Allen-Bradley

1336 Adjustable Frequency AC Drive

B003-B200/C003-C200

Programming Manual

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. "Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls" (Publication SGI-1 1) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will the Allen-Bradley Company be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, the Allen-Bradley Company cannot assume responsibility or liability for actual use based on the examples and diagrams.

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

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

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

Attentions help you

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

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

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Manual Objective

The 1336 Programming Manual is designed to be read and used like an ordinary textbook. Read the manual once from the beginning in the order presented to gain basic knowledge about your drive. Each chapter builds upon information presented in the previous chapter Become familiar with tasks that must be performed in a sequence for safety and successful completion. To assure successful installation and operation, the material presented must be thoroughly read and understood before proceeding. Particular attention must be directed to the Attention and Important statements throughout the manual.

This manual defines the parameter and parameter values used in 1336 drives with Main Control Board Firmware Version 1.01 to 2.01, and Base Driver/Power Supply Board Firmware Versions 1.01 to 3.01 At the back of this manual is a parameter setting chart that provides minimum and maximum parameter values, factory parameter settings, and a place to record any settings that were changed during programming. Also provided is a detailed Run and Start Boost setup procedure in Appendix A.

Important: Read and use the Hardware Manual first. Retain this manual for future reference.

Important: The Handheld Programming Terminal (Cat. No. 1336-MOD-E1) firmware must be upgraded with Kit SP-148340 (Version 2.01) to be compatible with drive firmware Version 2.01 and 3.01

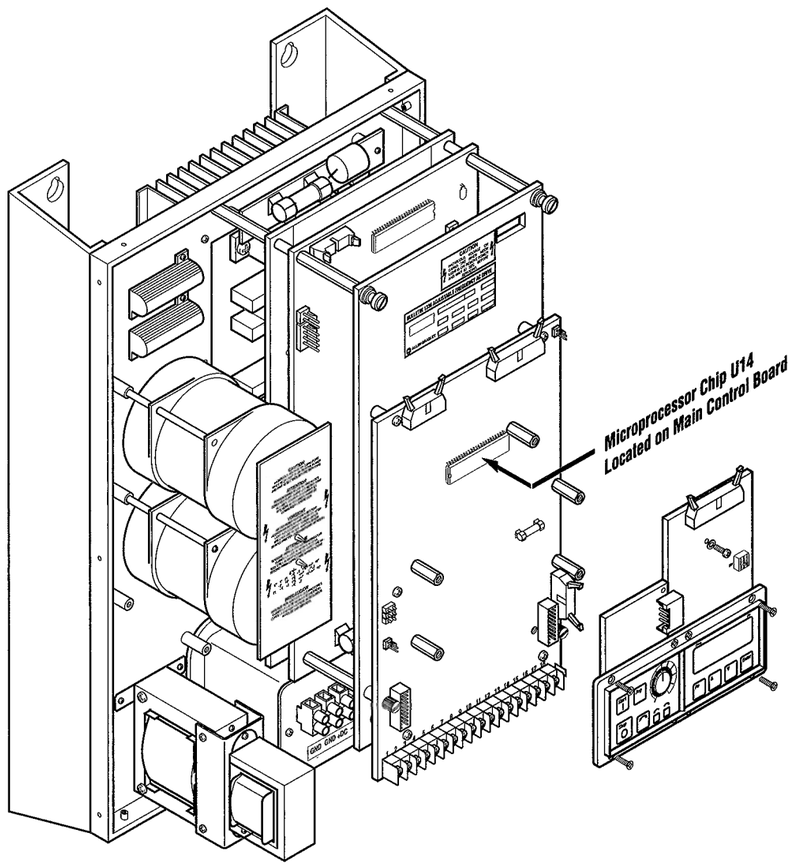
The Monitor Display (Cat. No. 1336-MOD-E2) firmware must be upgraded with Kit SP-148341 (Version 2.01) to be compatible with drive firmware Version 2.01 and 3.01

Manual Objective (cont.)

Firmware versions are marked at two locations in the drive – on the Main Control Board and on the Base Driver/Power Supply Board.

For all drive ratings, the microprocessor chip U14 located on the Main Control Board has the following firmware identification:

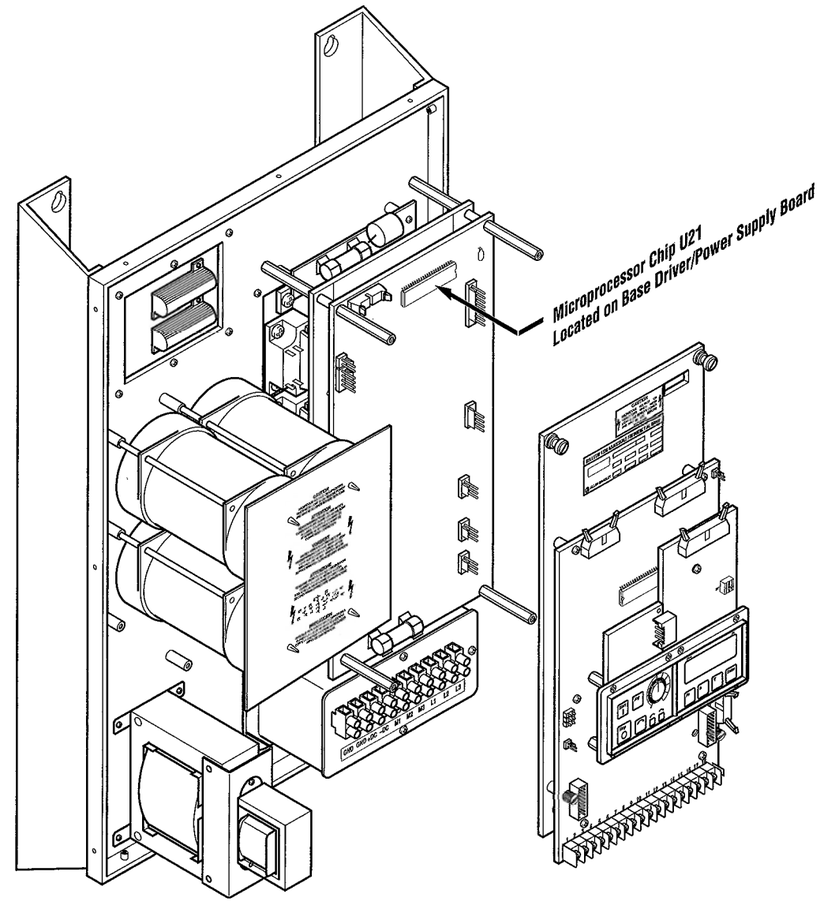
- P/N XXXXXXV1.01 — Firmware Version 1.01
- P/N XXXXXXV1.10 — Firmware Version 1.10.
- P/N XXXXXXV1.11 — Firmware Version 1.11.
- P/N XXXXXXV2.01 — Firmware Version 2.01.



Manual Objective (cont.)

For B003-B030 & C003-C030 ratings, microprocessor chip U21 located on the Base Driver/Power Supply Board has the following firmware identification:

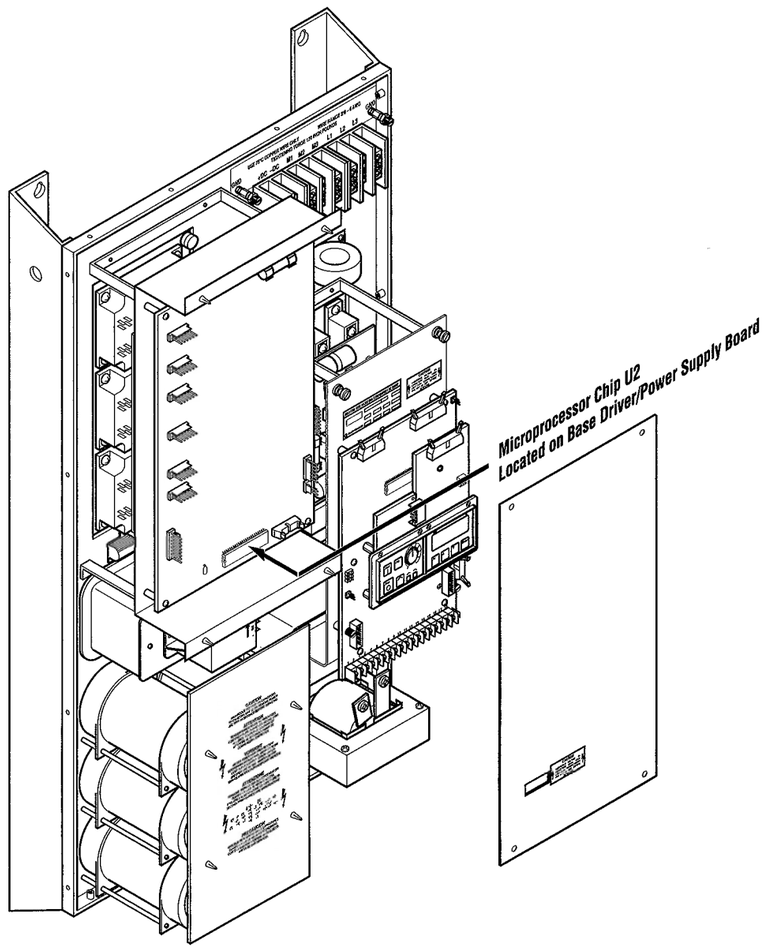
- P/N XXXXXXV1.01 — Firmware Version 1.01.
- P/N XXXXXXV1 11 — Firmware Version 1.11.
- P/N XXXXXXV1 13 — Firmware Version 1.13.
- P/N XXXXXXV1 14 — Firmware Version 1.14.
- P/N XXXXXXV3.01 — Firmware Version 3.01.



Manual Objective (cont.)

For B040-B050 & C040-C050 ratings, microprocessor chip U2 located on the Base Driver/Power Supply Board has the following firmware identification:

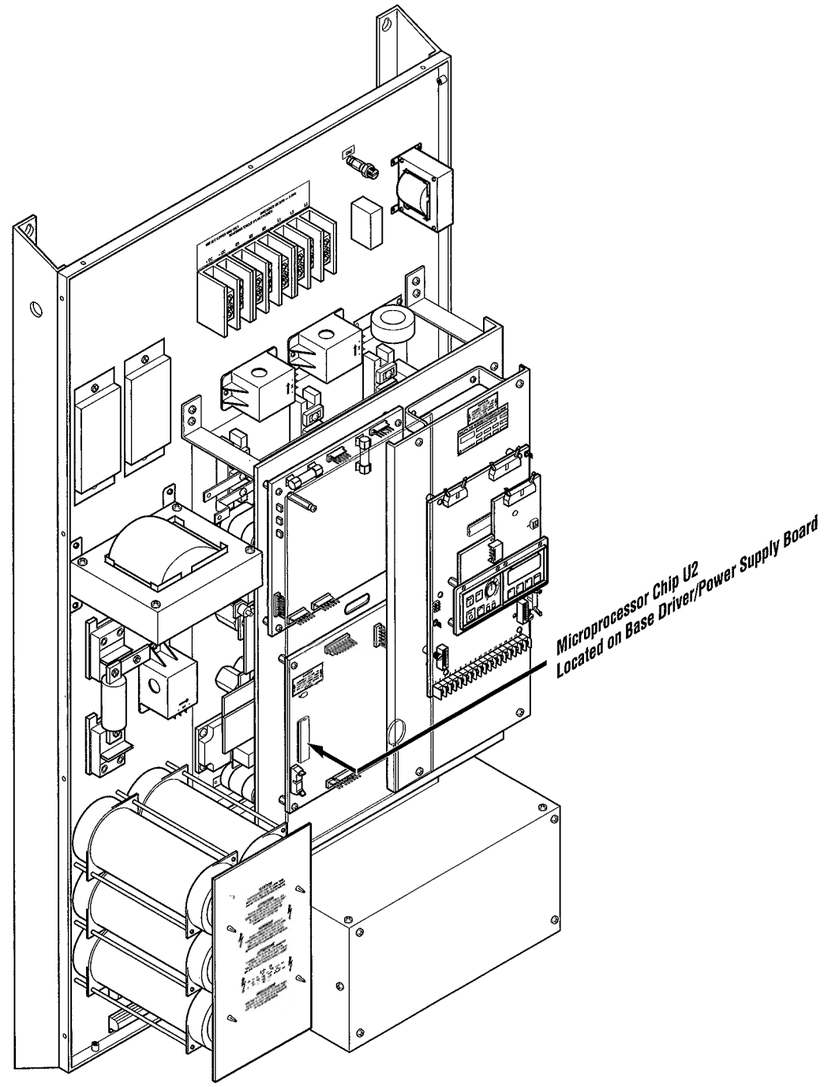
- P/N XXXXXXV1 11 — Firmware Version 1.11
- P/N XXXXXXV1 13 — Firmware Version 1.13.
- P/N XXXXXXV1 14 — Firmware Version 1 14.
- P/N XXXXXXV3.01 — Firmware Version 3.01



Manual Objective (cont.)

For B075-B125 & C075-C125 ratings, microprocessor chip U2 located on the Base Driver/Power Supply Board has the following firmware identification:

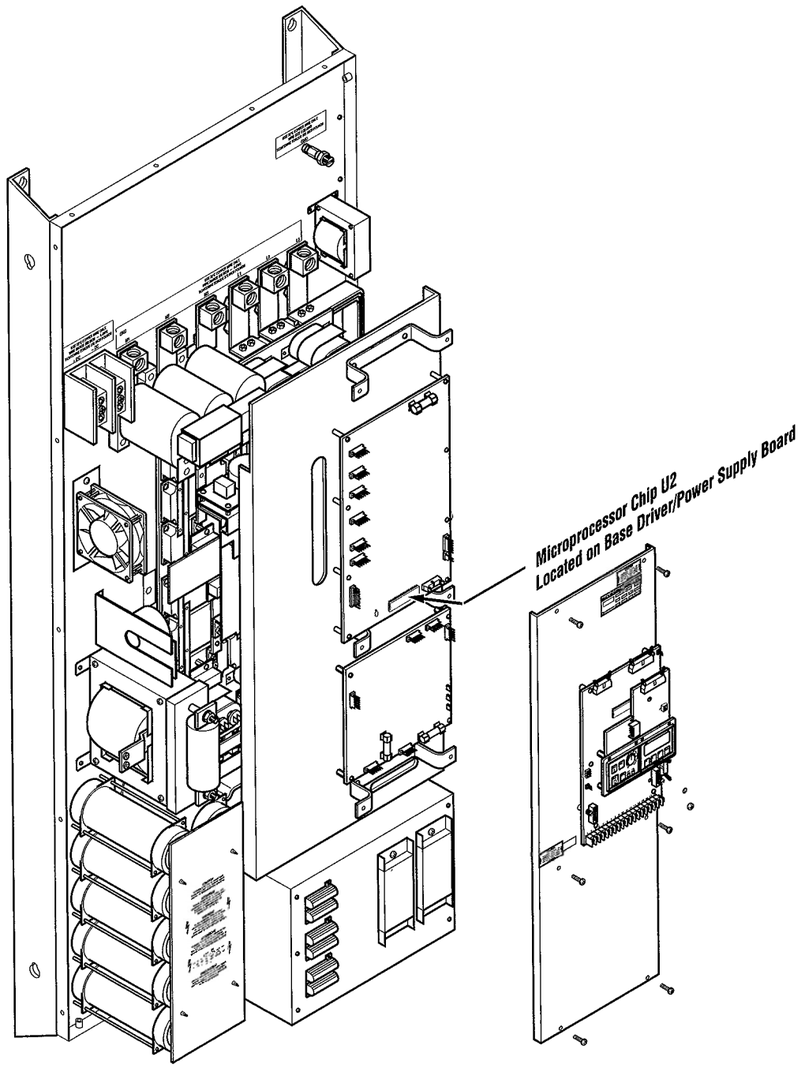
- P/N XXXXXXV1.11 — Firmware Version 1.11
- P/N XXXXXXV1.13 — Firmware Version 1 13.
- P/N XXXXXXV1.14 — Firmware Version 1 14.
- P/N XXXXXXV3.01 — Firmware Version 3.01



Manual Objective (cont.)

