different values to a single parameter, which you can select. The active Block Value is selected by the PLC and monitored by Active Block (CP-51).

Minimum Value: -99999999	Maximum Value: 99999999
Default Value: 0	Units: Parameter Value

(Continued)

APPENDIX D: CONTROL PARAMETER REFERENCE

CODE	DESCRIPTION	MIN	MAX	DEFAULT	USER RECORD	UNITS
CP-201	Setpoint X	-9999999	9999999	0.0		EU/Tm
CP-202	RUN Mode	1	4	2		Coded
CP-203	Sync Mode	0	3	0		Coded
CP-204	Sync Logic	1	3	1		Coded
CP-205	LdSnycDvd	1	255	1		Coded
CP-206	FbSyncDvd	1	255	1		Coded
CP-207	LdOfstSelect	1	3	1		Coded
CP-208	FbOfstSelect	1	3	1		Coded
CP-209	Time Base	1	3	2		Coded
CP-210	Master SP	-9999999	9999999	0.0		EU/Tm
CP-211	Max SP Mstr	0	9999999	9999999		EU/Tm
CP-212	Min SP Mstr	0	9999999	0		EU/Tm
CP-220	Follower SP	0	999999	1.000		Ratio
CP-221	Max SP Fol	0	999999	999999		Ratio
CP-222	Min SP Fol	0	999999	0		Ratio
CP-230	Direct SP	-15	15	0.0		Volts
CP-231	Acl Tm Drct	0	3600	3.000		Seconds
CP-232	Dcl Tm Drct	0	3600	3.000		Seconds
CP-240	Jog SP	0	999999	200		EU/Tm
CP-241	Acl Tm Jog	0.0	3600	1.000		Seconds
CP-242	Acl Rt Jog	0	9999999	200.0		EU/Tm/S
CP-243	Dcl Tm Jog	0.0	3600	0.500		Seconds
CP-244	Dcl Rt Jog	0	9999999	400.0		EU/Tm/S
CP-245	Jog Loop Mode	0	1	1		Coded
CP-250	ScFbDisp Equ	1	3	1		Coded
CP-260	Cnt Mode FI1	1	2	2		Coded
CP-261	PPR FI1	1	60000	60		Pls/Rev
CP-262	Pulses FI1	1	999999	60		Pulses
CP-263	EU FI1	0.0001	999999	1.0		EU
CP-264	LdSyncPolarity	1	2	1		Coded

(Continued)

CODE	DESCRIPTION	MIN	MAX	DEFAULT	USER RECORD	UNITS
CP-265	Cnt Mode FI2	1	2	2		Coded
CP-266	PPR FI2	1	60000	60		Pls/Rev
CP-267	Pulses FI2	1	999999	60		Pulses
CP-268	EU FI2	0.0001	999999	1.0		EU
CP-269	FbSyncPolarity	1	2	1		Coded
CP-270	CO Mode	1	3	2		Coded
CP-271	CO Max Volts	0.1	15	10.0		Volts
CP-272	CO Polarity	1	2	1		Coded
CP-273	CO Offset	-1.00	1	0.00		Volts
CP-280	AI1 Mode	1	2	1		Coded
CP-281	AI1 RA	-12.75	25	0.0		V or ma
CP-282	EU@AI1 RA	-9999999	9999999	0.0		EU
CP-283	AI1 RB	-12.75	25	0.0		V or ma
CP-284	EU@AI1 RB	-9999999	9999999	100.0		EU
CP-285	AI2 Mode	1	2	1		Coded
CP-286	AI2 RA	-12.75	25	0.0		V or ma
CP-287	EU@AI2 RA	-9999999	9999999	0.0		EU
CP-288	AI2 RB	-12.75	25	0.0		V or ma
CP-289	EU@AI2 RB	-9999999	9999999	100.0		EU
CP-290	AO Parameter	0	429	31		MP/CP
CP-291	AO Mode	1	2	1		Coded
CP-292	AO RA	-15.0	20	-10.0		V or ma
CP-293	Val@AO RA	-9999999	9999999	-2000		Parm Val
CP-294	AO RB	-15.00	20	10.0		V or ma
CP-295	Val@AO RB	-9999999	9999999	2000		Parm Val
CP-300	Ref Ramps	0.001	9999999	1000		EU/Tm
CP-301	Acl Tm RUN	0	3600	1.000		Seconds
CP-302	Acl Rt RUN	0	9999999	1000		EU/Tm/S
CP-303	Dcl Tm RUN	0	3600	1.000		Seconds
CP-304	Dcl Rt RUN	0	9999999	1000		EU/Tm/S

(Continued)

CODE	DESCRIPTION	MIN	MAX	DEFAULT	USER RECORD	UNITS
CP-305	Ramp Thd	0	999999	1.0		EU/Tm
CP-310	Dcl Tm RStp	0	3600	1.000		Seconds
CP-311	Dcl Rt RStp	0	9999999	1000		EU/Tm/S
CP-312	Dcl Tm HStp	0	3600	1.000		Seconds
CP-313	Dcl Rt HStp	0	9999999	1000		EU/Tm/S
CP-320	Kp VL	0	200	100		Constant
CP-321	Ki VL	0	200	60		Constant
CP-322	Kd VL	0	200	120		Constant
CP-323	Deriv Thd VL	0	99999	5		EU/Tm
CP-325	Kp PL	0	200	130		Constant
CP-326	Ki PL	0	200	120		Constant
CP-327	Kd PL	0	200	60		Constant
CP-328	Deriv Thd PL	0	99999	0.5		EU
CP-329	Max FB	0.1	130000	2000		EU/Tm
CP-330	Max Spd Lmt	0	9999999	5000		EU/Tm
CP-331	Min Spd Lmt	0	9999999	0		EU/Tm
CP-332	Zero Speed	0	100000	5.0		EU/Tm
CP-333	Trim Authority	0	100	100.0		%
CP-334	Integral Limit	0	100	100.0		%
CP-335	LdSyncBand	0	9999999	0		EU
CP-336	FbSyncBand	0	9999999	0		EU
CP-337	InPosnBand	0.01	999999	1		EU
CP-340	LdSnsrDist	-999999	9999999	0		EU
CP-341	LdSnsrOfst	-999999	9999999	0.00		EU
CP-347	TrendJSChg%	0	100	10		%
CP-348	NonSyncErrRecEn	0	1	0		Coded
CP-350	FbSnsrDist	-999999	9999999	0		EU
CP-351	FbSnsrOfst	-999999	9999999	0.00		EU
CP-356	PhaseSource	1	3	1		Coded
CP-357	NonSyncPhase	-999999	9999999	0.00		EU

(Continued)

CODE	DESCRIPTION	MIN	MAX	DEFAULT	USER RECORD	UNITS
CP-360	Loop Update	1	3	1		Coded
CP-361	Sig Fltr	0	4	0		Coded
CP-362	SigFltrTmConst	2	500	10		mSec
CP-363	KffAdjUpdt	1	6	3		Coded
CP-364	Kff Auto En	0	1	0		Coded
CP-367	LgErrThld	0	999999	999999		EU
CP-368	LgErrGain	1	100	20		%/Sec
CP-369	OvrSpdAllow	1	100	50		%
CP-370	Min Fb Alm	0	9999999	0		EU/Tm
CP-371	Max Fb Alm	0	9999999	2000		EU/Tm
CP-372	Max Acl/Dcl	0	9999999	2000		EU/Sec^2
CP-373	NO Resp Time	0.010	600	1.000		Seconds
CP-374	Posn Alarm	0.001	9999999	999999		EU/Tm
CP-375	Std Alm Msk	00000000	11111111	00000000		Coded
CP-376	CustAlm Msk	00000000	11111111	00000000		Coded
CP-380	Cmpr1 Parm	1	199	32		MP
CP-381	Cmpr2 Parm	1	199	33		MP
CP-382	Cmpr3 Parm	1	199	37		MP
CP-383	Cmpr4 Parm	1	199	36		MP
CP-384	Cmpr1 Type	1	6	4		Coded
CP-385	Cmpr2 Type	1	6	4		Coded
CP-386	Cmpr3 Type	1	6	5		Coded
CP-387	Cmpr4 Type	1	6	5		Coded
CP-388	Cmpr1 Val	-9999999	9999999	2000		Parm Val
CP-389	Cmpr2 Val	-9999999	9999999	1000		Parm Val
CP-390	Cmpr3 Val	-9999999	9999999	15		Parm Val
CP-391	Cmpr4 Val	-9999999	9999999	7.5		Parm Val
CP-396	Copy Source 1	1	667	230		CP or MP
CP-397	Copy Dest 1	201	667	230		CP or MP
CP-398	Copy Source 2	1	667	230		CP or MP

(Continued)

CODE	DESCRIPTION	MIN	MAX	DEFAULT	USER RECORD	UNITS
CP-399	Copy Dest 2	201	667	230		CP or MP
CP-400	Rmt Scroll	0	449	351		CP
CP-401	Rmt Scroll Rate	1	100	10		Inc/Sec
CP-402	DI 1 Shot	00000000	11111111	00000000		Coded
CP-403	DI Set	00000000	11111111	00000000		Coded
CP-405	PLC Monitor 1	0	223	12		PLC Bits
CP-406	PLC Monitor 2	0	223	13		PLC Bits
CP-407	PLC Bit Set	0	223	3		PLC Bits
CP-408	PLC Bit Clear	0	223	2		PLC Bits
CP-410	Tmr1 Delay	0	86400	1.000		Seconds
CP-411	Tmr1 on Tm	-1	86400	-1		Seconds
CP-412	Tmr2 Delay	0	86400	1.000		Seconds
CP-413	Tmr2 on Tm	-1	86400	-1		Seconds
CP-414	Tmr3 Delay	0	86400	1.000		Seconds
CP-415	Tmr3 on Tm	-1	86400	-1		Seconds
CP-416	Tmr4 Delay	0	86400	1.000		Seconds
CP-417	Tmr4 on Tm	-1	86400	-1		Seconds
CP-420	Cntr1 Trig	0	10000000	10		Counts
CP-421	Cntr1 Cnt	0	10000000	0		Counts
CP-422	Cntr2 Trig	0	10000000	10		Counts
CP-423	Cntr2 Cnt	0	10000000	0		Counts
CP-424	Cntr3 Trig	0	10000000	10		Counts
CP-425	Cntr3 Cnt	0	10000000	0		Counts
CP-426	Cntr4TrigUp	0	10000000	10		Counts
CP-427	Cntr4 Cnt	0	10000000	0		Counts
CP-428	Cntr4TrigDn	0	10000000	0		Counts
CP-429	Cntr4Preset	0	10000000	0		Counts
CP-430	DN Write Parm 1	0	667	0		CP
CP-431	DN Write Parm 2	0	667	0		CP
CP-432	DN Write Parm 3	0	667	0		CP

(Continued)

CODE	DESCRIPTION	MIN	MAX	DEFAULT	USER RECORD	UNITS
CP-433	DN Write Parm 4	0	667	0		CP
CP-434	DN Read Parm 1	0	667	0		CP or MP
CP-435	DN Read Parm 2	0	667	0		CP or MP
CP-436	DN Read Parm 3	0	667	0		CP or MP
CP-437	DN Read Parm 4	0	667	0		CP or MP
CP-438	DN MAC ID	0	63	63		ID
CP-439	DN Baud Rate	1	3	1		Coded
CP-440	Lg Number Parm	1	479	40		CP or MP
CP-441	Status Line 1	1	667	201		CP or MP
CP-442	Status Line 2	0	667	50		CP or MP
CP-443	Status Line 3	0	667	2		CP or MP
CP-444	Status Line 4	0	667	10		CP or MP
CP-445	Status Line 5	0	667	4		CP or MP
CP-446	Status Line 6	0	667	20		CP or MP
CP-449	Lg Number Units	0	80	1		Coded
CP-450	Diagnostics En	0	1	0		Coded
CP-451	Diag DO Shift	0	8	0		Coded
CP-452	Diag DO	00000000	11111111	00000000		Coded
CP-453	Diag DAC Test	0	3	0		Coded
CP-454	Diag DAC Volts	-15.0	15.0	0.0		Volts
CP-455	Diag DAC Bits	-32768	32767	0		Bits
CP-456	Diag Rmp Tm	0	600	10.000		Seconds
CP-460	Analog Cal En	0	1	0		Coded
CP-461	Analog Cal Sel	1	2	1		Coded
CP-462	Analog Cal Ref	1	2	1		Coded
CP-463	AnalogRef Val	-13.00	25	0		V or ma
CP-464	AO Bit Set	-32768	32767	0		Bits
CP-465	AO Direct	-15.0	20	0.0		V or ma
CP-468	CRC Enable	0	1	1		Coded
CP-469	Record Format	1	3	1		Coded

(Continued)

Appendix D: Control Parameter Reference (continued)

CODE	DESCRIPTION	MIN	MAX	DEFAULT	USER RECORD	UNITS
CP-470	Device Address	1	99	1		Address
CP-471	Baud Rate	1	7	6		Coded
CP-472	Frame Format	1	2	1		Coded
CP-473	SerCom Char Out	0	255	0		Decimal
CP-474	Video Mode	1	3	1		Coded
CP-475	Contrast Value	8	32	18		Contrast
CP-477	Cntrl Latch	0	255	0		Coded
CP-478	Blk Sel Source	1	3	1		Coded
CP-479	Keypad Blk Sel	0	7	0		Coded
CP-480	KyPdLk Mask	0	4	0		Coded
CP-481	Unlock CP A	0	667	0		CP
CP-482	Unlock CP B	0	667	0		CP
CP-483	Unlock CP C	0	667	0		CP
CP-484	Unlock CP D	0	667	0		CP
CP-485	Unlock CP E	0	667	0		CP
CP-486	Unlock CP F	0	667	0		CP
CP-487	Unlock CP G	0	667	0		CP
CP-488	Unlock CP H	0	667	0		CP
CP-489	Unlock Block	0	7	7		Block #
CP-490	Memory Test	0	4	0		Coded
CP-491	Clr Fault Cntrs	0	1	0		Coded
CP-492	Video Test	0	1	0		Coded
CP-495	Serial Number	0	999999	0		Serial #
CP-496	Load Parms	0	6	0		Coded
CP-497	Load PLC Prgm	0	2	0		Coded
CP-498	Save Parms	0	3	0		Coded
CP-499	Save PLC Prgm	0	1	0		Coded
CP-500	Block Parm 1	0	349	210		CP
CP-501	Block Parm 2	0	349	0		CP
CP-502	Block Parm 3	0	349	0		CP

(Continued)