For B150-B200 & C150-C200 ratings, microprocessor chip U2 located on the Base Driver/Power Supply Board has the following firmware identification:

- P/N XXXXXXV1 11 — Firmware Version 1.11.
- P/N XXXXXXV1.13 — Firmware Version 1.13.
- P/N XXXXXXV1 14 — Firmware Version 1.14.
- P/N XXXXXXV3.01 — Firmware Version 3.01.



Important Information about this Manual

This manual has been prepared primarily to support this product in a single application. It is a standard document that is intended to help the user understand the individual operating characteristics and limitations of this equipment including hazards associated with installation and setup procedures. Note the following points:

- This equipment has been designed to meet the requirements of a component in an integrated system.
- It must be noted that special considerations are to be given to characteristics of other peripheral solid-state control equipment and the cumulative impact on safety
- Manufacturers and engineering groups responsible for specification or design of electrical control equipment must refer to applicable industry standards and codes for specific safety guidelines and interface requirements.
- In the actual factory environment, the user is responsible to assure compliance with applicable machine and operator safety codes or regulations which are beyond the scope and purpose of this document.

General Precautions

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

ATTENTION: Only personnel familiar with the 1336 AC Drive and associated machinery should plan or implement the installation, start-up and subsequent maintenance of the system. Failure to comply may result in personal injury and/or equipment damage.

ATTENTION: An incorrectly applied or installed system can result in component damage or reduction in product life. Wiring or application errors, such as undersizing the motor, incorrect or inadequate AC supply, or excessive ambient temperatures may result in malfunction of the system.

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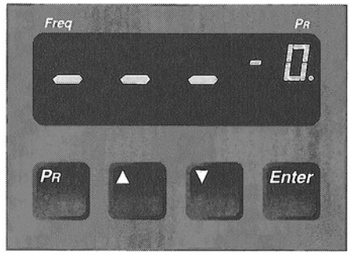
Chapter 1

Local and Serial Port Parameter Programming

Programming and Display Panel



Read and Write Restrictions

At all Programming and Display Panels, parameters 0-50 and 70-89 may be viewed (***Read***) while the drive is running. Eight of these parameters display real-time events (such as present drive speed and output current) that cannot be changed (***Written to***). The remaining parameters may be changed as long as the drive isn't running. A decimal point displayed in the far right corner indicates that programming has been selected and that the enter button has been pressed. Parameter values may be changed when the decimal point is present. With the exception of Parameter 45 (which is programmable in 0.01 kHz increments), all Programming and Display Panels allow all frequency parameters to be programmed in 0.1 Hertz increments and all time parameters to be programmed in 1 second increments.

Four pushbuttons on all Programming and Display Panels are used for both viewing and programming parameters.

PR The PR pushbutton is used to switch from the operating display to the parameter viewing display Once in the viewing display, the PR pushbutton is used to increment through the parameters.

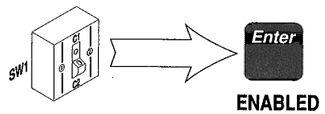
Enter The Enter pushbutton is used to switch from viewing to programming but only when Parameter 0 is displayed, and only if switch SW1 is set to allow parameter programming. When programming parameters, the Enter pushbutton is also used to store the displayed value.

▲ ▼ These buttons are only functional in the programming mode. When programming parameters, the increment and decrement pushbuttons are used to scroll up or down to the parameter value to be entered. Pressing both buttons simultaneously will end programming and return the drive to the operating display

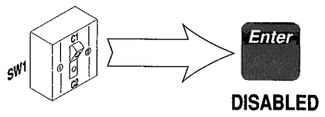
After exiting the programming mode, the stop command must be cycled to reset the drive and confirm that programming is complete. Failure to follow these instructions will result in an F11 (Operator Error) fault.

SW1 Operation

SW1 is a rocker switch only accessible on the chassis mounted Local Programming and Display Panel, 1336-MOD-RP1 The switch can be accessed only with the drive cover removed and may be used to disable the Enter pushbutton and control access to local programming.



Enter button enabled — Access to programming allowed if SW1 is set to position C1.



Enter button disabled — Access to programming not allowed if SW1 is set to position C2

Serial Port Parameter Programming

Read and Write Restrictions

Serial Port parameter programming may be accomplished by using the 1336-MOD-E1 or 1336-MOD-G2 through the 1336-MOD-S1 Serial Port Connector. Through the Serial Port Connector, all parameters may be viewed (***Read***) while the drive is running. Eight of these parameters display real-time events (such as present drive speed and output current) that cannot be changed (***Written to***). An additional 15 parameters are used to report drive status and operational codes that are not programmable. All remaining parameters may be changed while the drive is running. With the exception of Parameter 45 (which is programmable in 0.01 kHz increments), the Serial Port allows all frequency parameters to be programmed in 0.01 Hertz increments and all time parameters to be programmed in 0.01 second increments. Refer to your MOD option instructions for operation and setup.

Firmware Version 1.01-3.01 Local and Serial Port Parameters

The 1336 drive logic uses a set of 90 user parameters to select and control drive operation. Seventy-one of these parameters are accessible through any of the Programming and Display Panels. All 90 are accessible through the Serial Port.

Initial values for each parameter have been preset at the factory and are shown in the following displays. Any interaction or preconditions required for setting parameters are included in the following descriptions.

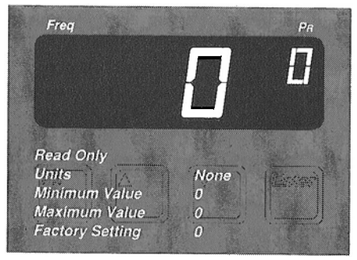
When using any Programming and Display Panel, pressing the Enter pushbutton will access programming when parameter 0 is displayed. When using the chassis mounted Local Programming and Display Panel (1336-MOD-RP1), switch SW1 on the Local Display and Programming Panel must also be set to C1. In either case, in the programming mode a decimal point will be shown at the right edge of the display

To store a changed value, the Enter pushbutton must be pressed first, if not, the previous value will be restored to memory

To end programming, both the ▲ ▼ pushbuttons must be pressed and held down simultaneously

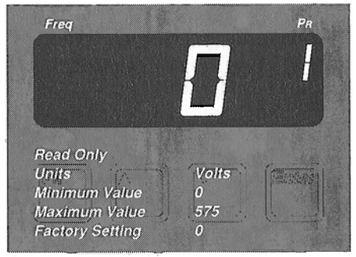
After exiting the programming mode, the stop command must be cycled to reset the drive and confirm that programming is complete. The decimal point will not be displayed when not in the programming mode.

Parameter 0 — Parameter Mode



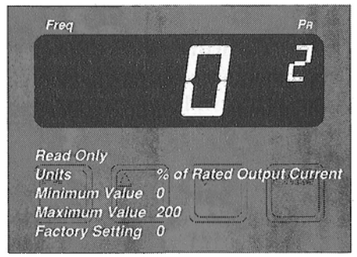
The first parameter displayed when either viewing or programming a parameter at a Programming and Display Panel.

Parameter 1 — Output Volts



When this parameter is selected for viewing, the drive output voltage can be viewed while the drive is running.

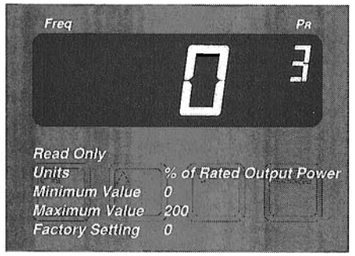
Parameter 2 — Output Current



When this parameter is selected for viewing, the output current of the drive as a % of full load output current can be viewed while the drive is running. Refer to the % Load/Current Conversion Tables in Chapter 6 for quick conversions.

Important: The displayed output current is an approximate value calculated from drive internal calculations. Motor characteristics will affect the accuracy of the output current indication.

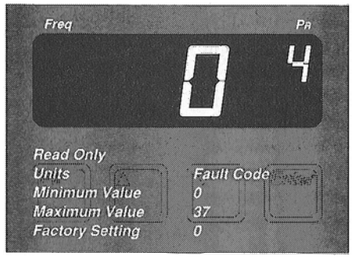
Parameter 3 — Output Power



When this parameter is selected for viewing, the output power of the drive as a % of rated output power can be viewed while the drive is running. Refer to the % Power/HP Conversion Tables in Chapter 7, or the % Power/kW Conversion Tables in Chapter 8 for quick conversions.

Important: The displayed output current is an approximate value calculated from drive internal calculations. Motor characteristics will affect the accuracy of the output current indication.

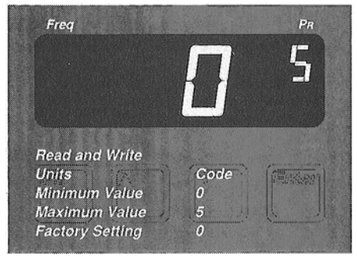
Parameter 4 — Last Fault



This parameter will always display the same value as shown in Parameter 86 even after the drive fault has been reset. Since Parameter displays 4 and 86 are identical but Parameter 86 is programmable, Parameter 4 will show whatever value has been entered in Parameter 86.

If a value has not been entered in Parameter 86, the Fault Code for the last drive fault that occurred will be shown. Both parameters are updated by the drive each time a new fault occurs. Refer to the 1336 User Manual for Fault Code definitions.

Parameter 5 — Frequency Select 1



This parameter selects one of six possible sources to control drive output frequency when TB3 Terminal 27 is false. Either·

0 — A Control Panel speed potentiometer
1 — A 0 to +10V DC source at TB2
2 — A 4 to 20mA source at TB2
3 — A pulse train source at TB2
4 — A serial input source from 1336-MOD-G2 at the serial input port connector if 1336-MOD-S1 is installed.
5 — A remote speed potentiometer connected to TB2 Terminals 1, 2 & 3.

In addition to the selected parameter, other drive inputs may alter the source used for frequency control. Other sources include:

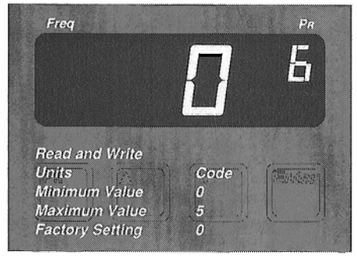
Jog — Parameter 24
Preset Frequency 1 — Parameter 27
Preset Frequency 2 — Parameter 28
Preset Frequency 3 — Parameter 29

This parameter may be programmed to only one of the six selectable values listed, **0 – 5**. Whenever Parameter 5 is selected, a value of **0 – 5** will be displayed. Since other sources can be the control source, the Operating Display however will always show the frequency source using the following code:

0 — Control Panel speed potentiometer
1 — 0 to +10V DC input
2 — 4 to 20mA input
3 — Pulse train input
4 — Serial input
5 — Remote speed pot input
6 — Jog
7 — Preset Frequency 1
8 — Preset Frequency 2
9 — Preset Speed 3 or if Parameter 72 is set to **1**, Preset Speeds 4-7

Use the information provided in the 1336 User Manual to determine what will be the drive speed source for various conditions.

Parameter 6 — Frequency Select 2



This parameter selects one of six possible sources to control the drive output frequency when Terminal 27 at TB3 is true. Either·

0 — A Control Panel speed potentiometer
1 — A 0 to +10V DC source at TB2
2 — A 4 to 20mA source at TB2
3 — A pulse train source at TB2
4 — A serial input source from 1336-MOD-G2 at the serial input port connector if 1336-MOD-S1 is installed.
5 — A remote speed potentiometer connected to TB2 Terminals 1, 2 & 3.

In addition to the selected parameter, other drive inputs may alter the source used for frequency control. Other sources include:

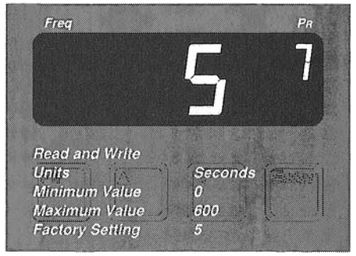
Jog — Parameter 24
Preset Frequency 1 — Parameter 27
Preset Frequency 2 — Parameter 28
Preset Frequency 3 — Parameter 29

This parameter may be programmed to only one of the six selectable values listed, **0 – 5**. Whenever Parameter 6 is selected, a value of **0 – 5** will be displayed. Since other sources can be the control source, the Operating Display however will always show the frequency source using the following code:

0 — Control Panel speed potentiometer
1 — 0 to +10V DC input
2 — 4 to 20mA input
3 — Pulse train input
4 — Serial input
5 — Remote speed pot input
6 — Jog
7 — Preset Frequency 1
8 — Preset Frequency 2
9 — Preset Speed 3 or if Parameter 72 is set to **1**, Preset Speeds 4-7

Use the information provided in the 1336 Hardware User Manual to determine what will be the drive speed source for various conditions.

Parameter 7 — Accel Time 1



This parameter determines the time that it will take the drive to ramp from 0 Hz to the maximum frequency programmed into Parameter 19. The drive output frequency will accelerate at a linear rate proportional to this setting for any frequency (speed) change unless one of the following conditions modify the rate:

Accel Time 2 is selected — see Parameter 30.

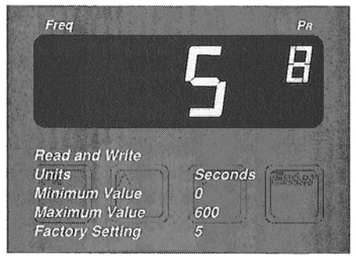
The MOPC setting is reached — see Parameter 36.

Dwell frequency is used — see Parameter 43.

Important: For drives with Base Driver/Power Supply Board Firmware Version 1.01, the ratio of Parameter 19 to Parameter 7 must not be faster than 60Hz/Second. Drive logic will limit the rate to 60Hz/Second.

For drives with Base Driver/Power Supply Board Firmware Version 1 11-3.01, the ratio of Parameter 19 to Parameter 7 may be faster than 60Hz/Second.

Parameter 8 — Decel Time 1



This parameter sets the time that it will take the drive to ramp from the maximum frequency programmed into Parameter 19 to 0 Hz. The drive output frequency will decelerate at a linear rate proportional to this setting for any frequency (speed) change unless one of the following conditions modify the rate:

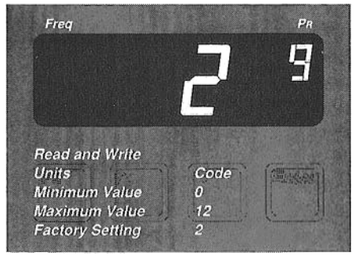
Decel frequency hold is selected and a high bus voltage exists — see Parameter 11

Decel time 2 is selected — see Parameter 31

Important: For drives with Base Driver/Power Supply Board Firmware Version 1.01, the ratio of Parameter 19 to Parameter 8 must not be faster than 60Hz/Second. Drive logic will limit the rate to 60Hz/Second.