CODE	DESCRIPTION	MIN	MAX	DEFAULT	USER RECORD	UNITS
CP-503	Block Parm 4	0	349	0		CP
CP-504	Block Parm 5	0	349	0		CP
CP-505	Block Parm 6	0	349	0		CP
CP-506	Block Parm 7	0	349	0		CP
CP-507	Block Parm 8	0	349	0		CP
CP-508	Block Parm 9	0	349	0		CP
CP-509	Block Parm 10	0	349	0		CP
CP-510	Block Parm 11	0	349	0		CP
CP-511	Block Parm 12	0	349	0		CP
CP-512	Block Parm 13	0	349	0		CP
CP-513	Block Parm 14	0	349	0		CP
CP-514	Block Parm 15	0	349	0		CP
CP-515	Block Parm 16	0	349	0		CP
CP-540	Blk0 Val 1	-99999999	99999999	0		Parm Val
CP-541	Blk0 Val 2	-99999999	99999999	0		Parm Val
CP-542	Blk0 Val 3	-99999999	99999999	0		Parm Val
CP-543	Blk0 Val 4	-99999999	99999999	0		Parm Val
CP-544	Blk0 Val 5	-99999999	99999999	0		Parm Val
CP-545	Blk0 Val 6	-99999999	99999999	0		Parm Val
CP-546	Blk0 Val 7	-99999999	99999999	0		Parm Val
CP-547	Blk0 Val 8	-99999999	99999999	0		Parm Val
CP-548	Blk0 Val 9	-99999999	99999999	0		Parm Val
CP-549	Blk0 Val10	-99999999	99999999	0		Parm Val
CP-550	Blk0 Val11	-99999999	99999999	0		Parm Val
CP-551	Blk0 Val12	-99999999	99999999	0		Parm Val
CP-552	Blk0 Val13	-99999999	99999999	0		Parm Val
CP-553	Blk0 Val14	-99999999	99999999	0		Parm Val
CP-554	Blk0 Val15	-99999999	99999999	0		Parm Val
CP-555	Blk0 Val16	-99999999	99999999	0		Parm Val
CP-556	Blk1 Val 1	-99999999	99999999	0		Parm Val

(Continued)

CODE	DESCRIPTION	MIN	MAX	DEFAULT	USER RECORD	UNITS
CP-557	Blk1 Val 2	-99999999	99999999	0		Parm Val
CP-558	Blk1 Val 3	-99999999	99999999	0		Parm Val
CP-559	Blk1 Val 4	-99999999	99999999	0		Parm Val
CP-560	Blk1 Val 5	-99999999	99999999	0		Parm Val
CP-561	Blk1 Val 6	-99999999	99999999	0		Parm Val
CP-562	Blk1 Val 7	-99999999	99999999	0		Parm Val
CP-563	Blk1 Val 8	-99999999	99999999	0		Parm Val
CP-564	Blk1 Val 9	-99999999	99999999	0		Parm Val
CP-565	Blk1 Val10	-99999999	99999999	0		Parm Val
CP-566	Blk1 Val11	-99999999	99999999	0		Parm Val
CP-567	Blk1 Val12	-99999999	99999999	0		Parm Val
CP-568	Blk1 Val13	-99999999	99999999	0		Parm Val
CP-569	Blk1 Val14	-99999999	99999999	0		Parm Val
CP-570	Blk1 Val15	-99999999	99999999	0		Parm Val
CP-571	Blk1 Val16	-99999999	99999999	0		Parm Val
CP-572	Blk2 Val 1	-99999999	99999999	0		Parm Val
CP-573	Blk2 Val 2	-99999999	99999999	0		Parm Val
CP-574	Blk2 Val 3	-99999999	99999999	0		Parm Val
CP-575	Blk2 Val 4	-99999999	99999999	0		Parm Val
CP-576	Blk2 Val 5	-99999999	99999999	0		Parm Val
CP-577	Blk2 Val 6	-99999999	99999999	0		Parm Val
CP-578	Blk2 Val 7	-99999999	99999999	0		Parm Val
CP-579	Blk2 Val 8	-99999999	99999999	0		Parm Val
CP-580	Blk2 Val 9	-99999999	99999999	0		Parm Val
CP-581	Blk2 Val10	-99999999	99999999	0		Parm Val
CP-582	Blk2 Val11	-99999999	99999999	0		Parm Val
CP-583	Blk2 Val12	-99999999	99999999	0		Parm Val
CP-584	Blk2 Val13	-99999999	99999999	0		Parm Val
CP-585	Blk2 Val14	-99999999	99999999	0		Parm Val
CP-586	Blk2 Val15	-99999999	99999999	0		Parm Val

(Continued)

CODE	DESCRIPTION	MIN	MAX	DEFAULT	USER RECORD	UNITS
CP-587	Blk2 Val16	-99999999	99999999	0		Parm Val
CP-588	Blk3 Val 1	-99999999	99999999	0		Parm Val
CP-589	Blk3 Val 2	-99999999	99999999	0		Parm Val
CP-590	Blk3 Val 3	-99999999	99999999	0		Parm Val
CP-591	Blk3 Val 4	-99999999	99999999	0		Parm Val
CP-592	Blk3 Val 5	-99999999	99999999	0		Parm Val
CP-593	Blk3 Val 6	-99999999	99999999	0		Parm Val
CP-594	Blk3 Val 7	-99999999	99999999	0		Parm Val
CP-595	Blk3 Val 8	-99999999	99999999	0		Parm Val
CP-596	Blk3 Val 9	-99999999	99999999	0		Parm Val
CP-597	Blk3 Val10	-99999999	99999999	0		Parm Val
CP-598	Blk3 Val11	-99999999	99999999	0		Parm Val
CP-599	Blk3 Val12	-99999999	99999999	0		Parm Val
CP-600	Blk3 Val13	-99999999	99999999	0		Parm Val
CP-601	Blk3 Val14	-99999999	99999999	0		Parm Val
CP-602	Blk3 Val15	-99999999	99999999	0		Parm Val
CP-603	Blk3 Val16	-99999999	99999999	0		Parm Val
CP-604	Blk4 Val 1	-99999999	99999999	0		Parm Val
CP-605	Blk4 Val 2	-99999999	99999999	0		Parm Val
CP-606	Blk4 Val 3	-99999999	99999999	0		Parm Val
CP-607	Blk4 Val 4	-99999999	99999999	0		Parm Val
CP-608	Blk4 Val 5	-99999999	99999999	0		Parm Val
CP-609	Blk4 Val 6	-99999999	99999999	0		Parm Val
CP-610	Blk4 Val 7	-99999999	99999999	0		Parm Val
CP-611	Blk4 Val 8	-99999999	99999999	0		Parm Val
CP-612	Blk4 Val 9	-99999999	99999999	0		Parm Val
CP-613	Blk4 Val10	-99999999	99999999	0		Parm Val
CP-614	Blk4 Val11	-99999999	99999999	0		Parm Vall
CP-615	Blk4 Val12	-99999999	99999999	0		Parm Val
CP-616	Blk4 Val13	-99999999	99999999	0		Parm Val

(Continued)

CODE	DESCRIPTION	MIN	MAX	DEFAULT	USER RECORD	UNITS
CP-617	Blk4 Val14	-99999999	99999999	0		Parm Val
CP-618	Blk4 Val15	-99999999	99999999	0		Parm Val
CP-619	Blk4 Val16	-99999999	99999999	0		Parm Val
CP-620	Blk5 Val 1	-99999999	99999999	0		Parm Val
CP-621	Blk5 Val 2	-99999999	99999999	0		Parm Val
CP-622	Blk5 Val 3	-99999999	99999999	0		Parm Val
CP-623	Blk5 Val 4	-99999999	99999999	0		Parm Val
CP-624	Blk5 Val 5	-99999999	99999999	0		Parm Val
CP-625	Blk5 Val 6	-99999999	99999999	0		Parm Val
CP-626	Blk5 Val 7	-99999999	99999999	0		Parm Val
CP-627	Blk5 Val 8	-99999999	99999999	0		Parm Val
CP-628	Blk5 Val 9	-99999999	99999999	0		Parm Val
CP-629	Blk5 Val10	-99999999	99999999	0		Parm Val
CP-630	Blk5 Val11	-99999999	99999999	0		Parm Val
CP-631	Blk5 Val12	-99999999	99999999	0		Parm Val
CP-632	Blk5 Val13	-99999999	99999999	0		Parm Val
CP-633	Blk5 Val14	-99999999	99999999	0		Parm Val
CP-634	Blk5 Val15	-99999999	99999999	0		Parm Val
CP-635	Blk5 Val16	-99999999	99999999	0		Parm Val
CP-636	Blk6 Val 1	-99999999	99999999	0		Parm Val
CP-637	Blk6 Val 2	-99999999	99999999	0		Parm Val
CP-638	Blk6 Val 3	-99999999	99999999	0		Parm Val
CP-639	Blk6 Val 4	-99999999	99999999	0		Parm Val
CP-640	Blk6 Val 5	-99999999	99999999	0		Parm Val
CP-641	Blk6 Val 6	-99999999	99999999	0		Parm Val
CP-642	Blk6 Val 7	-99999999	99999999	0		Parm Val
CP-643	Blk6 Val 8	-99999999	99999999	0		Parm Val
CP-644	Blk6 Val 9	-99999999	99999999	0		Parm Val
CP-645	Blk6 Val10	-99999999	99999999	0		Parm Val
CP-646	Blk6 Val11	-99999999	99999999	0		Parm Val

(Continued)

CODE	DESCRIPTION	MIN	MAX	DEFAULT	USER RECORD	UNITS
CP-647	Blk6 Val12	-99999999	99999999	0		Parm Val
CP-648	Blk6 Val13	-99999999	99999999	0		Parm Val
CP-649	Blk6 Val14	-99999999	99999999	0		Parm Val
CP-650	Blk6 Val15	-99999999	99999999	0		Parm Val
CP-651	Blk6 Val16	-99999999	99999999	0		Parm Val
CP-652	Blk7 Val 1	-99999999	99999999	0		Parm Val
CP-653	Blk7 Val 2	-99999999	99999999	0		Parm Val
CP-654	Blk7 Val 3	-99999999	99999999	0		Parm Val
CP-655	Blk7 Val 4	-99999999	99999999	0		Parm Val
CP-656	Blk7 Val 5	-99999999	99999999	0		Parm Val
CP-657	Blk7 Val 6	-99999999	99999999	0		Parm Val
CP-658	Blk7 Val 7	-99999999	99999999	0		Parm Val
CP-659	Blk7 Val 8	-99999999	99999999	0		Parm Val
CP-660	Blk7 Val 9	-99999999	99999999	0		Parm Val
CP-661	Blk7 Val10	-99999999	99999999	0		Parm Val
CP-662	Blk7 Val11	-99999999	99999999	0		Parm Val
CP-663	Blk7 Val12	-99999999	99999999	0		Parm Val
CP-664	Blk7 Val13	-99999999	99999999	0		Parm Val
CP-665	Blk7 Val14	-99999999	99999999	0		Parm Val
CP-666	Blk7 Val15	-99999999	99999999	0		Parm Val
CP-667	Blk7 Val16	-99999999	99999999	0		Parm Val

(Continued)

—NOTES—

APPENDIX E: MONITOR PARAMETER REFERENCE

CODE	DESCRIPTION	MIN	MAX	UNITS
MP-01	FI1 Hz	-180000	180000	Hertz
MP-02	FI1 RPM	-99999.9	99999.9	RPM
MP-03	FI2 Hz	-180000	180000	Hertz
MP-04	FI2 RPM	-99999.9	99999.9	RPM
MP-05	Ld EU/Tm	-9999999	9999999	EU/Tm
MP-06	Fb EU/Tm	-9999999	9999999	EU/Tm
MP-10	Ld Posn	0	999999999	EU
MP-11	LdJobSize	0	9999999	EU
MP-12	LdJbSzVar	-999999	999999	EU
MP-13	LdJbSzAvg	0	9999999	EU
MP-14	LdJbSzAct	0	99999999	EU
MP-15	LdNetOfst	-9999999	9999999	EU
MP-20	Fb Posn	0	999999999	EU
MP-21	FbJobSize	0	9999999	EU
MP-22	FbJbSzVar	-999999	999999	EU
MP-23	FbJbSzAvg	0	9999999	EU
MP-24	FbJbSzAct	0	99999999	EU
MP-25	FbNetOfst	-9999999	9999999	EU
MP-29	SyncFlgDif	-9999999	9999999	EU
MP-30	ScaledRef	-99999.9	99999.9	EU/Tm
MP-31	RampedRef	-99999.9	99999.9	EU/Tm
MP-32	VelError	-99999.9	99999.9	EU/Tm
MP-33	PosnErr	0	999999999	EU
MP-34	Intgrl	-15.00	15.00	Volts
MP-35	FeedFwd	-15.00	15.00	Volts
MP-36	Trim Out	-15.00	15.00	Volts
MP-37	CO Volts	-15.00	15.00	Volts
MP-38	CO Bits	-32767	32767	Bits
MP-39	CO Max Bits	0	32767	Bits
MP-40	Scaled Fb	-9999999	9999999	EU

(Continued)

CODE	DESCRIPTION	MIN	MAX	UNITS
MP-41	ScaleFactor	0	999999	Ratio
MP-42	ActScaleFactor	0	999999	Ratio
MP-48	Kff	0.00	99999.99	V/kiloRPM
MP-49	Cntrl Loop	0	3	Coded
MP-50	State	0	9	Coded
MP-51	Active Blk	0	7	Coded
MP-52	InvalidBlks	00000000	11111111	Coded
MP-53	Misc Status	00000000	11111111	Coded
MP-54	Std Alms	00000000	11111111	Coded
MP-55	Custom Alms	00000000	11111111	Coded
MP-56	Misc Alarms	00000000	11111111	Coded
MP-90	SerCom Char In	0	255	Binary
MP-91	SerCom Errs	00000000	11111111	Coded
MP-94	ROM Test	0	1	Coded
MP-95	SRAM Test	0	1	Coded
MP-96	NV RAM Test	0	1	Coded
MP-97	Model #	1000	60000	Model #
MP-98	RELEASE	090102	123105	Date
MP-99	REVISION	0.50	99.99	Rev Level
MP-100	DI 7..0	00000000	11111111	Coded
MP-101	DI 15..8	00000000	11111111	Coded
MP-102	DO 7..0	00000000	11111111	Coded
MP-103	KeyPad Lockout	0	1	Coded
MP-107	Tmr4 Time	0	86400	Seconds
MP-108	PLC Mon 1 Val	0	1	Coded
MP-109	PLC Mon 2 Val	0	1	Coded
MP-110	PLC 15-8	00000000	11111111	Coded
MP-111	PLC 23-16	00000000	11111111	Coded
MP-112	PLC 31-24	00000000	11111111	Coded
MP-113	PLC 39-32	00000000	11111111	Coded

(Continued)

Appendix E: Monitor Parameter Reference (continued)

CODE	DESCRIPTION	MIN	MAX	UNITS
MP-114	PLC 47-40	00000000	11111111	Coded
MP-115	PLC 55-48	00000000	11111111	Coded
MP-116	PLC 63-56	00000000	11111111	Coded
MP-117	PLC 71-64	00000000	11111111	Coded
MP-118	PLC 79-72	00000000	11111111	Coded
MP-119	PLC 87-80	00000000	11111111	Coded
MP-120	PLC 95-88	00000000	11111111	Coded
MP-121	PLC 107-100	00000000	11111111	Coded
MP-122	PLC 115-108	00000000	11111111	Coded
MP-123	PLC 123-116	00000000	11111111	Coded
MP-124	PLC 131-124	00000000	11111111	Coded
MP-125	PLC 139-132	00000000	11111111	Coded
MP-126	PLC 147-140	00000000	11111111	Coded
MP-127	PLC 155-148	00000000	11111111	Coded
MP-128	PLC 163-156	00000000	11111111	Coded
MP-129	PLC 171-164	00000000	11111111	Coded
MP-130	PLC 179-172	00000000	11111111	Coded
MP-131	PLC 187-180	00000000	11111111	Coded
MP-132	PLC 195-188	00000000	11111111	Coded
MP-133	PLC 203-196	00000000	11111111	Coded
MP-134	PLC 211-204	00000000	11111111	Coded
MP-135	PLC 219-212	00000000	00001111	Coded
MP-150	Last Reset	00000000	11110111	Coded
MP-151	Misc Intrpt	00000000	00111111	Coded
MP-152	Device Alms	00000000	00001111	Coded
MP-153	PC at Intrpt	2560	524288	Address
MP-154	Norm Pwr Ups	1	65535	Counts
MP-155	Low Pwr Cntr	0	65535	Counts
MP-156	Mem Err Cntr	0	65535	Counts
MP-157	WatchDogCntr	0	65535	Counts

CODE	DESCRIPTION	MIN	MAX	UNITS
MP-158	MiscIntrptCntr	0	65535	Counts
MP-160	AI1 Bits	-8192	8191	Bits
MP-161	AI1 Signal	-12.00	20	V or ma
MP-162	AI1 EU	-999999	999999	EU
MP-163	AI2 Bits	-8192	8191	Bits
MP-164	AI2 Signal	-12.00	20	V or ma
MP-165	AI2 EU	-999999	999999	EU
MP-166	AO Bits	-32767	32767	Bits
MP-167	AO Signal	-12.00	20	V or ma
MP-168	AnlgCal Ref A	-13.00	25	V or ma
MP-169	AnlgCal Ref B	-13.00	25	V or ma
MP-178	PosnErrCnt	-500000000	500000000	Lines
MP-179	SyncFlgDifCnt	-500000000	500000000	Lines
MP-180	LdPsnCnt	-500000000	500000000	Lines
MP-182	LdJSCnt	-500000000	500000000	Lines
MP-183	LdJSAvgCnt	-500000000	500000000	Lines
MP-184	LdJSVarCnt	-500000000	500000000	Lines
MP-190	FbPsnCnt	-500000000	500000000	Lines
MP-192	FbJSCnt	-500000000	500000000	Lines
MP-193	FbJSAvgCnt	-500000000	500000000	Lines
MP-194	FbJSVarCnt	-500000000	500000000	Lines

—NOTES—

APPENDIX F: CONTROL PARAMETER SCREEN LOCATOR

CP#	CP Name	Screen
CP-201	Setpoint X	Status\pg 1
	....	Setup\System Setup\pg 2
	....	Setup\System Setup\pg 3
	....	Setup\System Setup\pg 5
	....	System Monitor\Run Monitor\pg 1
	....	System Monitor\Control Overrides\pg 4
CP-202	RUN Mode	Setup\System Setup\pg 2
	....	Setup\System Setup\pg 3
	....	Setup\System Setup\pg 5
	....	Setpoints & Ramps\Run Modes\pg1
	....	Setpoints & Ramps\Run Modes\pg1
	....	Setpoints & Ramps\Follower\pg1
	....	Setpoints & Ramps\Direct SP & Ramps\pg 1
	....	System Monitor\Position\pg 1
	....	System Monitor\Position\pg 2
	....	System Monitor\Job Sizes\pg 1
	....	System Monitor\Job Sizes\pg 2
	....	System Monitor\Control Overrides\pg 1
	....	System Monitor\Control Overrides\pg 4
CP-203	Sync Mode	Scaling\Job Sizes\pg 1
	....	Setpoints & Ramps\Master\pg1
	....	Setpoints & Ramps\Follower\pg1
	....	System Monitor\Job Sizes\pg 1
	....	System Monitor\Job Sizes\pg 2
	....	System Monitor\Control Overrides\pg 4
CP-204	Sync Logic	Tuning\Related Items\pg 1
CP-205	LdSyncDvd	Scaling\Job Sizes\pg 1
CP-206	FbSyncDvd	Scaling\Job Sizes\pg 1
CP-207	LdOfstSelect	Scaling\Offsets & Phase\pg 1
CP-208	FbOfstSelect	Scaling\Offsets & Phase\pg 1

(Continued)

CP#	CP Name	Screen
CP-209	Time Base	Scaling\Lead\pg 1
		Scaling\Follower\pg 1
CP-210	Master SP	Setpoints & Ramps\Master\pg1
CP-211	Max SP Mstr	Setpoints & Ramps\Master\pg1
CP-212	Min SP Mstr	Setpoints & Ramps\Master\pg1
CP-220	Follower SP	Setpoints & Ramps\Follower\pg1
CP-221	Max SP Fol	Setpoints & Ramps\Follower\pg1
CP-222	Min SP Fol	Setpoints & Ramps\Follower\pg1
CP-230	Direct SP	Setpoints & Ramps\Direct SP & Ramps\pg 1
CP-231	Acl Tm Drct	Setpoints & Ramps\Direct SP & Ramps\pg 1
CP-232	Dcl Tm Drct	Setpoints & Ramps\Direct SP & Ramps\pg 1
CP-240	Jog SP	Setpoints & Ramps\Jog SP & Ramps\pg 1
CP-241	Acl Tm Jog	Setpoints & Ramps\Jog SP & Ramps\pg 1
CP-242	Acl Rt Jog	Setpoints & Ramps\Jog SP & Ramps\pg 1
CP-243	Dcl Tm Jog	Setpoints & Ramps\Jog SP & Ramps\pg 1
CP-244	Dcl Rt Jog	Setpoints & Ramps\Jog SP & Ramps\pg 1
CP-245	Jog Loop Mode	Setpoints & Ramps\Jog SP & Ramps\pg 1
CP-250	ScFbDisp Equ	Setup\System Setup\pg 5
CP-260	Cnt Mode FI1	Setup\System Setup\pg 4
		Scaling\Lead\pg 1
CP-261	PPR FI1	Setup\System Setup\pg 4
		Scaling\Lead\pg 1
CP-262	Pulses FI1	Setup\System Setup\pg 4
		Scaling\Lead\pg 1
CP-263	EU FI1	Setup\System Setup\pg 4
		Scaling\Lead\pg 1
CP-264	LdSyncPolarity	Scaling\Lead\pg 1
CP-265	Cnt Mode FI2	Setup\System Setup\pg 1
		Scaling\Follower\pg 1
CP-266	PPR FI2	Setup\System Setup\pg 1
		Scaling\Follower\pg 1
CP-267	Pulses FI2	Setup\System Setup\pg 3

(Continued)

CP#	CP Name	Screen
	....	Scaling\Follower\pg 1
CP-268	EU FI2	Setup\System Setup\pg 3
	....	Scaling\Follower\pg 1
CP-269	FbSyncPolarity	Scaling\Follower\pg 1
CP-270	CO Mode	Setup\System Setup\pg 1
	....	Scaling\Follower\pg 2
CP-271	CO Max Volts	Setup\System Setup\pg 1
	....	Scaling\Follower\pg 2
	....	Device Tests\Std Signals Tests\pg 2
CP-272	CO Polarity	Setup\System Setup\pg 2
	....	Scaling\Follower\pg 2
CP-273	CO Offset	Setup\System Setup\pg 2
	....	Scaling\Follower\pg 2
	....	Device Tests\Std Signals Tests\pg 2
CP-280	AI1 Mode	Scaling\Aux Analog Input 1\pg 1
	....	System Monitor\Aux Analog Monitor\pg 1
	....	Device Tests\Aux Analog Tests\pg 1
	....	Device Tests\Aux Analog Tests\pg 3
CP-281	AI1 RA	Scaling\Aux Analog Input 1\pg 1
CP-282	EU @ AI1 RA	Scaling\Aux Analog Input 1\pg 1
CP-283	AI1 RB	Scaling\Aux Analog Input 1\pg 1
CP-284	EU @ AI1 RB	Scaling\Aux Analog Input 1\pg 1
CP-285	AI2 Mode	Scaling\Aux Analog Input 2\pg 1
	....	System Monitor\Aux Analog Monitor\pg 1
	....	Device Tests\Aux Analog Tests\pg 1
	....	Device Tests\Aux Analog Tests\pg 3
CP-286	AI2 RA	Scaling\Aux Analog Input 2\pg 1
CP-287	EU @ AI2 RA	Scaling\Aux Analog Input 2\pg 1
CP-288	AI2 RB	Scaling\Aux Analog Input 2\pg 1
CP-289	EU @ AI2 RB	Scaling\Aux Analog Input 2\pg 1
CP-290	AO Parameter	Scaling\Aux Analog Output\pg 1
	....	Device Tests\Aux Analog Tests\pg 2

(Continued)

CP#	CP Name	Screen
CP-291	AO Mode	Scaling\Aux Analog Output\pg 1
		System Monitor\Aux Analog Monitor\pg 1
		Device Tests\Aux Analog Tests\pg 2
		Device Tests\Aux Analog Tests\pg 3
CP-292	AO RA	Scaling\Aux Analog Output\pg 1
CP-293	Val @ AO RA	Scaling\Aux Analog Output\pg 1
CP-294	AO RB	Scaling\Aux Analog Output\pg 1
CP-295	Val @ AO RB	Scaling\Aux Analog Output\pg 1
CP-300	Ref Ramps	Setpoints & Ramps\Run Ramps\pg 1
		Setpoints & Ramps\Stop Ramps\pg 1
CP-301	Acl Tm RUN	Setpoints & Ramps\Run Ramps\pg 1
CP-302	Acl Rt RUN	Setpoints & Ramps\Run Ramps\pg 1
CP-303	Dcl Tm RUN	Setpoints & Ramps\Run Ramps\pg 1
CP-304	Dcl Rt RUN	Setpoints & Ramps\Run Ramps\pg 1
CP-305	Ramp Thd	Setpoints & Ramps\Run Ramps\pg 1
CP-310	Dcl Tm RStp	Setpoints & Ramps\Stop Ramps\pg 1
CP-311	Dcl Rt RStp	Setpoints & Ramps\Stop Ramps\pg 1
CP-312	Dcl Tm HStp	Setpoints & Ramps\Stop Ramps\pg 1
CP-313	Dcl Rt HStp	Setpoints & Ramps\Stop Ramps\pg 1
CP-320	Kp VL	Tuning\Velocity Loop\pg 1
CP-321	Ki VL	Tuning\Velocity Loop\pg 1
CP-322	Kd VL	Tuning\Velocity Loop\pg 1
CP-323	DerivThd VL	Tuning\Velocity Loop\pg 2
CP-325	Kp PL	Tuning\Position Loop\pg 1
CP-326	Ki PL	Tuning\Position Loop\pg 1
CP-327	Kd PL	Tuning\Position Loop\pg 1
CP-328	DerivThd PL	Tuning\Position Loop\pg 2
CP-329	Max Fb	Tuning\Feedforward\pg 1
CP-330	Max Spd Lmt	Alarms & Limits\Limits\pg 1
CP-331	Min Spd Lmt	Alarms & Limits\Limits\pg 1
CP-332	Zero Speed	Alarms & Limits\Alarms\pg 1
		Alarms & Limits\Limits\pg 1

(Continued)

Appendix F: Control Parameter Screen Locator (continued)

CP#	CP Name	Screen
CP-333	Trim Authority	Tuning\Velocity Loop\pg 2
	....	Tuning\Position Loop\pg 2
	....	Alarms & Limits\Limits\pg 1
CP-334	Integral Limit	Tuning\Velocity Loop\pg 2
	....	Tuning\Position Loop\pg 2
	....	Alarms & Limits\Limits\pg 1
CP-335	LdSyncBand	Scaling\Job Sizes\pg 1
	....	Tuning\Related Items\pg 1
CP-336	FbSyncBand	Scaling\Job Sizes\pg 1
	....	Tuning\Related Items\pg 1
CP-337	InPosnBand	Tuning\Related Items\pg 1
CP-340	LdSnsrDist	Scaling\Offsets & Phase\pg 2
CP-341	LdSnsrOfst	Scaling\Offsets & Phase\pg 2
CP-347	TrendJSChg%	Alarms & Limits\Limits\pg 2
CP-348	NonSyncErrRecEn .	Alarms & Limits\Limits\pg 2
CP-350	FbSnsrDist	Scaling\Offsets & Phase\pg 2
CP-351	FbSnsrOfst	Scaling\Offsets & Phase\pg 2
CP-356	Phase Source	Scaling\Offsets & Phase\pg 1
CP-357	NonSyncPhase	Scaling\Offsets & Phase\pg 2
CP-360	Loop Update	Tuning\Related Items\pg 1
CP-361	Sig Fltr Sel	Tuning\Related Items\pg 1
CP-362	SigFltrTmConst	Tuning\Related Items\pg 1
CP-363	KffAdjUpdt	Tuning\Feedforward\pg 1
CP-364	Kff Auto En	Setup\System Setup\pg 3
	....	Tuning\Feedforward\pg 1
CP-367	LgErrThld	Tuning\Large Error\pg 1
CP-368	LgErrGain	Tuning\Large Error\pg 1
CP-369	OverSpdAllow	Tuning\Large Error\pg 1
CP-370	Min Fb Alm	Alarms & Limits\Alarms\pg 1
CP-371	Max Fb Alm	Alarms & Limits\Alarms\pg 1
CP-372	Max Acl/Dcl	Alarms & Limits\Alarms\pg 1
CP-373	NO Resp Time	Alarms & Limits\Alarms\pg 1

(Continued)

CP#	CP Name	Screen
CP-374	Posn Alarm	Alarms & Limits\Alarms\pg 1
CP-375	Std Alm Msk	Setup\Alm Indicator Mask\pg 1
CP-376	CustAlm Msk	Setup\Alm Indicator Mask\pg 1
CP-380	Cmpr1 Parm	Alarms & Limits\Alarms\pg 2
CP-381	Cmpr2 Parm	Alarms & Limits\Alarms\pg 2
CP-382	Cmpr3 Parm	Alarms & Limits\Alarms\pg 3
CP-383	Cmpr4 Parm	Alarms & Limits\Alarms\pg 3
CP-386	Cmpr1 Type	Alarms & Limits\Alarms\pg 2
CP-387	Cmpr2 Type	Alarms & Limits\Alarms\pg 2
CP-388	Cmpr3 Type	Alarms & Limits\Alarms\pg 3
CP-389	Cmpr4 Type	Alarms & Limits\Alarms\pg 3
CP-392	Cmpr1 Val	Alarms & Limits\Alarms\pg 2
CP-393	Cmpr2 Val	Alarms & Limits\Alarms\pg 2
CP-394	Cmpr3 Val	Alarms & Limits\Alarms\pg 3
CP-395	Cmpr4 Val	Alarms & Limits\Alarms\pg 3
CP-396	Copy Source 1	PLC\PLC Data Copy\pg 1
CP-397	Copy Dest 1	PLC\PLC Data Copy\pg 1
CP-398	Copy Source 2	PLC\PLC Data Copy\pg 1
CP-399	Copy Dest 2	PLC\PLC Data Copy\pg 1
CP-400	Rmt Scroll	Setup\Remote Scroll Setup\pg 1
CP-401	Rmt Scroll Rate	Setup\Remote Scroll Setup\pg 1
CP-402	DI 1 Shot	PLC\Digital I/O\pg 1
CP-403	DI Set	PLC\PLC Monitor\pg 1
CP-405	PLC Monitor 1	PLC\PLC Monitor\pg 1
CP-406	PLC Monitor 2	PLC\PLC Monitor\pg 1
CP-407	PLC Bit Set	PLC\PLC Monitor\pg 1
CP-408	PLC Bit Clear	PLC\PLC Monitor\pg 1
CP-410	Tmr1 Delay	PLC\PLC Timers\pg 1
CP-411	Tmr1 on Tm	PLC\PLC Timers\pg 1
CP-412	Tmr2 Delay	PLC\PLC Timers\pg 1
CP-413	Tmr2 on Tm	PLC\PLC Timers\pg 1
CP-414	Tmr3 Delay	PLC\PLC Timers\pg 1

(Continued)