For drives with Base Driver/Power Supply Board Firmware Version 1 11-3.01, the ratio of Parameter 19 to Parameter 8 may be faster than 60Hz/Second.

Parameter 9 — DC Boost Select



This parameter provides a selectable DC boost voltage to the motor at low drive frequency to allow the drive/motor combination to be adapted to various starting torque conditions. Usually increased starting torque requires more DC boost. High boost may produce unnecessary current at low frequency and contribute to motor overheating. Excessive boost may force the drive into MOPC resulting in poor drive performance. The optimum DC boost is the lowest level that will permit satisfactory starting torque in a properly sized motor and drive application.

Values **0** and **1** are especially reduced curves that also reduce the volts-per-hertz curve up to Base Frequency These values are intended for use with drive/motor applications on fans and pumps where full rated motor torque is not required at reduced speeds.

Zero (**0**) produces zero boost at 0 Hz, and 30% of the Base Voltage set in Parameter 18 at 50% of the Base Frequency set in Parameter 17.

One (**1**) produces zero boost at 0 Hz, and 42% of the Base Voltage set in Parameter 18 at 50% of the Base Frequency set in Parameter 17

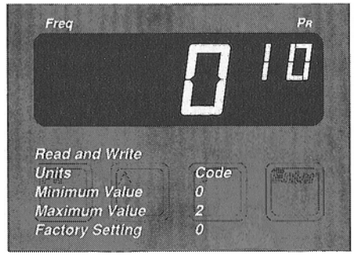
Values **2** through **10** produce increasingly higher DC boost until the straight line volts-per-hertz curve set by Parameter 17 and 18 equals the set Boost Voltage.

2 = 0V DC boost
3 = 6V DC boost
4 = 12V DC boost
5 = 18V DC boost
6 = 24V DC boost
7 = 30V DC boost
8 = 36V DC boost
9 = 42V DC boost
10 = 48V DC boost

11 is a custom volts-per-hertz and DC boost mode that uses Parameters 48, 49 and 50. Refer to these parameters for additional details.

12 is also a custom volts-per-hertz and DC boost mode that uses Parameters 48 and 83. Refer to these parameters for additional details.

Parameter 10 — Stop Select



This parameter selects the stopping performance of the motor.

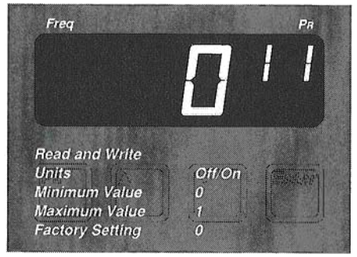
Zero (**0**) = coast-to-stop. The drive will shut off output frequency on receiving a Stop command to allow the motor to coast-to-stop. Set Parameter 12 to **0** seconds and Parameter 13 to **0** volts when Parameter 10 is set to **0**.

One (**1**) = DC brake-to-stop. The drive will stop producing frequency on receiving a Stop Command and apply a DC Hold Voltage to the motor to reduce stopping time. The applied voltage and time of the DC brake action is set by DC hold Parameters 12 and 13. Excessive voltage may produce a motor current that exceeds the setting of Parameter 36, MOPC. Parameter 36 does not limit this current. If the drive is restarted after the DC Hold Time, the drive will start as normally programmed.

Two (**2**) = ramp-to-stop. Upon receiving a Stop command, the drive will begin to ramp the output frequency down to zero. The decel ramp followed will be either Decel Time 1 or Decel Time 2, whichever is selected. After the output frequency is reduced to zero, the drive will apply a DC hold voltage to the motor if Parameters 12 and 13 are set to values other than zero.

ATTENTION: The user has the ultimate responsibility to determine which stopping mode is best suited to the application and which stopping mode will meet applicable standards for operator safety on a particular application.

Parameter 11 — Decel Frequency Hold

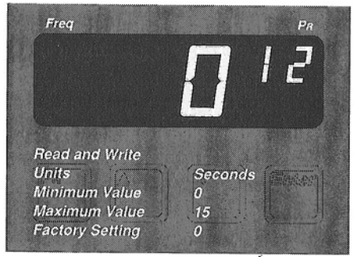


This parameter may be used to guard against overvoltage fault trips from occurring due to fast decel ramps. The status of this parameter selects the drive response to a condition where the DC bus level is rising towards the overvoltage trip point.

With Decel Frequency Hold set to **0**, drive logic continues to follow the decel ramp. If the bus voltage rises to 810V DC however, the drive will trip a bus overvoltage fault (F05).

With Decel Frequency Hold set to **1**, the drive logic will not follow the programmed decel ramp if the bus voltage rises above 110% of nominal bus voltage. Typically a rise in bus voltage is the result of decelerating at a fast rate. This causes the connected motor to regenerate energy back to the DC bus faster than the drive/motor can dissipate the energy With the decel ramp inhibited, the regenerated energy will reduce and stop increasing the DC bus voltage. As the amount of regenerated energy decreases, the DC bus voltage decreases to below 110% of nominal bus voltage and allows the drive logic to continue its original decel ramp.

Parameter 12 — DC Hold Time



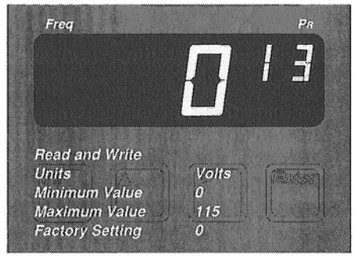
The time represented by this value affects drive stopping performance. Parameter 10 determines how this parameter value is used.

When Parameter 10 is set to **0**, Parameters 12 and 13 should also be set to **0**. When the drive receives a Stop command, DC Hold Time represents how long the last speed command value will be retained in memory If the drive is restarted within this time frame, the drive resumes its last speed command without accelerating from zero speed. If the elapsed time between a Stop and a Start command is longer than the DC Hold Time, the drive will restart at zero speed and follow the standard start sequence.

When Parameter 10 is set to **1** and the drive receives a Stop command, drive output frequency to the motor stops. A DC Hold Voltage is sent to brake the motor for a time equal to the DC Hold Time. If a Start command is received within the DC Hold Time, the drive will remove DC Hold Voltage from the motor and re-accelerate back to set speed. If a Start command is received after the DC Hold Time, the drive will follow the standard start sequence.

When Parameter 10 is set to **2**, the drive output frequency will ramp-to-stop after which a DC Hold Voltage will be applied to the motor for a time equal to the DC Hold Time. If a Start command is received within the DC Hold Time, the drive will remove the DC Hold Voltage and accelerate from 0 Hz to set speed. If a Start command is received after the DC Hold Time, the drive will follow the standard start sequence.

Parameter 13 — DC Hold Volts

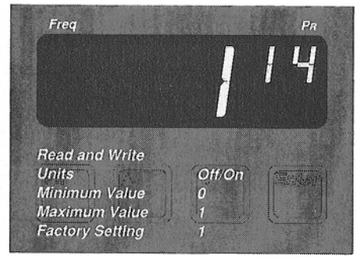


The value of this parameter sets the DC Hold Voltage that is applied to the motor during the DC Hold Time set by Parameter 12.

The optimum setting for this parameter is a function of external variables — motor size, load inertia, friction load and other factors. It is recommended that this setting be the lowest value needed to achieve the required holding or braking action at zero speed. Voltages above rated motor nameplate value can produce high motor currents during the hold or brake cycle which may lead to motor overheating.

ATTENTION: A power interruption lasting longer than 500mS or a malfunction in the solid-state circuitry will cause a loss of holding or braking torque. If a hazard of injury due to movement of equipment or material exists, an auxiliary mechanical braking device must be used.

Parameter 14 — Auto Restart



Auto Restart along with Parameters 40 and 85, affects the drive restart sequence after a line loss condition. Parameter 40 allows the sensing of a line power interrupt condition. Parameter 85 sets the number of times the drive will attempt to restart after a fault.

Important: Parameters 14 and 85 require two-wire control to allow an auto restart sequence to occur 1336 two-wire control requires that Logic Interface Option L1, L2 or L3 be installed in the drive.

When Auto Restart is set to **0**, the Auto Restart function is disabled. With Auto Restart disabled, a stop input must be cycled after F01 is displayed. If a code other than F01 is displayed, a fault has occurred. The fault code must first be cleared by cycling the stop input or power The stop input must then be recycled after F01 is displayed.

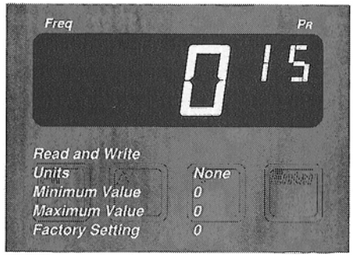
If Auto Restart is set to **1** and Parameter 40 is set to **1**, the Auto Restart function is enabled. Should a line power loss occur, the drive will attempt to restart once power is restored. Should a fault still be present (other than F13-18 and F33), the number of times the drive will attempt to restart is determined by Parameter 85.

When auto restart is set to **1**, recycling a stop input is not required after F01 is displayed. When Auto Restart is enabled however, it inhibits F04, Bus Undervoltage, from occurring.

With a momentary start input supplied from any source, should a drive power loss occur, the drive will restart itself providing the DC bus has not decayed below 200V DC for drives rated B003-B200, or 450V DC for drives rated C003-C200.

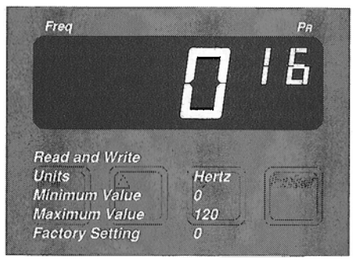
ATTENTION: Auto Restart operation may only be used as outlined in NFPA79, paragraph 6-14 (Exceptions 1, 2 and 3) for specialized applications. Equipment damage and/or personal injury may result if Parameter 14 settings are used in an inappropriate application.

Parameter 15 — Factory Set



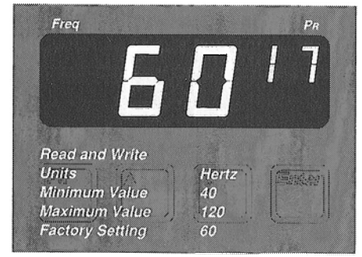
This parameter may be viewed but should not be changed from its factory setting.

Parameter 16 — Minimum Frequency



This parameter sets the minimum drive operating frequency. The only running conditions that can override the minimum frequency setting are Jog Frequency (Parameter 24) or Dwell Frequency (Parameter 43). Minimum Frequency also sets the offset or starting point for analog response signals. These include the local and remote potentiometers that may be used to control the drive output frequency Minimum Frequency is produced at a potentiometer setting of zero. Minimum Frequency will also be produced with a voltage input of zero or a current input of 4mA unless Parameter 84, Analog Inverse is set to **1**.

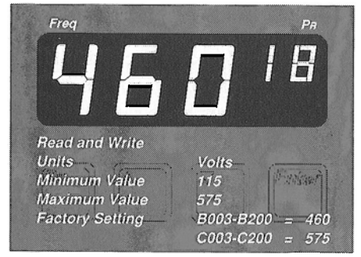
Parameter 17 — Base Frequency



Parameters 17 and 18 are typically set to the nameplate values of the connected motor

Parameter 17 in conjunction with Parameter 18 and the addition of DC Boost Select set by Parameters 9, 48, 49 and 50, determines the drive output volts-per-hertz slope up to Base Frequency The value for Base Frequency must be greater than the Minimum Frequency set by Parameter 16 and Break Frequency set by Parameter 49 as shown on page 2-37.

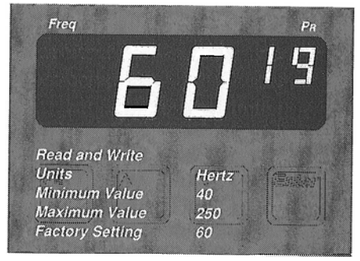
Parameter 18 — Base Volts



Parameters 17 and 18 are typically set to the nameplate values of the connected motor

Parameter 18 in conjunction with Parameter 17 determines the drive output volts-per-hertz slope up to Base Frequency unless modified by Parameters 9, 20, 48, 49 and 50. Parameters 9, 48, 49 and 50 may modify the drive slope at startup, while Parameter 20 will limit the maximum drive voltage produced as shown on page 2-37

Parameter 19 — Maximum Frequency



This parameter sets the highest frequency that the drive will produce when given a maximum speed command. The drive reaches this speed when a local or remote potentiometer or a digital speed command is at its maximum level unless Parameter 84 is set to **1**. That is:

- A +10V DC input at its maximum level.
- A 20mA input at its maximum level.
- A digital speed command at its maximum level.

— or if Parameter 84 (Analog Inverse) is enabled —

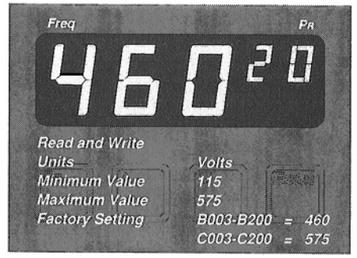
- A 0V DC input at its maximum level.
- A 4mA input at its maximum level.

Parameter 17 in conjunction with Parameter 18 and the addition of DC Boost Select set by Parameters 9, 48, 49, 50 and 83, determines the drive output volts-per-hertz slope up to Base Frequency The value for Base Frequency must be greater than the Minimum Frequency set by Parameter 16 and Break Frequency set by Parameter 49 as shown on page 2-37

If Parameter 19 is set to a value less than Parameter 17 (Base Frequency), drive output frequency will be limited to the value of Parameter 19 as shown on page 2-37

ATTENTION: The drive must be stopped before changing Parameter 19. Decreasing Parameter 19 while the drive is running will produce a sudden change in drive output frequency Sudden changes in drive output frequency may cause motor torque pulsations that can damage connected equipment.

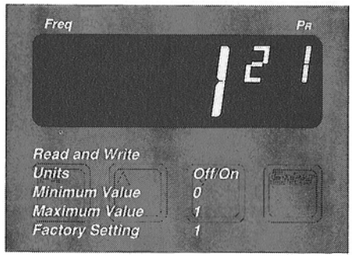
Parameter 20 — Maximum Volts



This parameter sets the maximum RMS output voltage of the drive. It may also be used to set the volts-per-hertz curve when the drive is operating between Base Frequency and Maximum Frequency Beginning at Base Frequency (Parameter 17), drive output voltage will be directly proportional to drive output frequency along a line that starts at Base Voltage (set by Parameter 18), and extends to Maximum Frequency (set by Parameter 19).

This parameter permits the drive to be programmed for custom motor applications. In custom motor applications, the voltage above base speed may need to be controlled differently than below base speed. To be of practical use, the voltage at Base Frequency must be less than the drive Maximum Voltage. If Parameter 20 is set to a value less than Parameter 18 (Base Volts), drive output voltage will be limited to the value of Parameter 20 as shown on page 2-37. For additional information about custom motor applications, contact your A-B sales representative.