CP#	CP Name	Screen
CP-415	Tmr3 on Tm	PLC\PLC Timers\pg 1
CP-416	Tmr4 Delay	PLC\PLC Timers\pg 1
CP-417	Tmr4 on Tm	PLC\PLC Timers\pg 1
CP-420	Cntr1 Trig	PLC\PLC Event Cntrs\pg 1
CP-421	Cntr1 Cnt	PLC\PLC Event Cntrs\pg 1
CP-422	Cntr2 Trig	PLC\PLC Event Cntrs\pg 1
CP-423	Cntr2 Cnt	PLC\PLC Event Cntrs\pg 1
CP-424	Cntr3 Trig	PLC\PLC Event Cntrs\pg 1
CP-425	Cntr3 Cnt	PLC\PLC Event Cntrs\pg 1
CP-426	Cntr4TrigUp	PLC\PLC Event Cntrs\pg 1
CP-427	Cntr4 Cnt	PLC\PLC Event Cntrs\pg 1
CP-428	Cntr4TrigDn	PLC\PLC Event Cntrs\pg 1
CP-429	Cntr4Preset	PLC\PLC Event Cntrs\pg 1
CP-430	DN Write Parm 1	Setup\DeviceNet Setup\pg 2
CP-431	DN Write Parm 2	Setup\DeviceNet Setup\pg 2
CP-432	DN Write Parm 3	Setup\DeviceNet Setup\pg 2
CP-433	DN Write Parm 4	Setup\DeviceNet Setup\pg 2
CP-434	DN Read Parm 1	Setup\DeviceNet Setup\pg 2
CP-435	DN Read Parm 2	Setup\DeviceNet Setup\pg 2
CP-436	DN Read Parm 3	Setup\DeviceNet Setup\pg 2
CP-437	DN Read Parm 4	Setup\DeviceNet Setup\pg 2
CP-438	DN MAC ID	Setup\DeviceNet Setup\pg 1
CP-439	DN Baud Rate	Setup\DeviceNet Setup\pg 1
CP-440	Lg Number Parm	Setup\Status Screen Setup\pg 1
CP-441	Status Line 1	Setup\Status Screen Setup\pg 1
CP-442	Status Line 2	Setup\Status Screen Setup\pg 1
CP-443	Status Line 3	Setup\Status Screen Setup\pg 1
CP-444	Status Line 4	Setup\Status Screen Setup\pg 1
CP-445	Status Line 5	Setup\Status Screen Setup\pg 1
CP-446	Status Line 6	Setup\Status Screen Setup\pg 1
CP-449	Lg Number Units	Setup\System Setup\pg 5
	....	Setup\Status Screen Setup\pg 1

(Continued)

Appendix F: Control Parameter Screen Locator (continued)

CP#	CP Name	Screen
CP-450	Diagnostics En	Device Tests\Std Signals Tests\pg 2
		Device Tests\Digital I/O Test\pg 1
CP-451	Diag DO Shift	Device Tests\Digital I/O Test\pg 1
CP-452	Diag DO	Device Tests\Digital I/O Test\pg 1
CP-453	Diag DAC Test	Device Tests\Std Signals Tests\pg 2
CP-454	Diag DAC Volts	Device Tests\Std Signals Tests\pg 2
CP-455	Diag DAC Bits	Device Tests\Std Signals Tests\pg 2
CP-456	Diag Rmp Tm	Device Tests\Std Signals Tests\pg 2
CP-460	Analog Cal En	Device Tests\Aux Analog Tests\pg 3
CP-461	Analog Cal Sel	Device Tests\Aux Analog Tests\pg 3
CP-462	Analog Cal Ref	Device Tests\Aux Analog Tests\pg 3
CP-463	AnalogRef Val	Device Tests\Aux Analog Tests\pg 3
CP-464	AO Bit Set	Device Tests\Aux Analog Tests\pg 3
CP-465	AO Direct	Scaling\Aux Analog Output\pg 1
		Device Tests\Aux Analog Tests\pg 2
CP-468	CRC Enable	Setup\Serial Comm Setup\pg 1
		Device Tests\Serial Comm Test\pg 1
CP-469	Record Format	Setup\Serial Comm Setup\pg 1
		Device Tests\Serial Comm Test\pg 1
CP-470	Device Address	Setup\Serial Comm Setup\pg 1
		Device Tests\Serial Comm Test\pg 1
CP-471	Baud Rate	Setup\Serial Comm Setup\pg 1
		Device Tests\Serial Comm Test\pg 1
CP-472	Frame Format	Setup\Serial Comm Setup\pg 1
		Device Tests\Serial Comm Test\pg 1
CP-473	SerCom Char Out	Device Tests\Serial Comm Test\pg 1
CP-474	Video Mode	Setup\Video Setup\pg 1
		Device Tests\Hardware Tests\pg 3
CP-475	Contrast Value	Setup\Video Setup\pg 1
		Device Tests\Hardware Tests\pg 3
CP-477	Cntrl Latch	Available through the "CODE" key
CP-478	Blk Sel Source	Blocks\Block Selection\pg 1

(Continued)

Appendix F: Control Parameter Screen Locator (continued)

CP#	CP Name	Screen
	....	System Monitor\Control Overrides\pg 4
CP-479	Keypad Blk Sel	Blocks\Block Selection\pg 1
	....	System Monitor\Control Overrides\pg 4
CP-480	KyPdLk Mask	Setup\Keypad Lock Setup\pg 1
	....	Setup\Keypad Lock Setup\pg 2
CP-481	Unlock CP A	Setup\Keypad Lock Setup\pg 1
CP-482	Unlock CP B	Setup\Keypad Lock Setup\pg 1
CP-483	Unlock CP C	Setup\Keypad Lock Setup\pg 1
CP-484	Unlock CP D	Setup\Keypad Lock Setup\pg 1
CP-485	Unlock CP E............	Setup\Keypad Lock Setup\pg 1
CP-486	Unlock CP F	Setup\Keypad Lock Setup\pg 1
CP-487	Unlock CP G	Setup\Keypad Lock Setup\pg 1
CP-488	Unlock CP H	Setup\Keypad Lock Setup\pg 1
CP-489	Unlock Block	Setup\Keypad Lock Setup\pg 2
CP-490	Memory Test	Device Tests\Hardware Tests\pg 1
CP-491	Clr Fault Cntrs.........	Device Tests\Device Status\pg 1
	....	Device Tests\Device Status\pg 2
CP-492	Video Test	Device Tests\Hardware Tests\pg 3
CP-495	Serial Number	Setup\DeviceNet Setup\pg 1
CP-496	Load Parms	Setup\Load & Save Parms\pg 1
CP-497	Load PLC Prgm......	Setup\Load & Save Parms\pg 1
CP-498	Save Parms	Setup\Load & Save Parms\pg 1
CP-499	Save PLC Prgm	Setup\Load & Save Parms\pg 1
CP-500	Block Parm 1	Block Setup\Edit Block Parms\pg 1
CP-501	Block Parm 2	Block Setup\Edit Block Parms\pg 1
CP-502	Block Parm 3	Block Setup\Edit Block Parms\pg 1
CP-503	Block Parm 4	Block Setup\Edit Block Parms\pg 1
CP-504	Block Parm 5	Block Setup\Edit Block Parms\pg 2
CP-505	Block Parm 6	Block Setup\Edit Block Parms\pg 2
CP-506	Block Parm 7	Block Setup\Edit Block Parms\pg 2
CP-507	Block Parm 8	Block Setup\Edit Block Parms\pg 2
CP-508	Block Parm 9	Block Setup\Edit Block Parms\pg 3

(Continued)

CP#	CP Name	Screen
CP-509	Block Parm 10	Block Setup\Edit Block Parms\pg 3
CP-510	Block Parm 11	Block Setup\Edit Block Parms\pg 3
CP-511	Block Parm 12	Block Setup\Edit Block Parms\pg 3
CP-512	Block Parm 13	Block Setup\Edit Block Parms\pg 4
CP-513	Block Parm 14	Block Setup\Edit Block Parms\pg 4
CP-514	Block Parm 15	Block Setup\Edit Block Parms\pg 4
CP-515	Block Parm 16	Block Setup\Edit Block Parms\pg 4
CP-540	Blk0 Val 1	Block Setup\Edit Block 0\pg 1
CP-541	Blk0 Val 2	Block Setup\Edit Block 0\pg 1
CP-542	Blk0 Val 3	Block Setup\Edit Block 0\pg 1
CP-543	Blk0 Val 4	Block Setup\Edit Block 0\pg 1
CP-544	Blk0 Val 5	Block Setup\Edit Block 0\pg 2
CP-545	Blk0 Val 6	Block Setup\Edit Block 0\pg 2
CP-546	Blk0 Val 7	Block Setup\Edit Block 0\pg 2
CP-547	Blk0 Val 8	Block Setup\Edit Block 0\pg 2
CP-548	Blk0 Val 9	Block Setup\Edit Block 0\pg 3
CP-549	Blk0 Val10	Block Setup\Edit Block 0\pg 3
CP-550	Blk0 Val11	Block Setup\Edit Block 0\pg 3
CP-551	Blk0 Val12	Block Setup\Edit Block 0\pg 3
CP-552	Blk0 Val13	Block Setup\Edit Block 0\pg 4
CP-553	Blk0 Val14	Block Setup\Edit Block 0\pg 4
CP-554	Blk0 Val15	Block Setup\Edit Block 0\pg 4
CP-555	Blk0 Val16	Block Setup\Edit Block 0\pg 4
CP-556	Blk1 Val 1	Block Setup\Edit Block 1\pg 1
CP-557	Blk1 Val 2	Block Setup\Edit Block 1\pg 1
CP-558	Blk1 Val 3	Block Setup\Edit Block 1\pg 1
CP-559	Blk1 Val 4	Block Setup\Edit Block 1\pg 1
CP-560	Blk1 Val 5	Block Setup\Edit Block 1\pg 2
CP-561	Blk1 Val 6	Block Setup\Edit Block 1\pg 2
CP-562	Blk1 Val 7	Block Setup\Edit Block 1\pg 2
CP-563	Blk1 Val 8	Block Setup\Edit Block 1\pg 2
CP-564	Blk1 Val 9	Block Setup\Edit Block 1\pg 3

(Continued)

CP#	CP Name	Screen
CP-565	Blk1 Val10	Block Setup\Edit Block 1\pg 3
CP-566	Blk1 Val11	Block Setup\Edit Block 1\pg 3
CP-567	Blk1 Val12	Block Setup\Edit Block 1\pg 3
CP-568	Blk1 Val13	Block Setup\Edit Block 1\pg 4
CP-569	Blk1 Val14	Block Setup\Edit Block 1\pg 4
CP-570	Blk1 Val15	Block Setup\Edit Block 1\pg 4
CP-571	Blk1 Val16	Block Setup\Edit Block 1\pg 4
CP-572	Blk2 Val 1	Block Setup\Edit Block 2\pg 1
CP-573	Blk2 Val 2	Block Setup\Edit Block 2\pg 1
CP-574	Blk2 Val 3	Block Setup\Edit Block 2\pg 1
CP-575	Blk2 Val 4	Block Setup\Edit Block 2\pg 1
CP-576	Blk2 Val 5	Block Setup\Edit Block 2\pg 2
CP-577	Blk2 Val 6	Block Setup\Edit Block 2\pg 2
CP-578	Blk2 Val 7	Block Setup\Edit Block 2\pg 2
CP-579	Blk2 Val 8	Block Setup\Edit Block 2\pg 2
CP-580	Blk2 Val 9	Block Setup\Edit Block 2\pg 3
CP-581	Blk2 Val10	Block Setup\Edit Block 2\pg 3
CP-582	Blk2 Val11	Block Setup\Edit Block 2\pg 3
CP-583	Blk2 Val12	Block Setup\Edit Block 2\pg 3
CP-584	Blk2 Val13	Block Setup\Edit Block 2\pg 4
CP-585	Blk2 Val14	Block Setup\Edit Block 2\pg 4
CP-586	Blk2 Val15	Block Setup\Edit Block 2\pg 4
CP-587	Blk2 Val16	Block Setup\Edit Block 2\pg 4
CP-588	Blk3 Val 1	Block Setup\Edit Block 3\pg 1
CP-589	Blk3 Val 2	Block Setup\Edit Block 3\pg 1
CP-590	Blk3 Val 3	Block Setup\Edit Block 3\pg 1
CP-591	Blk3 Val 4	Block Setup\Edit Block 3\pg 1
CP-592	Blk3 Val 5	Block Setup\Edit Block 3\pg 2
CP-593	Blk3 Val 6	Block Setup\Edit Block 3\pg 2
CP-594	Blk3 Val 7	Block Setup\Edit Block 3\pg 2
CP-595	Blk3 Val 8	Block Setup\Edit Block 3\pg 2
CP-596	Blk3 Val 9	Block Setup\Edit Block 3\pg 3

(Continued)

CP#	CP Name	Screen
CP-597	Blk3 Val10	Block Setup\Edit Block 3\pg 3
CP-598	Blk3 Val11	Block Setup\Edit Block 3\pg 3
CP-599	Blk3 Val12	Block Setup\Edit Block 3\pg 3
CP-600	Blk3 Val13	Block Setup\Edit Block 3\pg 4
CP-601	Blk3 Val14	Block Setup\Edit Block 3\pg 4
CP-602	Blk3 Val15	Block Setup\Edit Block 3\pg 4
CP-603	Blk3 Val16	Block Setup\Edit Block 3\pg 4
CP-604	Blk4 Val 1	Block Setup\Edit Block 4\pg 1
CP-605	Blk4 Val 2	Block Setup\Edit Block 4\pg 1
CP-606	Blk4 Val 3	Block Setup\Edit Block 4\pg 1
CP-607	Blk4 Val 4	Block Setup\Edit Block 4\pg 1
CP-608	Blk4 Val 5	Block Setup\Edit Block 4\pg 2
CP-609	Blk4 Val 6	Block Setup\Edit Block 4\pg 2
CP-610	Blk4 Val 7	Block Setup\Edit Block 4\pg 2
CP-611	Blk4 Val 8	Block Setup\Edit Block 4\pg 2
CP-612	Blk4 Val 9	Block Setup\Edit Block 4\pg 3
CP-613	Blk4 Val10	Block Setup\Edit Block 4\pg 3
CP-614	Blk4 Val11	Block Setup\Edit Block 4\pg 3
CP-615	Blk4 Val12	Block Setup\Edit Block 4\pg 3
CP-616	Blk4 Val13	Block Setup\Edit Block 4\pg 4
CP-617	Blk4 Val14	Block Setup\Edit Block 4\pg 4
CP-618	Blk4 Val15	Block Setup\Edit Block 4\pg 4
CP-619	Blk4 Val16	Block Setup\Edit Block 4\pg 4
CP-620	Blk5 Val 1	Block Setup\Edit Block 5\pg 1
CP-621	Blk5 Val 2	Block Setup\Edit Block 5\pg 1
CP-622	Blk5 Val 3	Block Setup\Edit Block 5\pg 1
CP-623	Blk5 Val 4	Block Setup\Edit Block 5\pg 1
CP-624	Blk5 Val 5	Block Setup\Edit Block 5\pg 2
CP-625	Blk5 Val 6	Block Setup\Edit Block 5\pg 2
CP-626	Blk5 Val 7	Block Setup\Edit Block 5\pg 2
CP-627	Blk5 Val 8	Block Setup\Edit Block 5\pg 2
CP-628	Blk5 Val 9	Block Setup\Edit Block 5\pg 3

(Continued)

CP#	CP Name	Screen
CP-629	Blk5 Val10	Block Setup\Edit Block 5\pg 3
CP-630	Blk5 Val11	Block Setup\Edit Block 5\pg 3
CP-631	Blk5 Val12	Block Setup\Edit Block 5\pg 3
CP-632	Blk5 Val13	Block Setup\Edit Block 5\pg 4
CP-633	Blk5 Val14	Block Setup\Edit Block 5\pg 4
CP-634	Blk5 Val15	Block Setup\Edit Block 5\pg 4
CP-635	Blk5 Val16	Block Setup\Edit Block 5\pg 4
CP-636	Blk6 Val 1	Block Setup\Edit Block 6\pg 1
CP-637	Blk6 Val 2	Block Setup\Edit Block 6\pg 1
CP-638	Blk6 Val 3	Block Setup\Edit Block 6\pg 1
CP-639	Blk6 Val 4	Block Setup\Edit Block 6\pg 1
CP-640	Blk6 Val 5	Block Setup\Edit Block 6\pg 2
CP-641	Blk6 Val 6	Block Setup\Edit Block 6\pg 2
CP-642	Blk6 Val 7	Block Setup\Edit Block 6\pg 2
CP-643	Blk6 Val 8	Block Setup\Edit Block 6\pg 2
CP-644	Blk6 Val 9	Block Setup\Edit Block 6\pg 3
CP-645	Blk6 Val10	Block Setup\Edit Block 6\pg 3
CP-646	Blk6 Val11	Block Setup\Edit Block 6\pg 3
CP-647	Blk6 Val12	Block Setup\Edit Block 6\pg 3
CP-648	Blk6 Val13	Block Setup\Edit Block 6\pg 4
CP-649	Blk6 Val14	Block Setup\Edit Block 6\pg 4
CP-650	Blk6 Val15	Block Setup\Edit Block 6\pg 4
CP-651	Blk6 Val16	Block Setup\Edit Block 6\pg 4
CP-652	Blk7 Val 1	Block Setup\Edit Block 7\pg 1
CP-653	Blk7 Val 2	Block Setup\Edit Block 7\pg 1
CP-654	Blk7 Val 3	Block Setup\Edit Block 7\pg 1
CP-655	Blk7 Val 4	Block Setup\Edit Block 7\pg 1
CP-656	Blk7 Val 5	Block Setup\Edit Block 7\pg 2
CP-657	Blk7 Val 6	Block Setup\Edit Block 7\pg 2
CP-658	Blk7 Val 7	Block Setup\Edit Block 7\pg 2
CP-659	Blk7 Val 8	Block Setup\Edit Block 7\pg 2
CP-660	Blk7 Val 9	Block Setup\Edit Block 7\pg 3

(Continued)

CP#	CP Name	Screen
CP-661	Blk7 Val10	Block Setup\Edit Block 7\pg 3
CP-662	Blk7 Val11	Block Setup\Edit Block 7\pg 3
CP-663	Blk7 Val12	Block Setup\Edit Block 7\pg 3
CP-664	Blk7 Val13	Block Setup\Edit Block 7\pg 4
CP-665	Blk7 Val14	Block Setup\Edit Block 7\pg 4
CP-666	Blk7 Val15	Block Setup\Edit Block 7\pg 4
CP-667	Blk7 Val16	Block Setup\Edit Block 7\pg 4

(Continued)

APPENDIX G: MONITOR PARAMETER SCREEN LOCATOR

MP#	MP Name	Screen
MP-01	FI1 Hz	Setup\System Setup\pg 4
		Scaling\Lead\pg 1
		System Monitor\Run Monitor\pg 2
		System Monitor\Std Signals Monitor\pg 1
		Device Tests\Std Signals Tests\pg 1
MP-02	FI1 RPM	Status\pg 1
		Setup\System Setup\pg 4
		Scaling\Lead\pg 1
		System Monitor\Run Monitor\pg 2
		System Monitor\Std Signals Monitor\pg 1
		Device Tests\Std Signals Tests\pg 1
MP-03	FI2 Hz	Setup\System Setup\pg 2
		Setup\System Setup\pg 3
		Scaling\Follower\pg 1
		System Monitor\Std Signals Monitor\pg 2
		Device Tests\Std Signals Tests\pg 1
MP-04	FI2 RPM	Status\pg 1
		Setup\System Setup\pg 3
		Scaling\Follower\pg 1
		System Monitor\Std Signals Monitor\pg 2
		Device Tests\Std Signals Tests\pg 1
MP-05	LdEU/Tm	Setup\System Setup\pg 4
		Setup\System Setup\pg 5
		Scaling\Lead\pg 1
		System Monitor\Run Monitor\pg 1
		System Monitor\Run Monitor\pg 2
		System Monitor\Std Signals Monitor\pg 1
		Device Tests\Std Signals Tests\pg 1
MP-06	FbEU/Tm	Setup\System Setup\pg 3
		Setup\System Setup\pg 5
		Scaling\Follower\pg 1
		System Monitor\Run Monitor\pg 1

(Continued)

Appendix G: Monitor Parameter Screen Locator (continued)

MP#	MP Name	Screen
	....	System Monitor\Run Monitor\pg 3
	....	System Monitor\Std Signals Monitor\pg 2
	....	Device Tests\Std Signals Tests\pg 1
MP-10	Ld Posn	Status\pg 1
	....	Scaling\Lead\pg 1
	....	Scaling\Offsets & Phase\pg2
	....	Tuning\Large Error\pg 1
	....	Alarms & Limits\Limits\pg 2
	....	System Monitor\Run Monitor\pg 1
	....	System Monitor\Run Monitor\pg 2
	....	System Monitor\Position\pg 1
	....	System Monitor\Std Signals Monitor\pg 1
MP-11	LdJobSize	System Monitor\Job Sizes\pg 1
MP-12	LdJbSzVar	System Monitor\Job Sizes\pg 1
MP-13	LdJbSzAvg	System Monitor\Run Monitor\pg 2
	....	System Monitor\Job Sizes\pg 1
MP-14	LdJbSzAct	Scaling\Job Sizes\pg1
MP-15	LdNetOfst	Scaling\Offsets & Phase\pg1
	....	Scaling\Offsets & Phase\pg2
	....	System Monitor\Position\pg 1
MP-20	Fb Posn	Status\pg 1
	....	Scaling\Follower\pg 1
	....	Scaling\Offsets & Phase\pg2
	....	Tuning\Large Error\pg 1
	....	Alarms & Limits\Limits\pg 2
	....	System Monitor\Run Monitor\pg 1
	....	System Monitor\Run Monitor\pg 3
	....	System Monitor\Position\pg 1
	....	System Monitor\Std Signals Monitor\pg 2
MP-21	FbJobSize	System Monitor\Job Sizes\pg 1
MP-22	FbJbSzVar	System Monitor\Job Sizes\pg 1
MP-23	FbJbSzAvg...............	System Monitor\Job Sizes\pg 1

(Continued)

MP#	MP Name	Screen
MP-24	FbJbSzAct	Scaling\Job Sizes\pg1
MP-25	FbNetOfst	Scaling\Offsets & Phase\pg1
		Scaling\Offsets & Phase\pg2
		System Monitor\Position\pg 1
MP-29	SyncFlgDif	Scaling\Offsets & Phase\pg1
		Scaling\Offsets & Phase\pg2
		System Monitor\Position\pg 3
MP-30	ScaledRef	System Monitor\Run Monitor\pg 3
MP-31	RampedRef	System Monitor\Run Monitor\pg 3
		System Monitor\Std Signals Monitor\pg 2
		System Monitor\Std Signals Monitor\pg 3
MP-32	VelError	Tuning\Velocity Loop\pg 1
		System Monitor\Run Monitor\pg 3
		System Monitor\Std Signals Monitor\pg 2
MP-33	PosnErr	Tuning\Position Loop\pg 1
		Tuning\Large Error\pg 1
		Alarms & Limits\Limits\pg 2
		System Monitor\Run Monitor\pg 1
		System Monitor\Run Monitor\pg 2
		System Monitor\Run Monitor\pg 3
		System Monitor\Position\pg 1
		System Monitor\Std Signals Monitor\pg 1
		System Monitor\Std Signals Monitor\pg 2
MP-34	Intgrl	Tuning\Velocity Loop\pg 1
		Tuning\Position Loop\pg 1
		Tuning\Feedforward\pg 1
		System Monitor\Std Signals Monitor\pg 3
MP-35	FeedFwd	Tuning\Velocity Loop\pg 1
		Tuning\Position Loop\pg 1
		Tuning\Feedforward\pg 1
		System Monitor\Std Signals Monitor\pg 3
MP-36	Trim Out	Tuning\Velocity Loop\pg 1

(Continued)

MP#	MP Name	Screen
	....	Tuning\Position Loop\pg 1
	....	Tuning\Feedforward\pg 1
	....	System Monitor\Run Monitor\pg 3
	....	System Monitor\Std Signals Monitor\pg 3
MP-37	CO Volts	Setup\System Setup\pg 2
	....	Scaling\Follower\pg 2
	....	Setpoints & Ramps\Direct SP & Ramps\pg 1
	....	Tuning\Velocity Loop\pg 1
	....	Tuning\Position Loop\pg 1
	....	Tuning\Feedforward\pg 1
	....	System Monitor\Run Monitor\pg 3
	....	System Monitor\Std Signals Monitor\pg 3
	....	Device Tests\Std Signals Tests\pg 2
MP-38	CO Bits	Scaling\Follower\pg 2
	....	System Monitor\Std Signals Monitor\pg 3
MP-39	CO Max Bits	Scaling\Follower\pg 2
	....	System Monitor\Std Signals Monitor\pg 3
MP-40	Scaleed Fb	Status\pg 1
	....	Setup\System Setup\pg 5
	....	System Monitor\Run Monitor\pg 1
MP-41	ScaleFactor	Scaling\Job Sizes\pg1
	....	System Monitor\Position\pg 1
	....	System Monitor\Position\pg 2
MP-42	ActScaleFactor	System Monitor\Run Monitor\pg 1
	....	System Monitor\Position\pg 1
	....	System Monitor\Position\pg 2
MP-48	Kff	Setup\System Setup\pg 3
	....	Tuning\Feedforward\pg 1
MP-49	Cntrl Loop	Tuning\Velocity Loop\pg 1
	....	Tuning\Position Loop\pg 1
	....	Tuning\Large Error\pg 1
	....	System Monitor\Run Monitor\pg 2

(Continued)

MP#	MP Name	Screen
	....	System Monitor\Run Monitor\pg 3
	....	System Monitor\Job Sizes\pg 1
	....	System Monitor\Job Sizes\pg 2
	....	System Monitor\Std Signals Monitor\pg 1
	....	System Monitor\Std Signals Monitor\pg 2
	....	System Monitor\Control Overrides\pg 1
	....	System Monitor\Control Overrides\pg 4
MP-50	State	Status\pg 1
	....	Setup\System Setup\pg 1
	....	Setup\System Setup\pg 2
	....	Setup\System Setup\pg 3
	....	Setup\System Setup\pg 4
	....	Setup\System Setup\pg 5
	....	Tuning\Large Error\pg 1
	....	System Monitor\Run Monitor\pg 1
	....	System Monitor\Run Monitor\pg 2
	....	System Monitor\Run Monitor\pg 3
	....	System Monitor\Position\pg 1
	....	System Monitor\Position\pg 2
	....	System Monitor\Job Sizes\pg 1
	....	System Monitor\Job Sizes\pg 2
	....	System Monitor\Std Signals Monitor\pg 1
	....	System Monitor\Std Signals Monitor\pg 2
	....	System Monitor\Control Overrides\pg 1
	....	System Monitor\Control Overrides\pg 4
	....	Device Tests\Std Signals Tests\pg 2
	....	Device Tests\Digital I/O Test\pg 1
MP-51	Active Blk	Blocks\Block Selection\pg 1
	....	System Monitor\Limits & Alarms\pg 2
	....	System Monitor\Control Overrides\pg 1
	....	System Monitor\Control Overrides\pg 4
MP-52	InvalidBlks	Blocks\Block Selection\pg 1

(Continued)

MP#	MP Name	Screen
		System Monitor\Limits & Alarms\pg 2
MP-53	Misc Status	System Monitor\Limits & Alarms\pg 2
MP-54	Std Alms	System Monitor\Limits & Alarms\pg 2
MP-55	Custom Alms	System Monitor\Limits & Alarms\pg 2
MP-56	Misc Alarms	System Monitor\Limits & Alarms\pg 2
MP-90	SerCom Char In	Device Tests\Serial Comm Test\pg 1
MP-91	SerCom Errs	Device Tests\Serial Comm Test\pg 1
		Device Tests\Serial Comm Test\pg 2
MP-94	ROM Test	Device Tests\Hardware Tests\pg 1
MP-95	SRAM Test	Device Tests\Hardware Tests\pg 1
MP-96	NV RAM Test	Device Tests\Hardware Tests\pg 1
MP-97	Model #	Device Tests\Device Model & Rev\pg 1
MP-98	RELEASE	Device Tests\Device Model & Rev\pg 1
MP-99	REVISION	Device Tests\Device Model & Rev\pg 1
MP-100	DI 7..0	PLC\Digital I/O\pg 1
		System Monitor\Dig I/O Monitor\pg 1
		Device Tests\Digital I/O Test\pg 1
MP-101	DI 15..8	PLC\Digital I/O\pg 1
		System Monitor\Dig I/O Monitor\pg 1
		Device Tests\Digital I/O Test\pg 1
MP-102	DO 7..0	PLC\Digital I/O\pg 1
		System Monitor\Dig I/O Monitor\pg 1
		Device Tests\Digital I/O Test\pg 1
MP-103	KeyPad Lockout	Setup\Keypad Lock Setup\pg 1
		Setup\Keypad Lock Setup\pg 2
		Device Tests\Hardware Tests\pg 2
MP-107	Tmr4 Time	PLC\PLC Timers\pg 1
MP-108	PLC Mon 1 Val	PLC\PLC Monitor\pg 1
MP-109	PLC Mon 2 Val	PLC\PLC Monitor\pg 1
MP-110	PLC 15-8	PLC\PLC Monitor\pg 1
MP-111	PLC 23-16	PLC\PLC Monitor\pg 2
MP-112	PLC 31-24	PLC\PLC Monitor\pg 2