Parameter 21 — Local Run

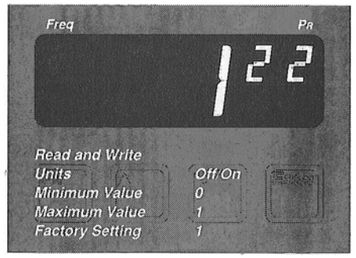


Parameter 21 allows the start pushbutton on an optional local or remote Control Panel to be enabled or disabled. This parameter does not affect any of the other Control Panel functions. All local and remote stop inputs remain active when this parameter is set to **0** or off.

When set to **0**, the drive will not accept a start command from the start pushbutton on the Control Panel. A start command from another source must be used.

When set to **1**, the drive will accept a start command from the Control Panel in addition to start commands from other sources. Enabling the Control Panel start pushbutton does not lock out start commands from other sources.

Parameter 22 — Local Reverse

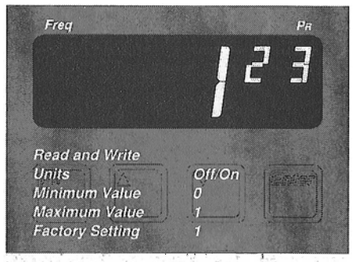


Parameter 22 selects the source that determines the direction of motor rotation.

When set to **0**, the direction of rotation is controlled by either the status of the reverse input at TB3 or through serial communications. The direction pushbutton on an optional Control Panel is not functional, but the direction LED display on the Control Panel is functional.

When set to **1**, the direction of rotation is controlled by the Control Panel direction pushbutton. Other sources of reversing control are disabled, and the direction of rotation cannot be changed by inputs from TB3 or through serial communications.

Parameter 23 — Local Jog

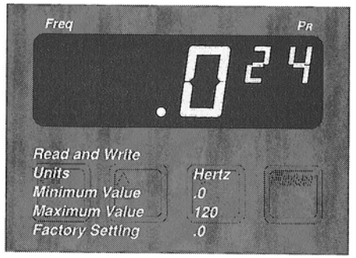


Parameter 23 determines if an optional Control Panel jog pushbutton can jog the drive. The setting of this parameter will not disable jog commands from other sources and will not disable other functions on the Control Panel.

When set to **0**, the local jog function is disabled. The jog pushbutton on an optional Control Panel will have no affect, but the jog input at TB3 or serial communication command can jog the drive.

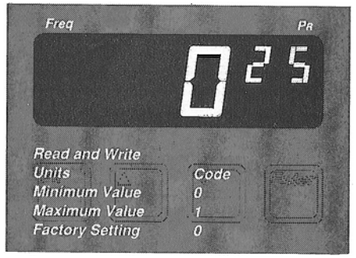
When set to **1**, the local jog function is enabled. The jog pushbutton on the Local Control Panel will jog the drive as long as it is pressed. Other sources of control will still be functional and jog inputs from TB3 or serial communications can jog the drive.

Parameter 24 — Jog Frequency



The value of this parameter is the speed reference frequency used when jog is commanded. Any time jog is commanded, the drive will ramp to this frequency Upon removing the jog command, if no other motion command is present, the drive will follow the stopping mode selected in Parameter 10. This parameter may be lower than the Minimum Frequency set by Parameter 16, but will be limited by the Maximum Frequency set by Parameter 19.

Parameter 25 — Analog Output



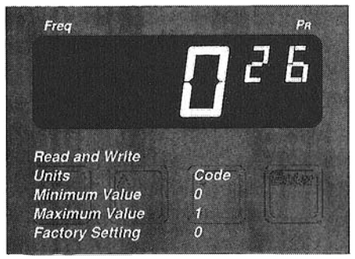
This parameter selects which one of the two possible output signals are used as the meter output at TB2, Terminal 9.

When set to **0**, the meter output is proportional to the actual output frequency of the drive.

When set to **1**, the meter output is proportional to the % of drive load current.

Important: The displayed load current is an approximate value calculated from drive internal feedback. Motor characteristics will affect the accuracy of the load current indication.

Parameter 26 — Preset/2nd Accel



This parameter selects which drive function will be controlled by optional inputs SW1, SW2, Speed Select at terminal block TB3 and Parameter 72, Activate Parameters 73-76.

Important: The settings of Serial Input (Parameter 56) and Serial Mask (Parameter 57) will affect the selection of Preset Frequencies 1, 2, 3, 4, 5, 6 and 7 Bits 2 and 3 of Parameter 56 select the source for drive preset speed control. Bits 0 and 1 of Parameter 56 select the source for drive accel and decel control.

If Parameter 26 is set to **0**, accel and decel times will be set by Accel Time 1 (Parameter 7) and Decel Time 1 (Parameter 8). SW1, SW2, Speed Select and Parameter 72 will control the selection of Preset Frequencies as follows:

SW1	SW2	Speed Select	Parameter 72	Accel at Accel Time 1, Parameter 7 Decel at Decel Time 1, Parameter 8 Run at:
False	False	False	Off	Frequency Select 1, Parameter 5
True	False	False	Off	Preset Frequency 1. Parameter 27
False	True	False	Off	Preset Frequency 2, Parameter 28
True	True	False	Off	Preset Frequency 3, Parameter 29
False	False	True	Off	Frequency Select 2, Parameter 6
True	False	True	Off	Preset Frequency 1, Parameter 27
False	True	True	Off	Preset Frequency 2, Parameter 28
True	True	True	Off	Preset Frequency 3, Parameter 29
False	False	False	On	Frequency Select 1, Parameter 5
True	False	False	On	Preset Frequency 1. Parameter 27
False	True	False	On	Preset Frequency 2, Parameter 28
True	True	False	On	Preset Frequency 3, Parameter 29
False	False	True	On	Preset Frequency 4, Parameter 73
True	False	True	On	Preset Frequency 5, Parameter 74
False	True	True	On	Preset Frequency 6, Parameter 75
True	True	True	On	Preset Frequency 7. Parameter 76

Important: The settings of Serial Input (Parameter 56) and Serial Mask (Parameter 57) will affect the selection of Accel Times 1 and 2. Bits 0 and 1 of Parameter 56 select the source for drive accel and decel control. Bits 2 and 3 of Parameter 56 select the source for drive preset speed control.

Parameter 26 — Preset/2nd Accel (cont.)

If Parameter 26 is set to **1**, SW1, SW2, Speed Select and Parameter 72 will control the selection of Run, Accel and Decel as follows:

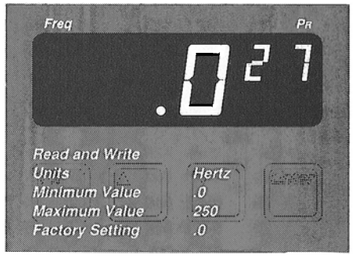
SW1	SW2	Speed Select	Parameter 72	Run at Frequency Select 1, Parameter 5 Accel at: Decel at:
False	False	False	Off	Accel Time 1, Parameter 7 Decel Time 1, Parameter 8
True	False	False	Off	Accel Time 2, Parameter 30 Decel Time 1, Parameter 8
False	True	False	Off	Accel Time 1, Parameter 7 Decel Time 2, Parameter 31
True	True	False	Off	Accel Time 2, Parameter 30 Decel Time 2, Parameter 31

SW1	SW2	Speed Select	Parameter 72	Run at Frequency Select 2, Parameter 6 Accel at: Decel at:
False	False	True	Off	Accel Time 1, Parameter 7 Decel Time 1, Parameter 8
True	False	True	Off	Accel Time 2, Parameter 30 Decel Time 1, Parameter 8
False	True	True	Off	Accel Time 1, Parameter 7 Decel Time 2, Parameter 31
True	True	True	Off	Accel Time 2, Parameter 30 Decel Time 2, Parameter 31

SW1	SW2	Speed Select	Parameter 72	Run at Frequency Select 1, Parameter 5 Accel at: Decel at:
False	False	False	On	Accel Time 1, Parameter 7 Decel Time 1, Parameter 8
True	False	False	On	Accel Time 2, Parameter 30 Decel Time 1, Parameter 8
False	True	False	On	Accel Time 1, Parameter 7 Decel Time 2, Parameter 31
True	True	False	On	Accel Time 2, Parameter 30 Decel Time 2, Parameter 31

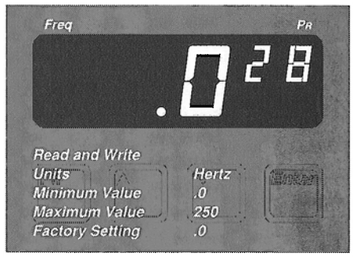
SW1	SW2	Speed Select	Parameter 72	Run at Preset Frequency 4, Parameter 73 Accel at: Decel at:
False	False	True	On	Accel Time 1, Parameter 7 Decel Time 1, Parameter 8
True	False	True	On	Accel Time 2, Parameter 30 Decel Time 1, Parameter 8
False	True	True	On	Accel Time 1, Parameter 7 Decel Time 2, Parameter 31
True	True	True	On	Accel Time 2, Parameter 30 Decel Time 2, Parameter 31

Parameter 27 — Preset Frequency 1



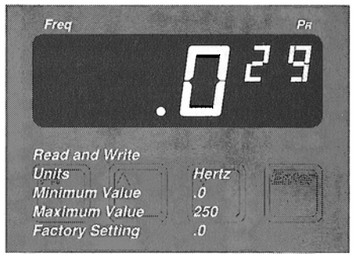
The value of this parameter is the command frequency when Preset Frequency 1 is selected.

Parameter 28 — Preset Frequency 2



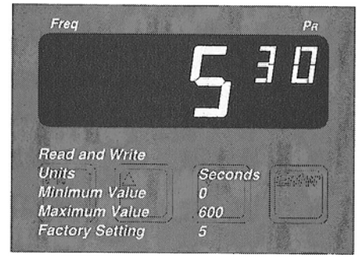
The value of this parameter is the command frequency when Preset Frequency 2 is selected.

Parameter 29 — Preset Frequency 3



The value of this parameter is the command frequency when Preset Frequency 3 is selected.

Parameter 30 — Accel Time 2

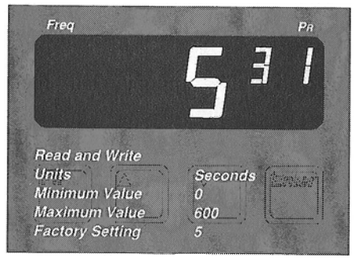


The value of this parameter is the time in seconds it will take the drive frequency to ramp from zero to the Maximum Frequency set by Parameter 19 when Accel Time 2 is selected.

Important: For drives with Base Driver/Power Supply Board Firmware Version 1.01, the ratio of Parameter 19 to Parameter 30 must not be faster than 60Hz/Second. Drive logic will limit the rate to 60Hz/Second.

For drives with Base Driver/Power Supply Board Firmware Version 1.11-3.01 or greater, the ratio of Parameter 19 to Parameter 30 may be faster than 60Hz/Second.

Parameter 31 — Decel Time 2



The value of this parameter is the time in seconds it will take the drive to ramp from the Maximum Frequency set by Parameter 19 to zero when Decel Time 2 is selected.

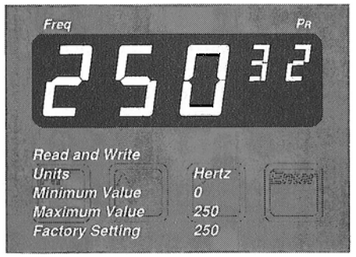
Important: For drives with Base Driver/Power Supply Board Firmware Version 1.01, the ratio of Parameter 19 to Parameter 31 must not be faster than 60Hz/Second. Drive logic will limit the rate to 60Hz/Second.

For drives with Base Driver/Power Supply Board Firmware Version 1.11 3.01 or greater, the ratio of Parameter 19 to Parameter 31 may be faster than 60Hz/Second.

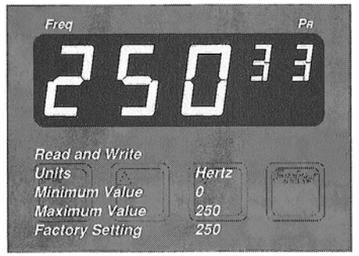
Parameters 32-35

Parameters 32 – 35 may be used to program up to three Skip Frequency Bands. Each band establishes a range of frequencies at which the drive will not operate. If the frequency source that is presently controlling the drive is within the band, the drive output frequency will stay slightly above or below the band until the frequency source changes to a frequency outside the band. The drive will then ramp up or down through the band to the desired frequency. Parameters 32, 33 and 34 are programmed for the center frequency of the bands.

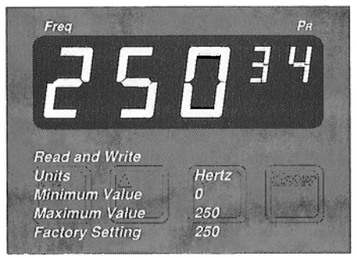
Parameter 32 — Skip Frequency 1



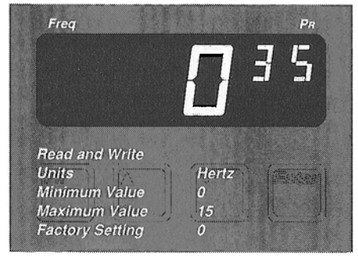
Parameter 33 — Skip Frequency 2



Parameter 34 — Skip Frequency 3



Parameter 35 — Skip Frequency Band



Parameter 35 is programmed for the Skip Frequency Band — the range of frequencies to skip. It is used for each of the skip frequency ranges programmed. The actual range will be the skip frequency (Parameter 32, 33 or 34) minus the value of Parameter 35, to the skip frequency plus the value of Parameter 35.

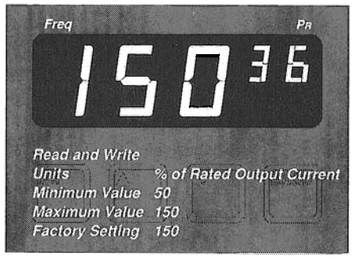
Example: If Parameter 32 = 30 Hz and Parameter 35 = 5 Hz, a skip frequency band from 25 Hz (30 – 5) to 35 Hz (30 + 5) will be generated.

If two or more of the skip frequencies are programmed with values that along with the Skip Frequency Band produce overlapping ranges, it will result in one large range.

Example: Parameter 32 = 20 Hz
Parameter 33 = 30 Hz
Parameter 34 = 50 Hz
Parameter 35 = 6 Hz

These values establish two skip frequency ranges. One range is from 14 Hz (20 – 6) to 36 Hz (30 + 6). The other range is from 44 Hz (50 – 6) to 56 Hz (50 + 6). Since the upper limit of the first range (20 + 6 = 26), is higher than the frequency at the lower limit of the second range (30 – 6 = 24), they combine to form one large range.

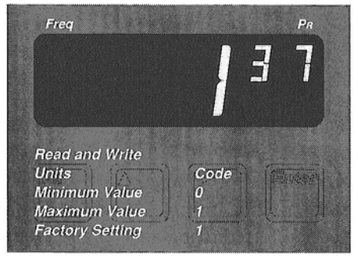
Parameter 36 — MOPC



Important: Overload Current (Parameter 38) limits the drive output current independent of the setting of Parameter 36. The overload range available from the drive will be limited by the lower of the two settings. If the setting of Parameter 36 is greater than the setting of Parameter 38, an overload condition could occur before MOPC is activated.