MP#	MP Name	Screen
MP-113	PLC 39-32	.... PLC\PLC Monitor\pg 2
MP-114	PLC 47-40	.... PLC\PLC Monitor\pg 2
MP-115	PLC 55-48	.... PLC\PLC Monitor\pg 2
MP-116	PLC 63-56	.... PLC\PLC Monitor\pg 2
MP-117	PLC 71-64	.... PLC\PLC Monitor\pg 2
MP-118	PLC 79-72	.... PLC\PLC Monitor\pg 2
MP-119	PLC 87-80	.... PLC\PLC Monitor\pg 2
MP-120	PLC 95-88	.... PLC\PLC Monitor\pg 2
MP-121	PLC 107-100	.... PLC\PLC Monitor\pg 3
MP-122	PLC 115-108	.... PLC\PLC Monitor\pg 3
MP-123	PLC 123-116	.... PLC\PLC Monitor\pg 3
MP-124	PLC 131-124	.... PLC\PLC Monitor\pg 3
MP-125	PLC 139-132	.... PLC\PLC Monitor\pg 3
MP-126	PLC 147-140	.... PLC\PLC Monitor\pg 3
MP-127	PLC 155-148	.... PLC\PLC Monitor\pg 3
MP-128	PLC 163-156	.... PLC\PLC Monitor\pg 3
MP-129	PLC 171-164	.... PLC\PLC Monitor\pg 3
MP-130	PLC 179-172	.... PLC\PLC Monitor\pg 3
MP-131	PLC 187-180	.... PLC\PLC Monitor\pg 4
MP-132	PLC 195-188	.... PLC\PLC Monitor\pg 4
MP-133	PLC 203-196	.... PLC\PLC Monitor\pg 4
MP-134	PLC 211-204	.... PLC\PLC Monitor\pg 4
MP-135	PLC 219-212	.... PLC\PLC Monitor\pg 4
MP-150	Last Reset	.... Device Tests\Device Status\pg 1
		.... Device Tests\Device Status\pg 2
MP-151	Misc Intrpt	.... Device Tests\Device Status\pg 1
		.... Device Tests\Device Status\pg 2
MP-152	Device Alms	.... Device Tests\Device Status\pg 1
MP-153	PC at Intrpt	.... Device Tests\Device Status\pg 2
MP-154	Norm Pwr Ups	.... Device Tests\Device Status\pg 1
MP-155	Low Pwr Cntr	.... Device Tests\Device Status\pg 1
MP-156	Mem Err Cntr	.... Device Tests\Device Status\pg 1

MP#	MP Name	Screen
MP-157	WatchDogCntr	Device Tests\Device Status\pg 1
MP-158	MiscIntrptCntr	Device Tests\Device Status\pg 2
MP-160	AI1 Bits	Scaling\Aux Analog Input1\pg1
		System Monitor\Aux Analog Monitor\pg 1
		Device Tests\Aux Analog Tests\pg 1
MP-161	AI1 Signal	Scaling\Aux Analog Input1\pg1
		System Monitor\Aux Analog Monitor\pg 1
		Device Tests\Aux Analog Tests\pg 1
MP-162	AI1 EU	Scaling\Aux Analog Input1\pg1
		System Monitor\Aux Analog Monitor\pg 1
MP-163	AI2 Bits	Scaling\Aux Analog Input2\pg1
		System Monitor\Aux Analog Monitor\pg 1
		Device Tests\Aux Analog Tests\pg 1
MP-164	AI2 Signal	Scaling\Aux Analog Input2\pg1
		System Monitor\Aux Analog Monitor\pg 1
		Device Tests\Aux Analog Tests\pg 1
MP-165	AI2 EU	Scaling\Aux Analog Input2\pg1
		System Monitor\Aux Analog Monitor\pg 1
MP-166	AO Bits	Scaling\Aux Analog Output\pg1
		System Monitor\Aux Analog Monitor\pg 2
		Device Tests\Aux Analog Tests\pg 2
MP-167	AO Signal	Scaling\Aux Analog Output\pg1
		System Monitor\Aux Analog Monitor\pg 2
		Device Tests\Aux Analog Tests\pg 2
MP-168	AnlgCal Ref A	Device Tests\Aux Analog Tests\pg 3
MP-169	AnlgCal Ref B	Device Tests\Aux Analog Tests\pg 3
MP-178	PosnErrCnt	System Monitor\Position\pg 2
MP-179	SyncFlgDifCnt	System Monitor\Position\pg 2
MP-180	LdPsnCnt	System Monitor\Position\pg 2
MP-182	LdJSCnt	System Monitor\Job Sizes\pg 2
MP-183	LdJSAvgCnt	System Monitor\Job Sizes\pg 2
MP-184	LdJSVarCnt	System Monitor\Job Sizes\pg 2

MP#	MP Name	Screen
MP-190	FbPsnCnt	System Monitor\Position\pg 2
MP-192	FbJSCnt	System Monitor\Job Sizes\pg 2
MP-193	FbJSAvgCnt	System Monitor\Job Sizes\pg 2
MP-194	FbJSVarCnt	System Monitor\Job Sizes\pg 2

APPENDIX H: ERROR CODE DEFINITIONS

Error	Definition
Acl Tm High	Acceleration time is too high.
Acl too Hi	Acceleration rate is too high.
Adrs Error	Address Error, there is an internal address conflict with the CPU.
Bad Blk Calc	During calculations for one of the parameter blocks, an error was encountered causing the block to be marked as bad. The block parameter value(s) in error should be corrected.
Bad Blk Sel	An attempt was made to switch to a bad parameter block.
Binary Only	The number is Binary, only “1’s” and “0’s” may be entered.
BkUp Loaded	Prompt which displays on completion of loading a code parameter backup into main CP list.
Blk Parm Err	An error was encountered in the block parameters.
Blk Val Err	An error was encountered in the block values of a block.
Buss Error	There is an internal buss conflict with the CPU.
ChkSm Error	Checksum Error, the checksum calculated for memory data is not correct.
Dcl Tm High	Deceleration time is too high.
Default Set	Prompt after resetting a parameter back to its default value.
Defaults Set	Prompt after resetting all parameters back to their default values.
Divide By 0	Math error has occurred internal resulting in divide by zero.
DP Present	Decimal point already present in the number you are entering.
Dspl Error	Display Error, an error has occurred when attempting to display a parameter (e.g., the parameter does not exist).
Field Full	The maximum number of characters (digits, decimal point, negative sign) allowed for parameter entry has been reached while entering a number via the keypad. You tried to enter more numbers/characters than will fit into the space allotted for the parameter value entry.
Flts Cleared	Prompt to indicate that the faults have been cleared, as a result of entering a 1 into Clr Fault Cntrs (CP-491)
Gen Intrpt	Some error occurred during the controls program execution to cause a General Interrupt.

(Continued)

Error	Definition
Halt Monitor	Reset caused by microprocessor or double bus fault.
Illegal Inst	Illegal Instruction.
Invalid Cmd	An invalid command was encountered during compilation of the PLC program.
Invalid Opnd	An invalid operand was encountered during compilation of the PLC program.
Invalid Parm	The parameter requested is not defined and therefore is invalid.
KyPd Lockout	The keypad is locked out, disallowing entry for this parameter through the keypad.
LgWd Ovfl	There was a Long Word Overflow as a result of some internal calculation.
LossOf Clock	There is no clock signal. Last reset caused by the detection of no clock signal.
Low Power	The device's AC input voltage level is low (below the required specification).
Max Error	The parameter value just entered is above the maximum allowed for the parameter.
Max Res Met	The maximum number of digits to the right of the decimal point for the parameter being entered has already been met (an attempt was made to exceed this limit).
Max SP Error	The value just entered for the setpoint exceeds the value set in its corresponding Max SP (211,221).
Memory Fail	Indicates that a memory test has failed.
Memory Pass	Indicates that the memory test has passed.
Memory Error	An internal memory error was encountered.
Min Error	The parameter value last entered exceeded the minimum value allowed for the parameter.
Min SP Error	The value just entered for the setpoint exceeds the value set in its corresponding Min SP (212,222).

(Continued)

Error	Definition
Minus First	When entering the value for this parameter the minus sign (-) must be entered first.
No <END>	During compilation of the PLC program, no END command was found.
No Cmpr Parm	Invalid comparison parameter entered.
Not Allowed	The last action attempted is not allowed.
Not Processd	The request for a parameter value change was not processed due to a “combo” check error that occurred as a result of some calculation for a related parameter value or a parameter in a block of parameters. May be the result of a block parameter transfer to the control via serial communications.
Not Ready	The control was “not ready” to process the last request.
NVRAM Failed	The memory test for the nonvolatile RAM has failed.
NVRAM Passed	The memory test for the nonvolatile RAM has passed.
Only 1 Page	Occurs when the page up or page down key is pressed and there is only one page to display.
Parm Mem Lmt	Indicates that the internal memory limit for parameters in block parameters has been exceeded, and therefore the number of parameters defined in block parameters must be reduced.
PLC BkUp set	Prompt to indicate that the PLC program has been changed to be the same as the backup PLC program that was saved to backup.
PLC Dflt set	Prompt to indicate that the PLC program has been changed to be the same as the default PLC program.
PLC Mem Lmt	During compilation of the PLC program, the internal memory limit set for the PLC program has been exceeded. The PLC program should be reduced.
Power Loss	Indicates that a momentary loss of AC power was detected.
Ratio too Hi	The ratio is too high.

(Continued)

Error	Definition
Res Error	The resolution for the last parameter value exceeded the limits for that parameter (result of a parameter value change using serial communications).
ROM Failed	Indicates that the memory test for the internal ROM part has failed.
ROM Passed	Indicates that the memory test for the internal ROM part has passed.
RUN Lockout	Indicates that the parameter entry is locked out during run. An attempt was made to enter a parameter value into a parameter that is locked out during run while the control is in run.
Saved 2 BkUp	Prompt to indicate that the data has been saved to backup storage for later use.
SP too High	The setpoint is too high.
SP too Low	The setpoint is too low.
Speed too Hi	The speed is too high.
SRAM Failed	Indicates that the memory test for the internal RAM part has failed.
SRAM Passed	Indicates that the memory test for the internal RAM part has passed.
Test Module	Reset caused by microprocessor's test sub-module.
UImpd Intrpt	An error has occurred while the CPU was processing to cause an unimplemented interrupt.
Watch Dog	The internal CPU watch dog timer has timed out. CPU is out of time and is not able to function correctly.

–NOTES—

APPENDIX I: SERIAL COMMUNICATIONS ERROR CODE DEFINITIONS

#	Name	Definition
0	OK	Request processed
1	General Data Error	A non-specified error occurred as a result of the last serial communications transmission. Check the contents of the last message transmission against the protocol definition.
2	Res Error	The resolution for the Control Parameter value exceeds the minimum or maximum that is allowed.
3	Invalid Parm	The requested parameter does not exist.
4	String too long	The custom engineering units string that was sent exceeds the 15 character limit and was truncated to 15 characters.
5	Out of Range	The parameter requested is above or below the available number of parameters, or the address requested for a memory read is not within the memory address range.
6	Not Allowed	The request is not allowed.
7	Lockout During RUN	An attempt was made to change a parameter value for a parameter that is locked out during run, while the control is in run (state).
8	Not Ready	The CX-1200 was "not ready" to receive the last request.
9	Block Parm Error	An error was encountered while processing a block parameter request.
10	Block Value Error	An error was encountered while processing a block value request.
11	Parm Memory Limit	The internal memory limit for block parameters was exceeded during processing of a block parameter change.
12	MIN Error	There was an attempt to exceed the minimum value allowed for a parameter value.

(Continued)

#	Name	Definition
13	Max Error	There was an attempt to exceed the maximum value allowed for a parameter value.
14	Invalid Command PLC	An invalid command was encountered during compilation of the PLC program.
15	Invalid Operand PLC	An invalid operand was encountered during compilation of the PLC program.
16	No <END> PLC	No END command was found during compilation of the PLC program.
17	PLC Memory Limit	The internal memory limit for the PLC program was reached while compiling the PLC program. The PLC program should be reduced in size.
18	Defaults Loaded	The default parameter values have been loaded into the Control Parameters.
19	Backup Loaded	The backup parameter values have been loaded into the Control Parameters.
20	Backup Saved	The Control Parameter values have been saved to backup storage.
21	Checksum Error	A checksum calculation error has occurred as a result of the last request.
22	Faults Cleared	The fault counters have been cleared.
23	Passed	The requested memory test passed.
24	Failed	The requested memory test failed.
25	No Compare Parm	No compare parameter.
26	Divide by Zero	The last request caused a “divide by zero” in an internal calculation.
27	Long Word Overflow	The last request caused a “long word overflow” in an internal calculation.
28	Parm Transfer Limit Error	An attempt was made to exceed the maximum number of parameters allowed for a request.

(Continued)

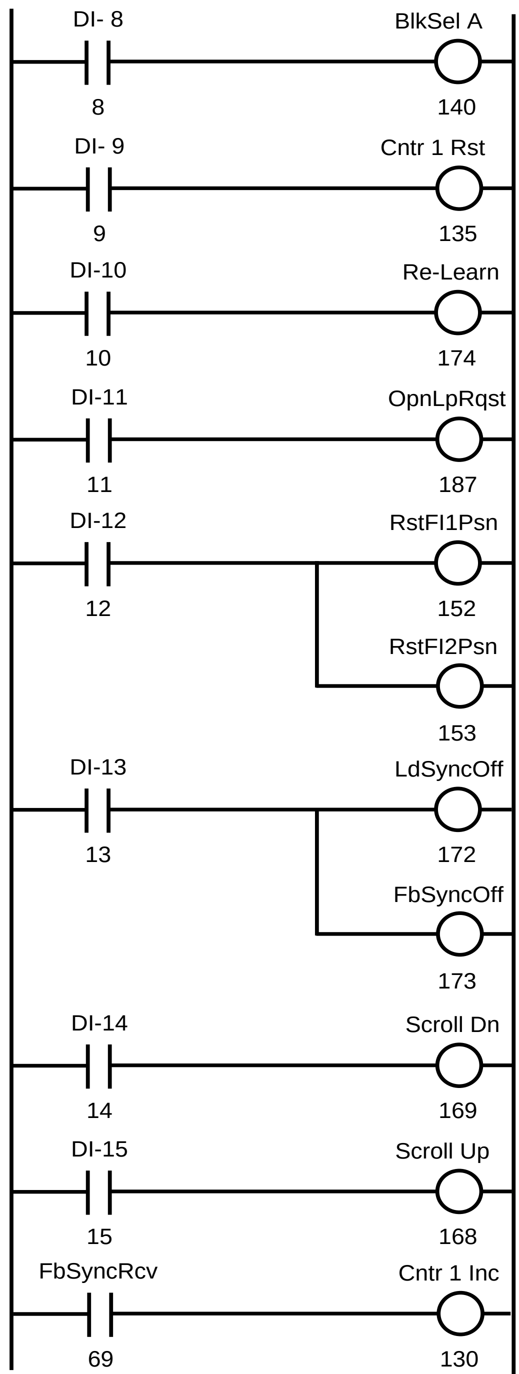
#	Name	Definition
29	Memory Read too Long	An attempt was made to read too many bytes of memory at one time.
30	Data Length Error	The “data field” length did not match the length expected for the specific serial communications function request.
31	Not Processed Msg	The last serial communications function request was not processed due to a combinational check error. One or more of the parameters in the block of parameters sent caused an error.
32	Invalid Serial Comm	The serial communications function that was requested, is not defined in the list of allowed functions. Check the protocol definition.

–NOTES—

APPENDIX J: PLC DEFAULT PROGRAM LOGIC

PLC Command | **Equivalent Logic Ladder**

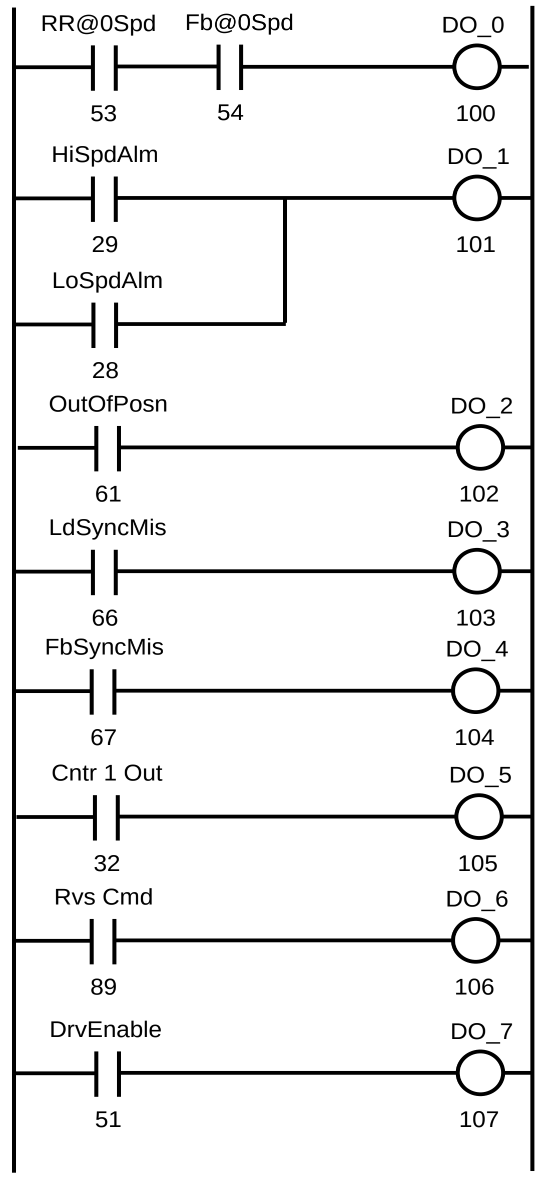
LOAD	8	DI_8
OUT	140	Blk Sel A
LOAD	9	DI_9
OUT	135	Cntr 1 Rst
LOAD	10	DI_10
OUT	174	Re-Learn
LOAD	11	DI_11
OUT	187	OpnLpRqst
LOAD	12	DI_12
OUT	152	RstFI1Psn
OUT	153	RstFI2Psn
LOAD	13	DI_13
OUT	172	LdSyncOff
OUT	173	FbSyncOff
LOAD	14	DI_14
OUT	169	Scroll Dn
LOAD	15	DI_15
OUT	168	Scroll Up
LOAD	69	FbSyncRcv
OUT	130	Cntr 1 Inc



(Continued)

PLC Command | **Equivalent Logic Ladder**

LOAD	53	RR@0Spd
AND	54	FB@0Spd
OUT	100	DO_0
LOAD	29	HiSpdAlm
OR	28	LoSpdAlm
OUT	101	DO_1
LOAD	65	OutOfPosn
OUT	102	DO_2
LOAD	66	LdSyncMis
OUT	103	DO_3
LOAD	67	FbSyncMis
OUT	104	DO_4
LOAD	32	Cntr 1 Out
OUT	105	DO_5
LOAD	89	Rvs Cmd
OUT	106	DO_6
LOAD	51	DrvEnable
OUT	107	DO_7



APPENDIX K: PLC PROGRAM COMMANDS

Command Description	Decimal:	Hexidecimal:
END Command	224	E0
LOAD Command	225	E1
AND Command	226	E2
OR Command	228	E4
Exclusive OR Command (XOR)	229	E5
NOT Command	232	E8
LOAD NOT Command	233	E9
AND NOT Command	234	EA
OR NOT Command	236	EC
Exclusive OR NOT Command	237	ED
OUT Command	240	F0
NOP Command	255	FF

—NOTES—

APPENDIX L: PLC PROGRAM OPERANDS

Op	Name	Related CP
0	S0	
1	S1	
2	ZERO = 0, off state	
3	ONE = 1, on state	
4	Pwr-Up 1 (on) for 1st PLC Scan	
5	Reserved	
6	Reserved	
7	Reserved	
8	DI_8, Digital Input 8	
9	DI_9, Digital Input 9	
10	DI_10, Digital Input 10	
11	DI_11, Digital Input 11	
12	DI_12, Digital Input 12	
13	DI_13, Digital Input 13	
14	DI_14, Digital Input 14	
15	DI_15, Digital Input 15	
16	Lch1 Out, Latch 1 Output	
17	Lch2 Out, Latch 2 Output	
18	Lch3 Out, Latch 3 Output	
19	Lch4 Out, Latch 4 Output	
20	Reserved	
21	Reserved	
22	Reserved	
23	Reserved	
24	Tmr1 Out, Timer 1 Output	CP-410,CP-411
25	Tmr2 Out, Timer 2 Output	CP-412,CP-413
26	Tmr3 Out, Timer 3 Output	CP-414,CP-415
27	Tmr4 Out, Timer 4 Output	CP-416,CP-417
28	LoSpdAlm, Low Speed Alarm	
29	HiSpdAlm, High Speed Alarm	

(Continued)

Op	Name	Related CP
30	MinSpdLmt, Scaled Ref Speed < Minimum Speed Limit	CP-331
31	MaxSpdLmt, Scaled Ref Speed > Maximum Speed Limit	CP-330
32	Cntr1 Out, Counter 1 Output	CP-420,CP-421
33	Cntr2 Out, Counter 2 Output	CP-422,CP-423
34	Cntr3 Out, Counter 3 Output	CP-424,CP-425
35	Cntr4UpO, Counter 4 Up Counter Output	CP-426,CP-427
36	Cntr4DnO, Counter 4 Down Counter Output	CP-428,CP-427
37	Low Power, Low Power Indication	
38	Reserved	
39	Reserved	
40	Direct, Direct Mode	
41	Master, Master Mode	
42	Follower, Follower Mode	
43	InvFollower, Inverse Follower Mode	
44	Non-Sync	
45	FixedSync, Fixed Ratio Sync	
46	TrendSync, Trend Ratio Sync	
47	LearnSync, Learn Ratio Sync	
48	Reserved	
49	MaxFI1Hz, Maximum FI1 Frequency [Hz}	
50	COSign, Control Output Sign (1 = Negative)	
51	DrvEnable, Drive Enable	
52	RmpActive, Ramp Active	
53	RR@0Spd, Ramped Reference at ‘0’ Speed	CP-370
54	Fb@0Spd, Feedback at ‘0’ Speed	CP-370
55	MxFbSpd, Maximum Feedback Speed	CP-329
56	MaxAclDcl, Maximum Accel/Decel	CP-372
57	DrvNoRsp, Drive/Motor NOT Responding	CP-372
58	MaxFI2Hz, Feedback is >= Maximum Freq (Hz)	MP-03
59	CO@MxVlts, Control Output at Maximum Volts	CP-271

(Continued)

Op	Name	Related CP
60	Cmpr1 Out, Numerical Comparator 1 result	CP-380,386,392
61	Cmpr2 Out, Numerical Comparator 2 result	CP-381,387,393
62	Cmpr3 Out, Numerical Comparator 3 result	CP-382,388,394
63	Cmpr4 Out, Numerical Comparator 4 result	CP-383,389,395
64	Reserved	
65	OutOfPosn, Out of Position	
66	LdSyncNPr, Lead Sync pulse Not Present	
67	FbSyncNPr, Follower Sync pulse Not Present	
68	LdSyncRcv, Lead Sync pulse Received	
69	FbSyncRcv, Follower Sync pulse Received	
70	OneSecSqW, One Second Square Wave Output	
71	Reserved	
72	F-Stop, F-Stop State (Monitor Only)	MP-50
73	R-Stop, R-Stop State (Monitor Only)	MP-50
74	H-Stop, H-Stop State (Monitor Only)	MP-50
75	Run, Run State (Monitor Only)	MP-50
76	Jog Fwd, Jog Forward State (Monitor Only)	MP-50
77	Jog Rvs, Jog Reverse State (Monitor Only)	MP-50
78	Reserved	
79	DiagState, Diagnostics State (Monitor Only)	MP-50
80	Blk Sel 0, Block 0 Selected (Active) - (Monitor Only)	MP-51
81	Blk Sel 1, Block 1 Selected (Active)	MP-51
82	Blk Sel 2, Block 2 Selected (Active)	MP-51
83	Blk Sel 3, Block 3 Selected (Active)	MP-51
84	Blk Sel 4, Block 4 Selected (Active)	MP-51
85	Blk Sel 5, Block 5 Selected (Active)	MP-51
86	Blk Sel 6, Block 6 Selected (Active)	MP-51
87	Blk Sel 7, Block 7 Selected (Active)	MP-51
88	Reserved	
89	RvsCmd, Reverse Direction Command indicated	

(Continued)

Op	Name	Related CP
90	Reserved	
91	Reserved	
92	Reserved	
93	Reserved	
94	Reserved	
95	Reserved	
96	Reserved (Not accessible)	
97	Reserved (Not accessible)	
98	Reserved (Not accessible)	
99	Reserved (Not accessible)	
100	DO_0, Digital Output 0	
101	DO_1, Digital Output 1	
102	DO_2, Digital Output 2	
103	DO_3, Digital Output 3	
104	DO_4, Digital Output 4	
105	DO_5, Digital Output 5	
106	DO_6, Digital Output 6	
107	DO_7, Digital Output 7	
108	Tmp1, Temporary Control Relay 1, CR1	
109	Tmp2, Temporary Control Relay 2, CR2	
110	Tmp3, Temporary Control Relay 3, CR3	
111	Tmp4, Temporary Control Relay 4, CR4	
112	Tmp5, Temporary Control Relay 5, CR5	
113	Tmp6, Temporary Control Relay 6, CR6	
114	Tmp7, Temporary Control Relay 7, CR7	
115	Tmp8, Temporary Control Relay 8, CR8	
116	Lch1 Set, Latch 1 Set	
117	Lch2 Set, Latch 2 Set	
118	Lch3 Set, Latch 3 Set	
119	Lch4 Set, Latch 4 Set	

(Continued)

Op	Name	Related CP
120	Lch1 Rst, Latch 1 Reset	
121	Lch2 Rst, Latch 2 Reset	
122	Lch3 Rst, Latch 3 Reset	
123	Lch4 Rst, Latch 4 Reset	
124	Tmr1 En, Timer 1 Enable	CP-410,CP-411
125	Tmr2 En, Timer 2 Enable	CP-412,CP-413
126	Tmr3 En, Timer 3 Enable	CP-414,CP-415
127	Tmr4 En, Timer 4 Enable	CP-416,CP-417
128	Tmr4 Rst, Timer 4 Reset	CP-416,CP-417
129	Reserved	
130	Cntr1 Inc, Counter 1 Increment	CP-420,CP-421
131	Cntr2 Inc, Counter 2 Increment	CP-422,CP-423
132	Cntr3 Inc, Counter 3 Increment	CP-424,CP-425
133	Cntr4 Inc, Counter 4 Increment	CP-426,CP-427
134	Cntr4 Dec, Counter 4 Decrement	CP-428,CP-427
135	Cntr1 Rst, Counter 1 Reset	CP-421
136	Cntr2 Rst, Counter 2 Reset	CP-423
137	Cntr3 Rst, Counter 3 Reset	CP-425
138	Cntr4 Rst, Counter 4 Reset	CP-429,CP-427
139	Reserved	
140	Blk Sel A, Block Select A	CP-478,MP-51
141	Blk Sel B, Block Select B	CP-478,MP-51
142	Blk Sel C, Block Select C	CP-478,MP-51
143	Reserved	
144	Reserved	
145	Reserved	
146	Reserved	
147	Reserved	
148	Rst Ingrl, Reset Integral to zero	MP-34
149	FrzIngrl, Freeze Integral (Freeze at current value)	MP-34

(Continued)

Appendix L: PLC Program Operands (continued)

Op	Name	Related CP
150	Reserved	
151	LgErr Off, Disable Large Error Recovery	
152	RstFI1Psn, Reset FI1 Position to zero	
153	RstFI2Psn, Reset FI2 Position to zero	
154	RstPsnErr, Reset Position Error to zero	
155	Reserved	
156	Reserved	
157	ByPassRmp, Bypass Ramp calculation	
158	FrzRamp, Freeze Ramp	
159	Negate SR, Negate Scaled Reference	
160	Data Copy 1	
161	Data Copy 2	
162	Reserved	
163	Reserved	
164	NegateCO, Negate Control Output	
165	Reserved	
166	Reserved	
167	StrtTrace, Start Data Trace	
168	Scroll Up, Remote Scroll Up	CP-400,CP-401
169	Scroll Dn, Remote Scroll Down	CP-400,CP-401
170	Reserved	
171	NOP Opnd, No Operation Operand	
172	LdSyncOff, Disable Lead Sync	
173	FbSyncOff, Disable Follower Sync	
174	Re-Learn	
175	Reserved	
176	Reserved	
177	Reserved	
178	Reserved	
179	Reserved	

Op	Name	Related CP
180	FStpRq, Request State change to F-Stop State	
181	Reserved	
182	Reserved	
183	Reserved	
184	Reserved	
185	Reserved	
186	Reserved	
187	OpnLpRq, Request Open Loop control	
188	Reserved	
189	Reserved	
190	Reserved	
191	Reserved	
192	Reserved	
193	Reserved	
194	Reserved	
195	Reserved	
196	Reserved	
197	Reserved	
198	Reserved	
199	Reserved	
200	OpenLoop	
201	VelLoop, Velocity Loop	
202	PosnLoop, Position Loop	
203	LgErrLoop, Large Error Loop	
204	Reserved	
205	Reserved	
206	Reserved	
207	Reserved	
208	Reserved	
209	Reserved	

Op	Name	Related CP
210	Reserved	
211	Reserved	
212	Reserved	
213	Reserved	
214	Reserved	
215	Reserved	
216	Reserved	
217	Reserved	
218	Reserved	
219	Reserved	