The value of this parameter adjusts the Momentary Overload Protection Circuit setting of the drive in units of % of rated output current. When the drive output current attempts to exceed this value, the drive will respond by reducing frequency and voltage to limit drive output current to this value. Once output current is reduced below this value, the drive will ramp back to command frequency

Parameter 37 — Baud Rate



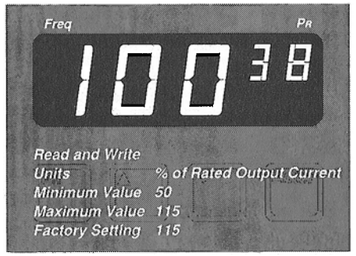
Important: For drives with Main Control Board Firmware Version 1.01, Parameter 37 must remain factory set to **0** to produce a baud rate of 2400 for communicating with remote serial devices.

For drives with Main Control Board Firmware Version 1.10 or greater, the baud rate for communicating with remote serial devices may be set to either 9600 (**0**) or 2400 (**1**) baud. Each time Parameter 37 is changed, power must be recycled to the drive before the new baud rate can be used.

The 9600 baud rate permits faster communications with remote serial devices and reduces update time. The 2400 baud rate provides slower communications, but improves communication accuracy with remote serial devices. If communication errors occur or erratic data is displayed, the slower baud rate should be used.

Serial devices are connected to the 1336-MOD-S1 Serial Port. The baud rate of the 1336-MOD-G2 Remote I/O Adapter must be set to match this parameter setting. The 1336-MOD-E1 Handheld Terminal and 1336-MOD-E2 Monitor Display, upon power up, automatically detect the setting of the drive baud rate and do not need to be reset to match Parameter 37

Parameter 38 — Overload Current



Important: For drives with Main Control Board Firmware Version 1.01 or Base Driver/Power Supply Board Firmware Version 1.01, the setting of Parameter 38 is limited to 100.

Important: MOPC Parameter 36 limits the drive output current independent of the setting of Parameter 38. The overload range available from the drive will be limited by the lower of the two settings. If the setting of Parameter 36 is greater than the setting of Parameter 38, an overload condition could occur before MOPC is activated.

When used with the branch circuit protection fuses recommended in the 1336 User Manual, this parameter provides inverse timed overload protection designed to meet NEC and UL equivalent requirements. Parameter Settings for all ratings are listed in Chapter 5 — Overload Current Settings.

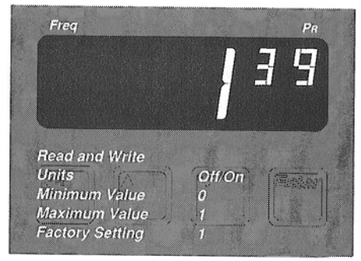
To approximate the I^2T motor thermal overload cutoff, timing starts when the output current rises above this parameter setting. Output current is then timed inversely proportional to the level of current above this setting. When the timed trip level is reached, the drive will fault, display Fault Code F07 and coast-to-stop.

Parameter 38 Selection

The value of Parameter 38 is selected from the charts in Chapter 6 based on drive rating and approximate motor full load current rating. Enter the value found in the column labeled % corresponding to the correct data.

Important: The overload current setting is intended for use with single motor applications. When two or more motors are connected to the drive output, individual motor thermal overloads are recommended and Parameter 38 must be set to 100. The drive cannot detect or be programmed to monitor individual motor currents.

Parameter 39 — Fault Clear



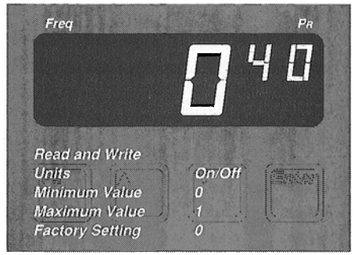
This parameter determines the sequence of events required to clear a Fault Code at the drive. The setting of Parameter 14, Auto Restart, will affect the sequence required to reset the drive after a fault has occurred. The setting of Parameter 40, Power Fault, will affect the sequence required to reset the drive after an AC 3-phase line power interruption has occurred.

If set to **0**, a Fault Code can only be cleared by removing input power from the drive, letting the bus discharge, then reapplying input power.

If set to **1**, a Fault Code can be cleared by either removing input power from the drive, letting the bus discharge then reapplying input power, or by causing the stop signal from an optional Control Panel or Terminal 20 of TB3 on the Logic Interface Board (MOD-L1, L2 or L3) to go false then true with a maintained false Start command.

If MOD-G2 Serial Communications, is being used, toggling the discrete stop bit will not perform this function, refer to Parameter 51

Parameter 40 — Power Fault



This parameter allows the sensing of a line power interrupt condition.

If set to **1**, only the following sequence can occur

On interruption of input power to the drive, the drive will continue to operate from the stored energy of the DC bus until bus voltage drops below 85% of its nominal value. At this point, drive output is shut off and the DC bus will discharge slower

For B003-B200 rated drives, operating logic status will be retained as long as bus voltage is above 388V DC.

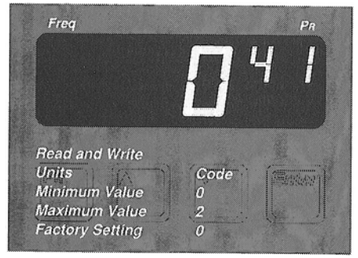
For C003-C200 rated drives, operating logic status will be retained as long as bus voltage is above 485V DC.

If input power is restored and bus voltage rises above 85% of its nominal value, the drive will restore output power to the motor and continue to run. Should DC bus voltage fall below 388 or 485V DC however, a Bus Undervoltage Fault (F04) will be displayed.

If set to **0**, and additional Fault, Input Power Loss F03 may be displayed.

In addition to the above sequence, when the DC bus drops below 85% of its nominal value but remains above 388 or 485V DC, a 500 msec timer is started. If bus voltage does not rise above 85% of its nominal value before 500 msec, the drive will trip, shut down and display Fault F03. If input power is restored and bus voltage rises above 85% of its nominal level before 500 msec, the drive will resume operation and the timer will be reset.

Parameter 41 — Motor Type



Important: For drives with Main Control Board Firmware Version 1.01 or Base Driver/Power Supply Board Firmware Version 1.01, the setting of Parameter 41 must remain factory set to **0**.

For drives with Main Control Board Firmware Version 1 10 or greater and Base Driver/Power Supply Board Firmware Version 1 11 or greater, Parameter 41 allows one of three motor types to be selected for drive control.

- Induction by setting Parameter 41 to **0**.
- Synchronous reluctance by setting Parameter 41 to **1**.
- Synchronous Permanent Magnet by setting Parameter 41 to **2**.

The value of Parameter 41 directly effects the programming of drive Parameters 10 and 42.

When Parameter 41 is set to **2** (Synchronous Permanent Magnet Motor), Parameter 10 must not be set to 1 (DC Brake-to-Stop). This type of braking will reduce the field strength of the permanent magnets in the motor

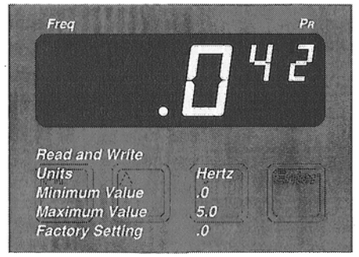
When Parameter 41 is set to a value of either **1** (Synchronous Reluctance), or **2** (Synchronous Permanent Magnet), Parameter 42 must be set to **0** (no slip compensation). Synchronous motors run without slip, and slip compensation will not allow the motor to run at synchronous speed.

If the value of Parameters 10, 41 and 42 are not compatible, the drive will detect it and Fault Code F11 (Operator Error), will appear when an attempt is made to start the drive.

The type of motor selected restricts other parameters. The following parameter settings must be used when selecting Parameter 41 Motor Type.

- Induction Motor — Parameter 41 = **0**
- Synchronous Reluctance Motor — Parameter 41 = **1**
  Parameter 42 = **0**
- Synchronous Permanent Magnet Motor — Parameter 41 = **2**
  Parameter 42 = **0**
  Parameter 10 = **0** or **2**

Parameter 42 — Slip Compensation



Important: For drives with Main Control Board Firmware Version 1.01 or Base Driver/Power Supply Board Firmware Version 1.01, the setting of Parameter 42 must remain factory set to **0**.

Important: Parameter 78, Traverse Period, must be set to **0** to allow Slip Compensation. If not, the drive will fault and display F37 — P-Jump Error

For drives with Main Control Board Firmware Version 1 10-2.01 and Base Driver/Power Supply Board Firmware Version 1 11-3.01, Parameter 42 adds frequency to the drive output. This added frequency will be seen at the drive Output Frequency Display and will be shown even when the drive is set to zero speed. It is based on a percentage of drive output current and compensates for motor slip in an induction motor Adding frequency to the drive output shifts the motor speed towards the synchronous speed of the motor By setting Parameter 42, variations in motor speed due to changes in motor load can be reduced.

The amount of motor load and motor slip is sensed in the drive by monitoring drive output current. Slip compensation may be set from **0** to **5** Hertz. As the output current of the drive increases from zero to full load, the drive adds a portion of the slip compensation setting to the output frequency If Parameter 66 (Output Frequency) is viewed, it will show the adjusted frequency — Parameter 65 (Command Frequency), plus a portion of Parameter 42 (Slip Compensation Frequency).

For example:

- At 25% of drive full load output current, one-quarter of the hertz set in Parameter 42 will be added to the output frequency of the drive.
- At 50% of drive full load output current, one-half of the hertz set in Parameter 42 will be added to the output frequency of the drive.
- At 75% of drive full load output current, three-quarters of the hertz set in Parameter 42 will be added to the output frequency of the drive.
- At 100% of drive output current, all of the hertz set in Parameter 42 will be added to the output frequency of the drive.

Chapter 2
Local and Serial Port Parameters
Firmware Version 1.01-3.01

Parameter 42 — Slip Compensation (cont.)

An "at speed" circuit in the drive monitors drive output frequency. As long as the input speed reference to the drive remains constant, the hertz set by Parameter 42 will be proportionally added to the drive output frequency If the speed command to the drive is increased or decreased, slip compensation will not be added until the command speed matches the drive output frequency.

For a given command speed, Parameter 42, should be set to produce the minimum amount of variation in motor speed as the motor load varies.

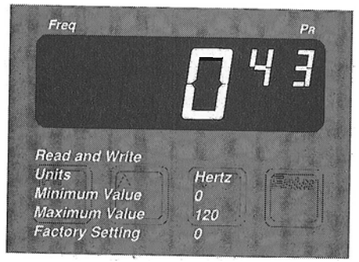
If the motor speed decreases as motor load increases, the value of Parameter 42 should be increased. If the motor speed increases as motor load increases, the value of Parameter 42 should be decreased. If slip compensation for fully loaded motors is desired, an initial setting of **1.7** for Parameter 42 is recommended.

Important. Slip compensation cannot increase the drive output frequency above the Maximum Frequency set by Parameter 19. If Maximum Frequency was selected as the optimum full speed before Slip Compensation, Parameter 19 must be set higher to allow Slip Compensation to work at that frequency

For example:

A typical operating range may be 0 to 60 Hz with Maximum Frequency, Parameter 19, set to **60** and Slip Compensation, Parameter 42, set to **1.7** These settings will not allow the drive to add slip compensation at a commanded frequency of 60 Hz. The Maximum Frequency, Parameter 19, would have to be reset to **62** Hz to allow slip compensation to be effective at a commanded speed of 60 Hz.

Parameter 43 — Dwell Frequency



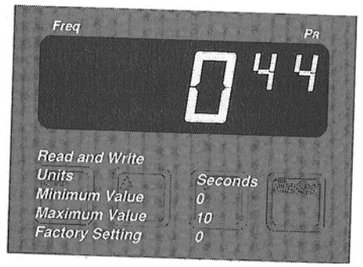
The value of this parameter sets a frequency that the drive will immediately produce when a Start command is received and Dwell Time (Parameter 44) is not set to **0**. The drive output will not follow the accel ramp to this frequency but jump directly to it. The drive then stays at this Dwell Frequency for the time set by Parameter 44. After the Dwell Time, the drive output will ramp up or down to the command frequency along the appropriate ramp.

Dwell Frequency and Dwell Time are intended for induction motor applications with high starting or break away torque. The dwell frequency produces a higher initial slip in the motor than would occur by following the drive accel ramp. The higher slip allows the motor to produce a higher starting torque.

For synchronous motor applications, a dwell frequency of 0 Hz and a dwell time greater than 0 allows the motor to be pulled into sync before the accel ramp is started.

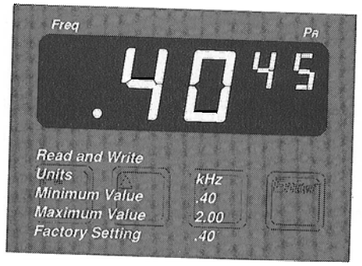
Settings from 2 to 6 are recommended. Higher settings may increase motor heating at startup. For additional setting information, contact your local Allen-Bradley Office.

Parameter 44 — Dwell Time



This function sets the time in seconds the drive will hold at the dwell frequency, Parameter 43.

Parameter 45 — PWM Frequency

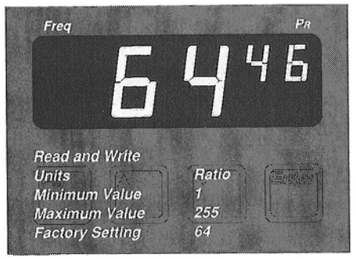


This parameter adjusts the minimum carrier frequency used to generate the PWM output waveform. In the range from 0 to 95 Hz, the carrier frequency will be 21 times the generated output frequency, but no less than this value. As an example, the factory setting of **0.4** is a 400 Hz carrier This carrier will be used from 0 to approximately 19 Hz of drive output. Above 19 Hz, the carrier will change proportionally to the drive output frequency

Increasing the PWM frequency usually reduces audible motor noise at low speeds, but may result in instability on lightly loaded motors. Reducing the PWM frequency improves motor stability, but may result in increased audible noise.

If the PWM frequency is changed while the drive is running, the drive will perform the PWM frequency change only when the output frequency is changed and not before.

Parameter 46 — Pulse Scale Factor



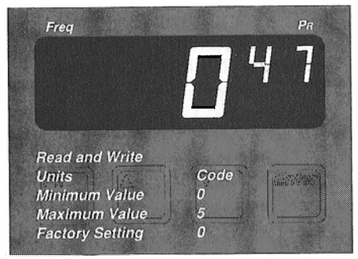
This parameter establishes the input pulse ratio required to produce a proportional output command frequency when the pulse train input is selected. The command frequency is determined by dividing the pulse train frequency by the value set by Parameter 46. For example, at **64**, a pulse train input of 3,840 Hz produces a drive command frequency of 3,840 ÷ **64** or 60 Hz.

Maximum pulse input frequency = 250(Hz) x 255(Scale) = 63750 pulses per second.

Important: The following use the drive pulse train input to control the drive output frequency and require that Parameter 46 be set to **64**:

- 1336-MOD-G1 — The BCD Interface Board
- 1336-MOD-N1 — The Isolated Signal Conditioner Board

Parameter 47 — Language



1336-MOD-E1, the Handheld Terminal, has the ability to display text in one of six languages. The setting of this parameter determines which language will be displayed.

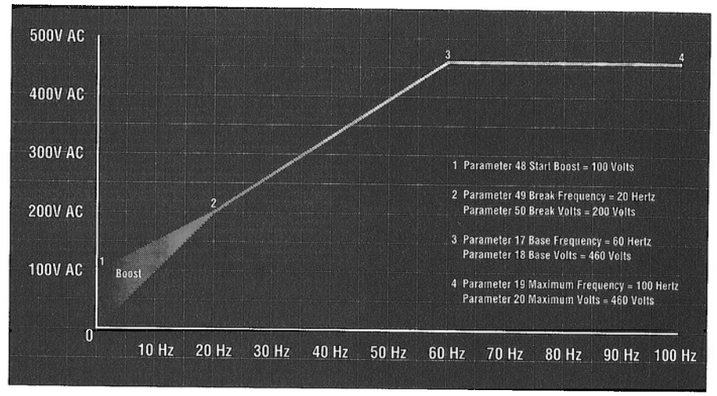
- **0** = English
- **1** = French
- **2** = Spanish
- **3** = Italian
- **4** = German
- **5** = Japanese

Parameters 48-50

Important: Parameters 48-50 may be used to program a custom volts-per-hertz curve for the 1336 for special motor applications.

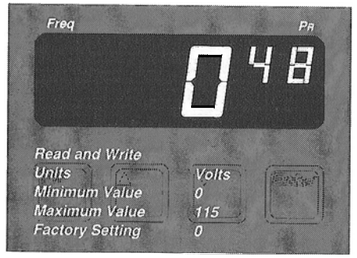
For drives with Main Control Board Firmware Version 1.01 or 1 10, Parameters 48-50 may be accessed only through the serial port, 1336-MOD-S1.

For drives with Main Control Board Firmware Version 1.11-2.01, Parameters 48-50 are accessible through the local programming panel or the serial port.



Parameter 9 = 11 — Custom Volts-per-Hertz

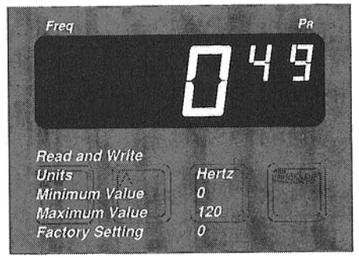
Parameter 48 — Start Boost



Important: If Run Boost (Parameter 83) is greater than Start Boost, the drive will fault and display F34 — Boost Error.

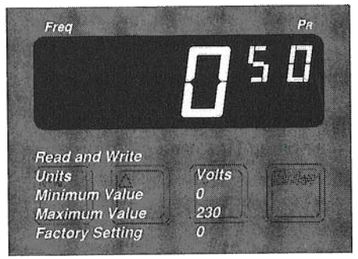
The parameter sets the drive boost voltage if Parameter 9 is set to **11**. This parameter along with Parameters 49 and 50 are used to construct a custom volts-per-hertz curve. If Parameter 83 (Run Boost) is required, this parameter must be set to a value greater than Run Boost and Parameter 9 must be set to **12**.

Parameter 49 — Break Frequency



This parameter sets an intermediate frequency below Parameter 17 (Base Frequency), if Parameter 9 is set to **11**. This parameter along with Parameters 48 and 50 are used to construct a custom volts-per-hertz curve.

Parameter 50 — Break Volts



Important: If Parameter 50 is less than Parameter 48, the drive will fault and display F35 — Negative Slope.

This parameter sets an intermediate voltage below Parameter 18 (Base Volts), if Parameter 9 is set to **11**. This parameter along with Parameters 48 and 49 are used to construct a custom volts-per-hertz curve. This parameter setting should not be less than Parameter 48.

Firmware Version 1.01-3.01 Serial Port Parameters

Parameters 51-69 may only be accessed through options connected to the serial port connector, not through a Programming and Display Panel. For a description of serial port options that use the serial interface, reference the individual option instructions — 1336-MOD-E1, 1336-MOD-E2 and 1336-MOD-G2.

Initial values for each parameter have been preset at the factory and are listed in the following descriptions. Any interaction or preconditions required for setting parameters are also included in the following descriptions.

Parameter 51 — Clear Fault

Read and Write	
Read Only	*Code*
Min Value	*0*
Max Value	*255*
Factory Setting	*0*

This parameter allows the drive to clear a Fault through the serial interface. A BTW set value of from 0-255 will clear the Fault and reset the drive.

Parameter 52 — Input Fault

Read Only	
Units	*Code*
Min Value	*0*
Max Value	*99*

This parameter stores the drive Fault Status for all drive faults. A listing of fault codes and definitions is provided in the 1336 Hardware User Manual. The parameter value will indicate the number of the fault that is present or 0 if a fault is not present or has been cleared. This is the same value which is displayed at a Programming and Display Panel.

Parameter 53 — Drive Fault

Read Only	
Units	*Code*
Min Value	*0*
Max Value	*99*

This is an internal drive parameter used to report a Base Driver/Power Supply Board Fault Parameter 52. Only Base Driver/Power Supply Board fault codes are reported to Parameter 52 by Parameter 53. Non-Base Driver/Power Supply Board fault codes 1, 2, 8, 9, 10, 11, 29, 30, 31 and 33 are not be reported by Parameter 53.

Parameter 54 — Local Input

Read Only	
Units	*Byte*
Min Value	*0*
Max Value	*255*

This parameter is an eight-bit word that reports the status of the pushbuttons on an optional Control or Programming and Display Panel.

BIT 0 — Stop

BIT 1 — Start

BIT 2 — Jog

BIT 3

BIT 4 — Enter

BIT 5 — PR

BIT 6

BIT 7

0 = Off (not pressed) *1 = On (pressed)*

Parameter 55 — Remote Input

Read Only	
Units	*Byte*
Min Value	*0*
Max Value	*255*

This parameter is an eight-bit word. Each bit represents the status of the customer connection to remote terminal block TB3.

BIT 0 — TERM 27 — Select speed
BIT 1 — TERM 28 — Auxiliary
BIT 2 — TERM 26 — SW2
BIT 3 — TERM 24 — SW1
BIT 4 — TERM 22 — Jog
BIT 5 — TERM 23 — Reverse
BIT 6 — TERM 20 — (not) Stop
BIT 7 — TERM 19 — Start
0 = Off (not present) 1 = On (present)

Parameter 56 — Serial Input

Read Only	
Units	*Byte*
Min Value	*0*
Max Value	*255*

This parameter is the drive storage location for the Serial Input byte. This same byte is used to control the drive through the PLC Controller Output Image Table. This parameter is an eight-bit word where each bit represents the following parameter or control function.

The Serial Mask Parameter 57, controls whether these bits are used by the drive. The Serial Mask must first be set through PLC programmable controller block transfer before this byte will be accepted by the drive.

BIT 0 — Decel Time — **0** = select Decel Time 1, Parameter 8
0 = select Decel Time 2, Parameter 31

BIT 1 — Accel Time — **0** = select Accel Time 1, Parameter 7
1 = select Accel Time 2, Parameter 30

BITS 2 and 3 — Frequency Control

If either Speed Select is false or Parameter 72 is set to **0** (Off), the combination of bits 2 and 3 selects Preset Frequency 1, 2 or 3, or Frequency Select 1 or 2 as follows:

BIT 2 = 0 and BIT 3 = **0** — select Frequency Select 1 or 2, Parameters 5 or 6

BIT 2 = 0 and BIT 3 = **1** — select Preset Frequency 1, Parameter 27

BIT 2 = 1 and BIT 3 = **0** — select Preset Frequency 2, Parameter 28

BIT 2 = 1 and BIT 3 = **1** — select Preset Frequency 3, Parameter 29

When both Speed Select is true and Parameter 72 is set to **1** (On), the combination of bits 2 and 3 selects Preset Frequency 4, 5, 6 or 7 as follows:

BIT 2 = 0 and BIT 3 = **0** — select Preset Frequency 4, Parameter 73

BIT 2 = 1 and BIT 3 = **0** — select Preset Frequency 5, Parameter 74

BIT 2 = 0 and BIT 3 = **1** — select Preset Frequency 6, Parameter 75

BIT 2 = 1 and BIT 3 = **1** — select Preset Frequency 7, Parameter 76

Parameter 56 — Serial Input (cont.)

BIT 4 — Jog — **0** = select (not) Jog — continue last state
1 = select Jog at Jog Frequency, Parameter 24

BIT 5 — Direction — **0** = select Forward
1 = select Reverse

BIT 6 — Stop — **0** = select Stop
1 = select (not) Stop — continue last state

BIT 7 — Start — **0** = select (not) Start — continue last state
1 = select Start

ATTENTION: Unexpected machine motion can cause injury or death. Do not use a Local or Remote Control Panel with option G2 or in any maintained serial control start application.

A maintained start input from the Serial Input Byte (Par 56, BIT 7) will affect Control Panel stop pushbutton operation. The drive will automatically restart after the Control Panel stop pushbutton is depressed and released.

Parameter 57 — Serial Mask

Read and Write	
Units	*Byte*
Min Value	*0*
Max Value	*255*
Factory Setting	*0*

This parameter permits the masking of any one of the bits defined in Parameter 56. Each bit in this parameter must be set to 1 to allow the corresponding bit in Parameter 56 to be fully functional.

Important: If power is removed from the drive, a default state will occur resetting all bits in Parameter 57 to **0**.

BIT 0 — Decel Time — **0** = use SW2 at terminal block TB3 to select Decel Time 1 or 2. Bit 0 of Parameter 56 ignored.

1 = use bit 0 of Parameter 56 to select Decel Time 1 or 2. SW2 at terminal block TB3 ignored.

BIT 1 — Accel Time — **0** = use SW1 at terminal block TB3 to select Accel Time 1 or 2. Bit 1 of Parameter 56 ignored.

1 = use bit 1 of Parameter 56 to select Accel Time 1 or 2. SW2 at terminal block TB3 ignored.

BIT 2 — Frequency Control — **0** = use SW2 at terminal block TB3 to select Preset Frequency 1 7 Bit 2 of Parameter 56 ignored.
1 = use bit 2 of Parameter 56 to select Preset Frequency 1·7 SW2 at terminal block TB3 ignored.

BIT 3 — Frequency Control — **0** = use SW1 at terminal block TB3 to select Preset Frequency 1 7 Bit 3 of Parameter 56 ignored.
1 = use bit 3 of Parameter 56 to select Preset Frequency 1-7. SW1 at terminal block TB3 ignored.

Parameter 57 — Serial Mask (cont.)

BIT 4 — Jog
— **0** = drive will not accept Jog command bit
1 = Jog at Jog Frequency, Parameter 24, may be selected.

BIT 5 — Direction
— **0** = drive will not accept Direction command bit.
1 = direction change allowed.

BIT 6 — Stop
— **0** = data will not stop drive.
1 = data will stop drive.

BIT 7 — Start
— **0** = data will not start drive.
1 = data will start drive.

Parameter 58 — Drive Command

Read Only	
Units	*Byte*
Min Value	*0*
Max Value	*255*

This parameter represents the status of various inputs that control the drive. It is an eight-bit word but only five bits contain actual status information.

BIT 0 — Direction
— **0** = forward
1 = reverse

BIT 1 — Enable
— **0** = drive (not) enabled
1 = drive enabled

BIT 2 — Run
— **0** = stop (Run command not present)
1 = run (Run command present)

BIT 3 — Accel Time
— **0** = use Accel Time 1, Parameter 7
1 = use Accel Time 2, Parameter 30

BIT 4 — Decel Time
— **0** = use Decel Time 1, Parameter 8
1 = use Decel Time 2, Parameter 31

BIT 5 — not defined

BIT 6 — not defined

BIT 7 — not defined

Parameter 59 — Drive Status

Read Only	
Units	*Byte*
Min Value	*0*
Max Value	*255*

This parameter is an eight-bit word that corresponds to the status byte read by the PLC Controller input image table. It reports the actual operating status of the drive.

BIT 0 — Direction — **0** = forward
1 = reverse

BIT 1 — Enable — **0** = drive (not) enabled
1 = drive enabled

BIT 2 — Fault — **0** = fault not present
1 = drive faulted

BIT 3 — Alarm — **0** = alarm not present
1 = one of six alarms is present

BIT 4 — Run — **0** = drive stopped
1 = drive running

BIT 5 — Set Speed — **0** = drive not at Frequency Command, Parameter 65
1 = drive is within Frequency Command limits, Parameter 65

BIT 6 — Accel — **0** = drive is not accelerating
1 = drive is accelerating

BIT 7 — Decel — **0** = drive is not decelerating
1 = drive is decelerating

Parameter 60 — Drive Alarm

Read Only	
Units	*Byte*
Min Value	*0*
Max Value	*255*

This parameter is an eight-bit word that shows the status of the six possible drive alarm conditions.

BIT 0 — Drive Output Current — **0** = output current below 150%
1 = output current above 150%

BIT 1 — MOPC Limit — **0** = output current is below MOPC limit set by Parameter 36
1 = output current is above MOPC limit set by Parameter 36

BIT 2 — High Bus Voltage — **0** = bus voltage below 110% of nominal input voltage
1 = bus voltage above 110% of nominal input voltage — Frequency Hold is active if Parameter 11 is set to 1

BIT 3 — Low Bus Voltage — **0** = bus voltage above 85% of nominal input voltage
1 = bus voltage below 85% of nominal input voltage

BIT 4 — not used

BIT 5 — precharge — **0** = precharge complete
1 = precharge not complete

BIT 6 — Auto Restart Alarm — **0** = Auto Restart function inactive
1 = Auto Restart function active (Refer to Parameter 85)

BIT 7 — not used

Parameter 61 — Drive Type

Read Only	
Units	*Byte*
Min Value	*0*
Max Value	*255*

This parameter is an eight bit word that indicates the voltage and power rating of the drive.