APPENDIX M: WIRING DIAGRAM EXAMPLES

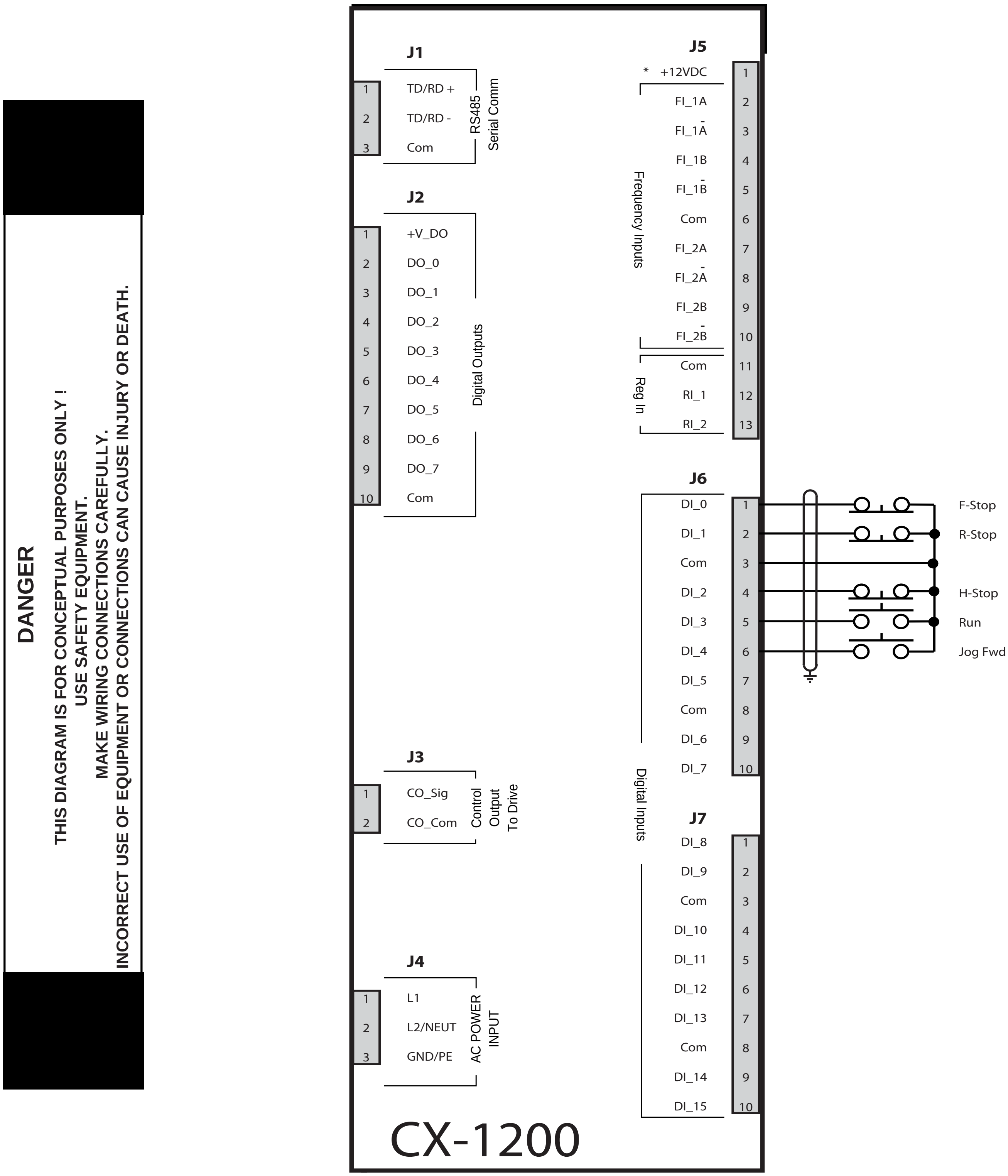
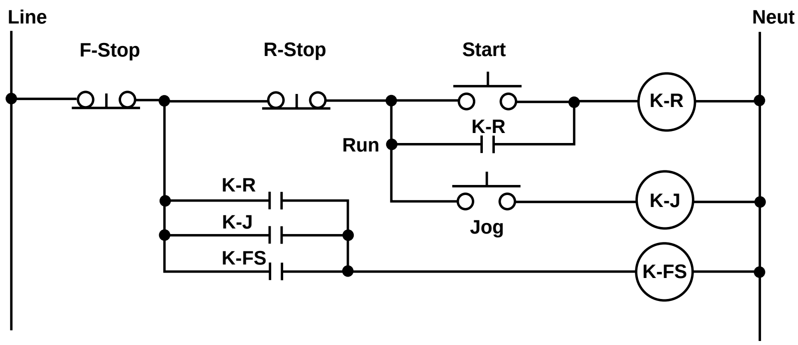


Figure M-1 Start/Stop Wiring Connections without Relays



DANGER

THIS DIAGRAM IS FOR CONCEPTUAL PURPOSES ONLY !
USE SAFETY EQUIPMENT.
MAKE WIRING CONNECTIONS CAREFULLY.
INCORRECT USE OF EQUIPMENT OR CONNECTIONS CAN CAUSE INJURY OR DEATH.

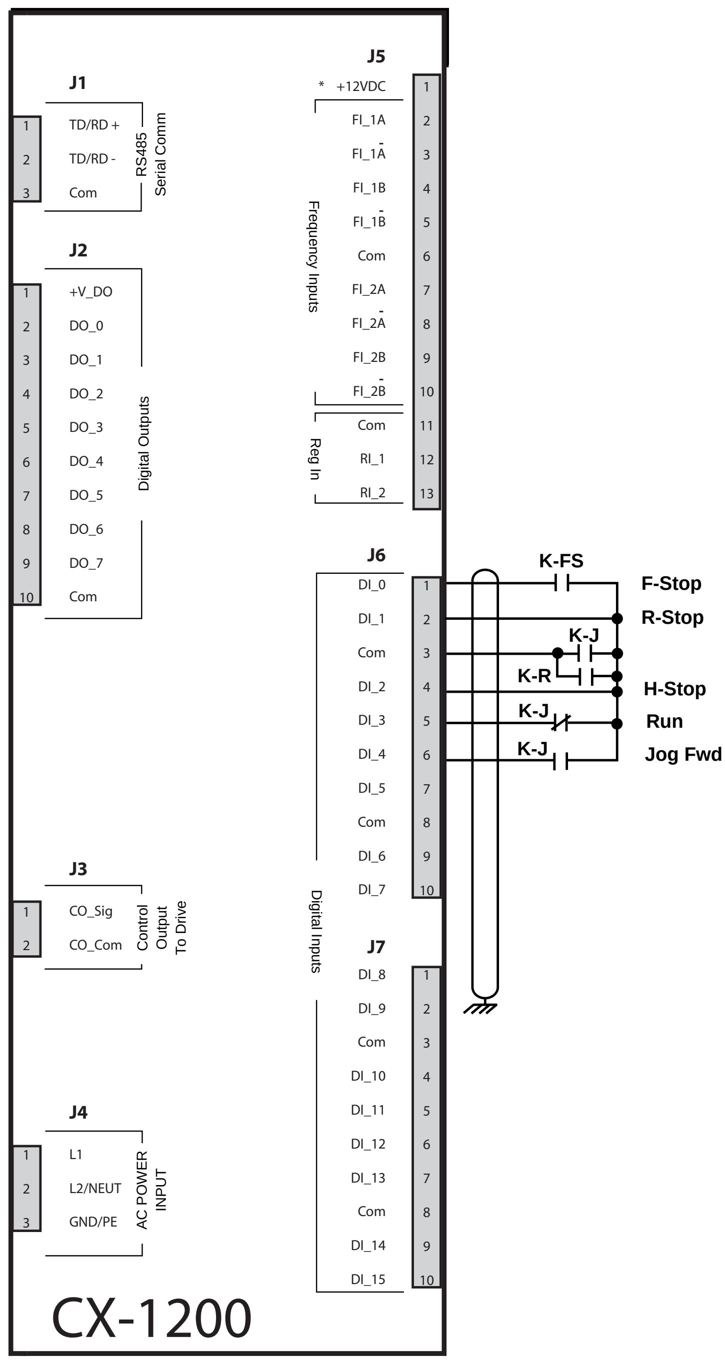
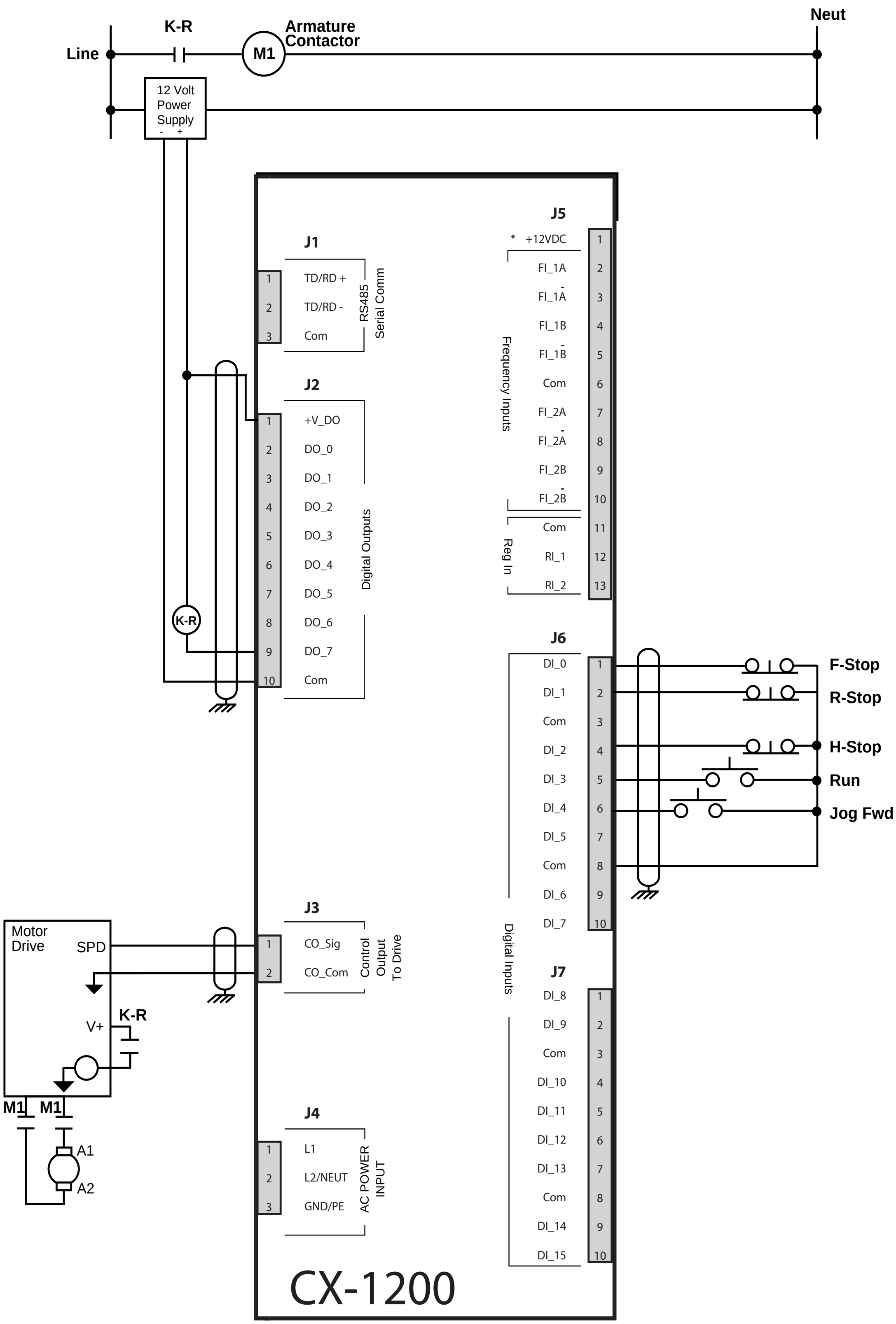


Figure M-2 Start/Stop Wiring Connections with Relays



DANGER

THIS DIAGRAM IS FOR CONCEPTUAL PURPOSES ONLY !
USE SAFETY EQUIPMENT.
MAKE WIRING CONNECTIONS CAREFULLY.
INCORRECT USE OF EQUIPMENT OR CONNECTIONS CAN CAUSE INJURY OR DEATH.

Figure M-3 Start/Stop Wiring Connections with Armature Contactor

—NOTES—

APPENDIX N: FAX COVER SHEET

Date: ______________________

Atten: **Contrex Technical Support**

From:
Name _____________________________ Company Name _____________________________________

Telephone # ________________________ Ext # _______________________ Fax # _________________

We have ______ CX-1200(s) that are used for: ____

____

____

____

____

____

Serial Communication Hookup: _____Yes _____No

Brief Description of the Problem: ____

____

____

____

____

____

____

Contrex Fax # = (763) 424-8734

We are transmitting _____ pages, including:
This Cover Sheet,
A copy of Appendix D w/ the User Record completed,

—NOTES—

APPENDIX O: REVISION LOG

Manual Revision	ECO Number	Revision Date	Corresponding * Software Rev.	Pages Changed
A	-	08/06	1000-8101 Rev. 1.0	New Manual Release
B	-	10/06		Added Unidirectional hookup to manual.
C	-	09/07	1000-8101 Rev. 1.2	Manual cleanup.

* Software revisions may not mandate manual changes. If your software revision is more recent than what is reflected here, use the the most current revision of the manual.

—NOTES—

Warranty/Service

SERVICE POLICY

Contrex, Inc., recognizes that with each sale of its product there are certain product obligations. This document defines the limits of such obligations and provides guidelines for the performance of related services.

Applicability

This Service Policy shall apply to all product sales of Contrex, Inc. However, it may be modified by mutual consent. Thus, whenever an accepted proposal contains wording inconsistent with this policy, the proposal will prevail with respect to specific sale or series of sales involved. Applicability of this policy is also somewhat limited in cases where products are sold to an OEM for resale to user. See paragraph below entitled *OEM Service.*

Service Personnel

Contrex, Inc., has a staff whose primary responsibility is service - both factory service and field (on-site) service. Personnel of this department are usually available for service on a 24 hour notice. To facilitate quicker handling of service requests, either written or by phone, such requests should be directed to the Contrex, Inc., Technical Services Department.

Service Charges

Contrex, Inc., reserves the right to charge for all services performed at the customers request with the exception of factory service performed under warranty. All on-site service is charged at flat-rate per diem rates plus expenses. Any Contrex, Inc., product developing defects as defined in the warranty during its effective period will be repaired or replaced without charge, providing it is shipped, prepaid, to Contrex, Inc., 8900 Zachary Lane North, Maple Grove, Minnesota 55369.

Spare Parts

Contrex, Inc., will usually have an adequate inventory of spare parts and circuit boards for all standard products. However, purchasers are encouraged to maintain a nominal supply of spare parts to insure immediate on-site accessibility.

Instruction Manuals

Instructions for installation, maintenance and troubleshooting are included in manuals that are provided with the equipment. Repairs may be performed in the field by competent customer personnel; but in order to not invalidate the warranty they must be made in strict accordance with published instructions, and ONLY AFTER obtaining approval of the Technical Service Department (such repairs are usually limited to the replacement of circuit boards and major subassemblies, not the repair of these items).

OEM Service

In many instances Contrex, Inc., products are sold to the original equipment manufactures or integrators for inclusion in larger systems. In such cases the obligations of Contrex, Inc., extend only to that original purchaser. It is the latter's responsibility to handle any service required by his customer, the end user. Such problems can usually be solved by field replacement of complete units. OEM's are encouraged to buy and maintain a supply of “loaners” for this purpose. Contrex, Inc., will provide factory overhaul service at nominal charges to support that OEM. Users of Contrex, Inc., products that were acquired as components of larger systems may buy service or spare parts directly from Contrex, Inc., at standard prices, but they must appeal through the OEM for warranty service.

If Contrex, Inc., encounters trouble in the field which appears to be the result of fault or inadequacy of the system, Contrex, Inc., reserves the right to recover service charges from the party that authorized the service activity.

WARRANTY

Contrex, Inc., guarantees this device against defects in workmanship and materials for a period of one (1) year from the date of purchase. Any parts or components that fail during the warranty period will be replaced or repaired without charge. This guarantee is void if the device has been damaged by improper installation or operation, tampering, careless handling or accident.

When a device fails to function in accordance with standards set forth in the instruction manual, the purchaser should contact an authorized representative of Contrex, Inc., 8900 Zachary Lane North, Maple Grove, Minnesota 55369. Whether repairs will take place in the field or at the factory will be solely the prerogative of Contrex, Inc.

If inspection reveals defects that are caused by faulty materials or workmanship, Contrex, Inc., reserves the right to either replace the device or rebuild the device using new or refurbished warranted parts and components. In either instance, the device that is returned to the purchaser meets full factory standards for new device performance. If there is less than 90 days remaining on the warranty period at the time of the repair, the warranty will extend to 90 days after the repair.

Parts and services outside the scope of this warranty will be available at Contrex, Inc., current market price.

Contrex's liability for a device or it's use, whether in warranty or not, shall not in any instance exceed the cost of correcting the defects of the device. Contrex, Inc., assumes no responsibility for damage to property or injuries to persons from improper use of this device.

No express warranties and no implied warranties whether of merchantability or otherwise (except as to title), other than those set forth above , which are expressly made in lieu of all other warranties, shall apply to any devise sold by Contrex, Inc.

Contrex, Inc., reserves the right to change or improve its devices without imposing any obligation upon Contrex, Inc., to make changes or improvements in previously manufactured devices.

This warranty statement is a summary of Contrex, Inc's policy. Further limits of liability are contained in the Contrex, Inc's purchase order acknowledgments and invoices.