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0		
0	1	0	0	0	1	1	0	=	B003 (380/415/460V AC)
0	1	0	0	0	1	1	1	=	B005 (380/415/460V AC)
0	1	0	0	1	0	0	0	=	B007 (380/415/460V AC)
0	1	0	0	1	0	0	1	=	B010 (380/415/460V AC)
0	1	0	0	1	0	1	0	=	B015 (380/415/460V AC)
0	1	0	0	1	0	1	1	=	B020 (380/415/460V AC)
0	1	0	0	1	1	0	0	=	B025 (380/415/460V AC)
0	1	0	0	1	1	0	1	=	B030 (380/415/460V AC)
0	1	0	0	1	1	1	0	=	B040 (380/415/460V AC)
0	1	0	0	1	1	1	1	=	B050 (380/415/460V AC)
0	1	0	1	0	0	0	1	=	B075 (380/415/460V AC)
0	1	0	1	0	0	1	0	=	B100 (380/415/460V AC)
0	1	0	1	0	0	1	1	=	B125 (380/415/460V AC)
0	1	0	1	0	1	0	0	=	B150 (380/415/460V AC)
0	1	0	1	0	1	0	1	=	B200 (380/415/460V AC)

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0		
0	1	1	0	0	1	1	0	=	C003 (500/575/600V AC)
0	1	1	0	0	1	1	1	=	C005 (500/575/600V AC)
0	1	1	0	1	0	0	0	=	C007 (500/575/600V AC)
0	1	1	0	1	0	0	1	=	C010 (500/575/600V AC)
0	1	1	0	1	0	1	0	=	C015 (500/575/600V AC)
0	1	1	0	1	0	1	1	=	C020 (500/575/600V AC)
0	1	1	0	1	1	0	0	=	C025 (500/575/600V AC)
0	1	1	0	1	1	0	1	=	C030 (500/575/600V AC)
0	1	1	0	1	1	1	0	=	C040 (500/575/600V AC)
0	1	1	0	1	1	1	1	=	C050 (500/575/600V AC)
0	1	1	1	0	0	0	1	=	C075 (500/575/600V AC)
0	1	1	1	0	0	1	0	=	C100 (500/575/600V AC)
0	1	1	1	0	0	1	1	=	C125 (500/575/600V AC)
0	1	1	1	0	1	0	0	=	C150 (500/575/600V AC)
0	1	1	1	0	1	0	1	=	C200 (500/575/600V AC)

Parameter 62 — Frequency Source

Read Only	
Units	*Code*
Min Value	*0*
Max Value	*13*

This parameter reports to the drive which frequency source is currently being used to command the drive.

0 — Local speed pot
1 — 0 to +10V input
2 — 4 – 20mA input
3 — Pulse train input
4 — Serial input
5 — Remote speed pot input
6 — Jog selected
7 — Preset Speed 1
8 — Preset Speed 2
9 — Preset Speed 3
10 — Preset Speed 4
11 — Preset Speed 5
12 — Preset Speed 6
13 — Preset Speed 7

Parameter 63 — Pulse Input

Read and Write	
Units	*Hertz*
Min Value	*0.00*
Max Value	*250.00*

This parameter represents the output frequency to be produced by the pulse input at TB2, Terminal 8.

Parameter 64 — Serial Frequency

Read and Write	
Units	*Hertz*
Min Value	*0.00*
Max Value	*250.00*
Factory Setting	*0.00*

This parameter sets the output frequency that will be used as the Command Frequency when serial communication is used for speed commands.

Parameter 65 — Command Frequency

Read Only
Units *Hertz*
Min Value *0.00*
Max Value *250.00*

This parameter represents the present drive command frequency set by the current command source. The current command source will be indicated by a code from 0-9 and shown by selecting Parameters 5 or 6.

Parameter 66 — Output Frequency

Read Only
Units *Hertz*
Min Value *0.00*
Max Value *250.00*

This parameter represents and will display the actual output frequency of the drive and will change as programmed parameters interact with the Command Frequency, Parameter 65. It is used in the PLC Controller Discrete Transfer.

Parameter 67— Output Pulses

Read Only
Units *1 Rev/256*
Min Value *0*
Max Value *65535/256*

This parameter represents the angular position of the output waveform to 1 in 256 parts of an output cycle. It will continually increment from 0 to 65535 or 65535 to 0, then repeat as long as the drive is running.

Parameter 68 — Serial Password

Read and Write
Units *Code*
Min Value *0*
Max Value *9999*
Factory Setting *0*

This parameter stores the access code used with the remote handheld programming device and is not intended to be used with remote I/O board programming. Once set, you can read the password only through RIO board programming.

Parameter 69 — Reverse Status

Read and Write
Units *Code*
Min Value *0*
Max Value *1*
Factory Setting *0*

This parameter serves as a memory location for the direction of drive rotation as controlled by the Local Control Panel.

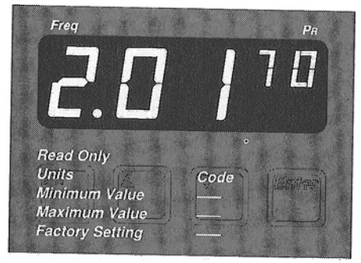
Chapter 4

Firmware Version 2.01-3.01 Local and Serial Port Parameters

The remaining parameters — from 70 on up — are local and serial port parameters that may only be accessed with Firmware Version 2.01-3.01

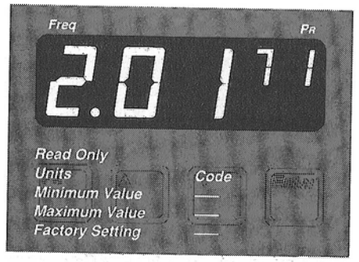
Initial values for each parameter have been preset at the factory and are listed in the following descriptions. Any interaction or preconditions required for setting parameters are also included in the following descriptions.

Parameter 70 — Base Driver Board Version



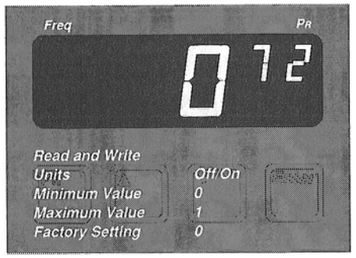
This parameter displays Firmware Version 3.01 located on the Base Driver Board in decimal format.

Parameter 71 — Control Board Version



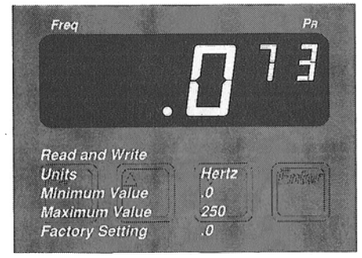
This parameter displays Firmware Version 2.01 located on the Main Control Board in decimal format.

Parameter 72 — Activate Parameters 73-76



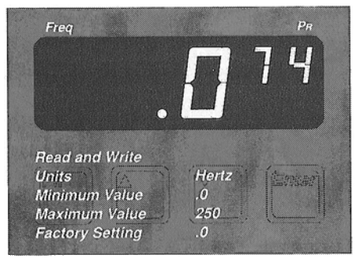
If set to **1**, this parameter will allow Preset Frequencies 73-76 to be used. Individual preset frequencies are selected by the setting of switches SW1 and SW2, and the Speed Select input at terminal block TB3 of the drive. A table listing SW1, SW2, and Speed Select combinations is shown in Chapter 3 — Parameter 26. If the serial input to the drive is used, Parameters 56 (Serial Input) and 57 (Serial Mask) will also determine the selection of Preset Frequencies 73-76.

Parameter 73 — Preset Frequency 4



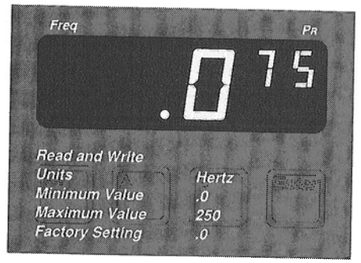
The value of this parameter is the command frequency when Preset Frequency 4 is selected.

Parameter 74 — Preset Frequency 5



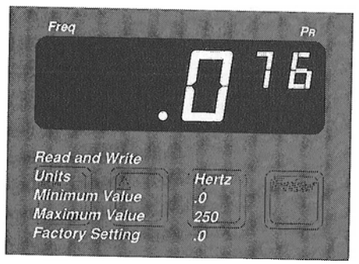
The value of this parameter is the command frequency when Preset Frequency 5 is selected.

Parameter 75 — Preset Frequency 6



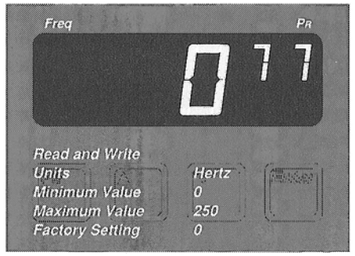
The value of this parameter is the command frequency when Preset Frequency 6 is selected.

Parameter 76 — Preset Frequency 7



The value of this parameter is the command frequency when Preset Frequency 7 is selected.

Parameter 77 — Above Frequency Contact



This parameter works in conjunction with terminals 10 and 11 of drive terminal block TB2. Terminals 10 and 11 allow an internal drive supplied at speed contact to be used in external circuits. The N.O. contact closes when the drive's output frequency reaches the command speed within ±0.5% of maximum speed.

When Parameter 77 is set to zero, the parameter is turned off and the N.O. contact functions as described above.

When this parameter is set to a value other than zero, Parameter 77 provides a set point reference other than the drive's command speed. The N.O. contact will now close when the drive's output frequency is above the frequency set by Parameter 77 The contact will open when the drive's output frequency is at or below the frequency set by Parameter 77

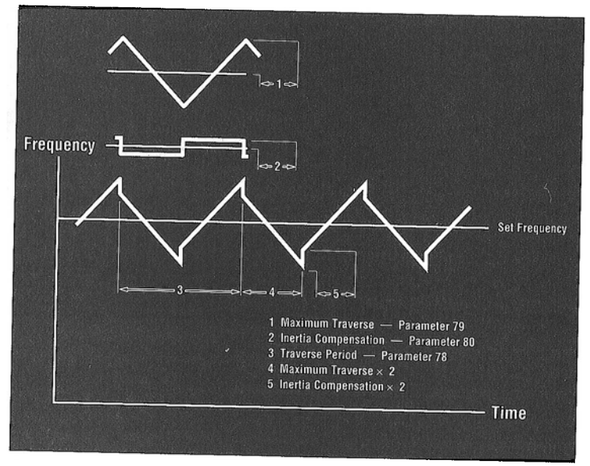
Parameters 78-80

Chapter 4
Local and Serial Port Parameters
Firmware Version 2.01-3.01

Parameters 78-80 may be used to provide a custom drive output waveform (a "P-jump" waveform) for specific applications. A value other than zero for Parameter 78 will enable a P–jump waveform to be produced by Parameters 78-80.

P-jump is an inertia compensated triangle traverse control scheme. This is a drive output frequency modulation scheme with a modulating waveform that is the sum of a triangle and a square wave. The actual desired speed variation at the motor is triangular, the square component is the derivative of the triangle added in for inertia compensation.

The drive will only modulate the output frequency while it is "at speed." "At speed " is the set frequency that the modulation waveform will be added to. When any speed change is commanded, the drive will stop modulating its output and either accel or decel to the new speed. Upon reaching the new speed, it will again apply the modulation.



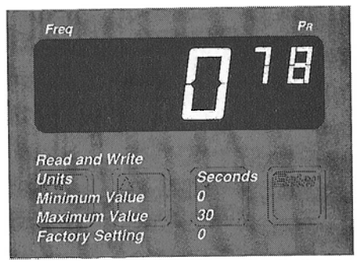
P-Jump Curve — Parameters 78-80

Several additional functions should be noted.

- Parameter 42, Slip Compensation, must be set to 0 to avoid adding additional frequency to the drive output. If not, the drive will fault and display F37 (P-Jump Error).
- P-jump frequency is limited to the frequency set by Parameter 19, Maximum Frequency.
- P-jump can operate at a frequency lower than that set by Parameter 16, Minimum Frequency
- P-jump can operate within the skip frequency bands set by Parameters 32-35.

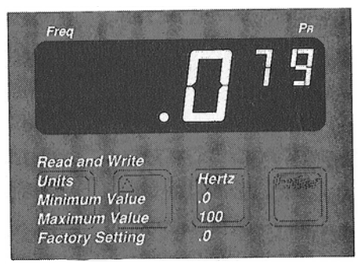
For additional information contact your Allen-Bradley Sales Representative.

Parameter 78 — Traverse Period



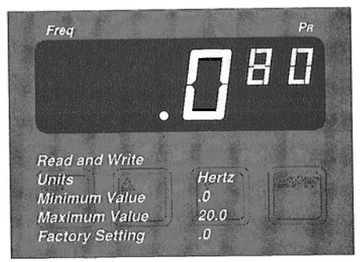
This parameter sets the modulation period of the waveform with a resolution of 1 second (.01 seconds if programmed through the serial port). Values from 0 to 30 may be entered, but anything less than 1 second will be clamped to zero. A value of zero will disable Parameter 78.

Parameter 79 — Maximum Traverse



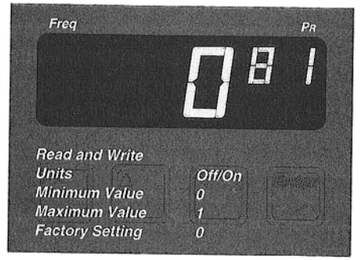
This parameter sets the magnitude — half of the peak-to-peak value of the the triangle wave portion of modulation, with a resolution of 0.1 Hertz (.01 Hertz if programmed through the serial port). Values from 0 to 100 may be entered.

Parameter 80 — Inertia Compensation



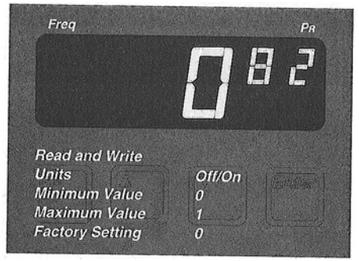
This parameter sets the magnitude — half of the peak-to-peak value of the square wave portion of the modulation, with a resolution of 0.1 Hertz (.01 Hertz if programmed through the serial port). The Inertia Compensation value will be added to the Maximum Traverse setting. Values from 0 to 20 may be entered.

Parameter 81 — Soft Start/Stop Enable



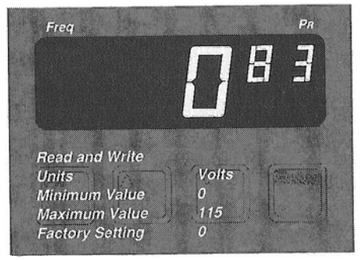
This parameter is currently not implemented.

Parameter 82 — Amp Limit Fault Enable

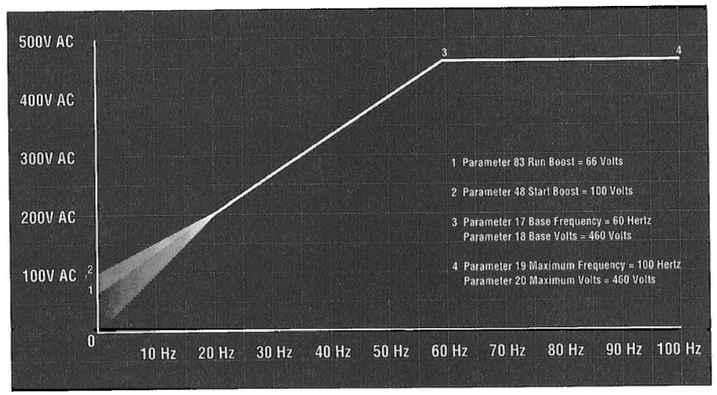


When enabled, exceeding the setting of Parameter 36 (MOPC) will cause a drive fault (F36 — Diagnostic Current Limit).

Parameter 83 — Run Boost



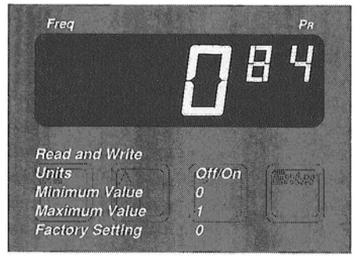
Important: If Run Boost is greater than Start Boost (Parameter 48), the drive will fault and display F34 — Boost Error



Parameter 9 = 12 — Run and Start Boost

When Parameter 9 is set to **12** and this parameter is set to a value less than Start Boost but greater than zero, Run Boost will be enabled. Run Boost allows a secondary lower boost voltage to be used once the drive has reached command speed and the motor is no longer accelerating. When the motor is decelerating, the drive will use Run Boost, not Start Boost to reach the new command speed.

Parameter 84 — Analog Inverse



When this parameter is set to **0** (disabled), the 0-10V DC and 4-20mA analog inputs at terminal block TB2 in the drive will function as described in the User Manual.

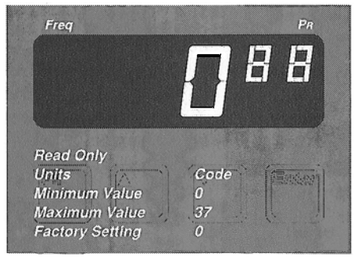
When set to **1** (enabled), the 0-10V DC and 4-20mA analog inputs at TB2 will still function as described in the User Manual, but will produce an inverse signal. A 0V DC or 4mA signal will produce maximum drive output frequency as set by Parameter 19. A 10V DC or 20mA signal will produce minimum drive output frequency as set by Parameter 16.

ATTENTION: Unexpected machine acceleration can cause injury or death.

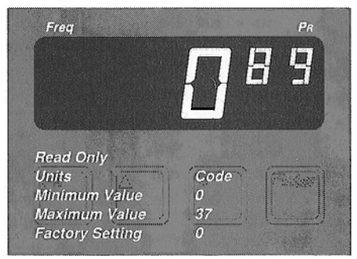
If Parameter 84 is enabled, a loss of the 4-20mA or 0-10V DC reference signal at drive terminal block TB2 will allow the drive to immediately accelerate to the maximum frequency set by Parameter 19.

Ensure that all control connection integrity is maintained and routinely inspected.

Parameter 88 — Fault Buffer 2



Parameter 89 — Fault Buffer 3



Chapter 5

Overload Current Settings

Table 5.A — Overload Current Settings for Drive Ratings B003-B200

Example: Drive rating = B003
Approximate Motor Full Load Current Rating = 3.66
Parameter 38 Setting = 61

Table 5.B — Overload Current Settings for Drive Ratings C003-C200

Example: Drive rating = C003
Approximate Motor Full Load Current Rating = 2.62
Parameter 38 Setting = 61

Table 5.A — Overload Current Settings for Drive Ratings B003-B200

Parameter 38	MOTOR FULL LOAD CURRENT RATING														
Setting	B003	B005	B007	B010	B015	B020	B025	B030	B040	B050	B075	B100	B125	B150	B200
50	3.00	4.80	6.50	8.50	12.5	16.5	20.5	24.0	30.0	37.5	60.0	75.0	90	111	145
51	3.06	4.90	6.63	8.67	12.8	16.8	20.9	24.5	30.6	38.3	61.2	76.5	92	113	148
52	3.12	4.99	6.76	8.84	13.0	17.2	21.3	25.0	31.2	39.0	62.4	78.0	94	115	151
53	3.18	5.09	6.89	9.01	13.3	17.5	21.7	25.4	31.8	39.8	63.6	79.5	95	118	154
54	3.24	5.18	7.02	9.18	13.5	17.8	22.1	25.9	32.4	40.5	64.8	81.0	97	120	157
55	3.30	5.28	7 15	9.35	13.8	18.2	22.6	26.4	33.0	41.3	66.0	82.5	99	122	160
56	3.36	5.38	7.28	9.52	14.0	18.5	23.0	26.9	33.6	42.0	67.2	84.0	101	124	162
57	3.42	5.47	7.41	9.69	14.3	18.8	23.4	27.4	34.2	42.8	68.4	85.5	103	127	165
58	3.48	5.57	7.54	9.86	14.5	19.1	23.8	27.8	34.8	43.5	69.6	87.0	104	129	168
59	3.54	5.66	7.67	10.03	14.8	19.5	24.2	28.3	35.4	44.3	70.8	88.5	106	131	171
60	3.60	5.76	7.80	10.20	15.0	19.8	24.6	28.8	36.0	45.0	72.0	90.0	108	133	174
61	3.66	5.86	7.93	10.37	15.3	20.1	25.0	29.3	36.6	45.8	73.2	91.5	110	135	177
62	3.72	5.95	8.06	10.54	15.5	20.5	25.4	29.8	37.2	46.5	74.4	93.0	112	138	180
63	3.78	6.05	8.19	10.71	15.8	20.8	25.8	30.2	37.8	47.3	75.6	94.5	13	140	183
64	3.84	6.14	8.32	10.88	16.0	21.1	26.2	30.7	38.4	48.0	76.8	96.0	115	142	186
65	3.90	6.24	8.45	11.05	16.3	21.5	26.7	31.2	39.0	48.8	78.0	97.5	117	144	189
66	3.96	6.34	8.58	11.22	16.5	21.8	27.1	31.7	39.6	49.5	79.2	99.0	119	147	191
67	4.02	6.43	8.71	11.39	16.8	22.1	27.5	32.2	40.2	50.3	80.4	100.5	121	149	194
68	4.08	6.53	8.84	11.56	17.0	22.4	27.9	32.6	40.8	51.0	81.6	102.0	122	151	197
69	4.14	6.62	8.97	11.73	17.3	22.8	28.3	33.1	41.4	51.8	82.8	103.5	124	153	200
70	4.20	6.72	9.10	11.90	17.5	23.1	28.7	33.6	42.0	52.5	84.0	105.0	126	155	203
71	4.26	6.82	9.23	12.07	17.8	23.4	29.1	34.1	42.6	53.3	85.2	106.5	128	158	206
72	4.32	6.91	9.36	12.24	18.0	23.8	29.5	34.6	43.2	54.0	86.4	108.0	130	160	209
73	4.38	7.01	9.49	12.41	18.3	24.1	29.9	35.0	43.8	54.8	87.6	109.5	131	162	212
74	4.44	7 10	9.62	12.58	18.5	24.4	30.3	35.5	44.4	55.5	88.8	111.0	133	164	215
75	4.50	7.20	9.75	12.75	18.8	24.8	30.8	36.0	45.0	56.3	90.0	112.5	135	167	218
76	4.56	7.30	9.88	12.92	19.0	25.1	31.2	36.5	45.6	57.0	91.2	114.0	137	169	220
77	4.62	7.39	10.01	13.09	19.3	25.4	31.6	37.0	46.2	57.8	92.4	115.5	139	171	223
78	4.68	7.49	10.14	13.26	19.5	25.7	32.0	37.4	46.8	58.5	93.6	117.0	140	173	226
79	4.74	7.58	10.27	13.43	19.8	26.1	32.4	37.9	47.4	59.3	94.8	118.5	142	175	229
80	4.80	7.68	10.40	13.60	20.0	26.4	32.8	38.4	48.0	60.0	96.0	120.0	144	178	232
81	4.86	7.78	10.53	13.77	20.3	26.7	33.2	38.9	48.6	60.8	97.2	121.5	146	180	235
82	4.92	7.87	10.66	13.94	20.5	27 1	33.6	39.4	49.2	61.5	98.4	123.0	148	182	238
83	4.98	7.97	10.79	14.11	20.8	27.4	34.0	39.8	49.8	62.3	99.6	124.5	149	184	241
84	5.04	8.06	10.92	14.28	21.0	27.7	34.4	40.3	50.4	63.0	100.8	126.0	151	186	244
85	5.10	8.16	11.05	14.45	21.3	28.1	34.9	40.8	51.0	63.8	102.0	127.5	153	189	247
86	5.16	8.26	11.18	14.62	21.5	28.4	35.3	41.3	51.6	64.5	103.2	129.0	155	191	249
87	5.22	8.35	11.31	14.79	21.8	28.7	35.7	41.8	52.2	65.3	104.4	130.5	157	193	252
88	5.28	8.45	11.44	14.96	22.0	29.0	36.1	42.2	52.8	66.0	105.6	132.0	158	195	255
89	5.34	8.54	11.57	15.13	22.3	29.4	36.5	42.7	53.4	66.8	106.8	133.5	160	198	258
90	5.40	8.64	11.70	15.30	22.5	29.7	36.9	43.2	54.0	67.5	108.0	135.0	162	200	261
91	5.46	8.74	11.83	15.47	22.8	30.0	37.3	43.7	54.6	68.3	109.2	136.5	164	202	264
92	5.52	8.83	11.96	15.64	23.0	30.4	37.7	44.2	55.2	69.0	110.4	138.0	166	204	267
93	5.58	8.93	12.09	15.81	23.3	30.7	38.1	44.6	55.8	69.8	111.6	139.5	167	206	270
94	5.64	9.02	12.22	15.98	23.5	31.0	38.5	45.1	56.4	70.5	112.8	141.0	169	209	273
95	5.70	9.12	12.35	16.15	23.8	31.4	39.0	45.6	57.0	71.3	114.0	142.5	171	211	276
96	5.76	9.22	12.48	16.32	24.0	31.7	39.4	46.1	57.6	72.0	115.2	144.0	173	213	278
97	5.82	9.31	12.61	16.49	24.3	32.0	39.8	46.6	58.2	72.8	116.4	145.5	175	215	281
98	5.88	9.41	12.74	16.66	24.5	32.3	40.2	47.0	58.8	73.5	117.6	147.0	176	218	284
99	5.94	9.50	12.87	16.83	24.8	32.7	40.6	47.5	59.4	74.3	118.8	148.5	178	220	287
100	6.00	9.60	13.00	17.00	25.0	33.0	41.0	48.0	60.0	75.0	120.0	150.0	180	222	290
101	6.06	9.70	13.13	17.17	25.3	33.3	41.4	48.5	60.6	75.8	121.2	151.5	182	224	293
102	6.12	9.79	13.26	17.34	25.5	33.7	41.8	49.0	61.2	76.5	122.4	153.0	184	226	296
103	6.18	9.89	13.39	17.51	25.8	34.0	42.2	49.4	61.8	77.3	123.6	154.5	185	229	299
104	6.24	9.98	13.52	17.68	26.0	34.3	42.6	49.9	62.4	78.0	124.8	156.0	187	231	302
105	6.30	10.08	13.65	17.85	26.3	34.7	43.1	50.4	63.0	78.8	126.0	157.5	189	233	305
106	6.36	10.18	13.78	18.02	26.5	35.0	43.5	50.9	63.6	79.5	127.2	159.0	191	235	307
107	6.42	10.27	13.91	18.19	26.8	35.3	43.9	51.4	64.2	80.3	128.4	160.5	193	238	310
108	6.48	10.37	14.04	18.36	27.0	35.6	44.3	51.8	64.8	81.0	129.6	162.0	194	240	313
109	6.54	10.46	14.17	18.53	27.3	36.0	44.7	52.3	65.4	81.8	130.8	163.5	196	242	316
110	6.60	10.56	14.30	18.70	27.5	36.3	45.1	52.8	66.0	82.5	132.0	165.0	198	244	319
111	6.66	10.66	14.43	18.87	27.8	36.6	45.5	53.3	66.6	83.3	133.2	166.5	200	246	322
112	6.72	10.75	14.56	19.04	28.0	37.0	45.9	53.8	67.2	84.0	134.4	168.0	202	249	325
113	6.78	10.85	14.69	19.21	28.3	37.3	46.3	54.2	67.8	84.8	135.6	169.5	203	251	328
114	6.84	10.94	14.82	19.38	28.5	37.6	46.7	54.7	68.4	85.5	136.8	171.0	205	253	331
115	6.90	11.04	14.95	19.55	28.8	38.0	47.2	55.2	69.0	86.3	138.0	172.5	207	255	334

Table 5.B — Overload Current Settings for Drive Ratings C003-C200

Parameter 38	MOTOR FULL LOAD CURRENT RATING														
Setting	C003	C005	C007	C010	C015	C020	C025	C030	C040	C050	C075	C100	C125	C150	C200
50	2.15	3.35	4.95	6.05	9.5	12.0	15.0	17.5	22.5	28.5	43	55	69	79	106
51	2.19	3.42	5.05	6.17	9.7	12.2	15.3	17.9	23.0	29.1	43	56	70	81	108
52	2.24	3.48	5.15	6.29	9.9	12.5	15.6	18.2	23.4	29.6	44	57	72	82	110
53	2.28	3.55	5.25	6.41	10.1	12.7	15.9	18.6	23.9	30.2	45	58	73	84	112
54	2.32	3.62	5.35	6.53	10.3	13.0	16.2	18.9	24.3	30.8	46	59	75	85	114
55	2.37	3.69	5.45	6.66	10.5	13.2	16.5	19.3	24.8	31.4	47	60	76	87	116
56	2.41	3.75	5.54	6.78	10.6	13.4	16.8	19.6	25.2	31.9	48	61	77	88	118
57	2.45	3.82	5.64	6.90	10.8	13.7	17 1	20.0	25.7	32.5	48	62	79	90	120
58	2.49	3.89	5.74	7.02	11.0	13.9	17.4	20.3	26.1	33.1	49	63	80	92	122
59	2.54	3.95	5.84	7 14	11.2	14.2	17.7	20.7	26.6	33.6	50	64	81	93	124
60	2.58	4.02	5.94	7.26	11.4	14.4	18.0	21.0	27.0	34.2	51	65	83	95	127
61	2.62	4.09	6.04	7.38	11.6	14.6	18.3	21.4	27.5	34.8	52	66	84	96	129
62	2.67	4.15	6.14	7.50	11.8	14.9	18.6	21.7	27.9	35.3	53	68	86	98	131
63	2.71	4.22	6.24	7.62	12.0	15.1	18.9	22.1	28.4	35.9	54	69	87	100	133
64	2.75	4.29	6.34	7.74	12.2	15.4	19.2	22.4	28.8	36.5	54	70	88	101	135
65	2.80	4.36	6.44	7.87	12.4	15.6	19.5	22.8	29.3	37 1	55	71	90	103	137
66	2.84	4.42	6.53	7.99	12.5	15.8	19.8	23.1	29.7	37.6	56	72	91	104	139
67	2.88	4.49	6.63	8.11	12.7	16.1	20.1	23.5	30.2	38.2	57	73	92	106	141
68	2.92	4.56	6.73	8.23	12.9	16.3	20.4	23.8	30.6	38.8	58	74	94	107	143
69	2.97	4.62	6.83	8.35	13.1	16.6	20.7	24.2	31 1	39.3	59	75	95	109	146
70	3.01	4.69	6.93	8.47	13.3	16.8	21.0	24.5	31.5	39.9	60	76	97	111	148
71	3.05	4.76	7.03	8.59	13.5	17.0	21.3	24.9	32.0	40.5	60	77	98	112	150
72	3.10	4.82	7 13	8.71	13.7	17.3	21.6	25.2	32.4	41.0	61	78	99	114	152
73	3.14	4.89	7.23	8.83	13.9	17.5	21.9	25.6	32.9	41.6	62	80	101	115	154
74	3.18	4.96	7.33	8.95	14.1	17.8	22.2	25.9	33.3	42.2	63	81	102	117	156
75	3.23	5.03	7.43	9.08	14.3	18.0	22.5	26.3	33.8	42.8	64	82	104	119	158
76	3.27	5.09	7.52	9.20	14.4	18.2	22.8	26.6	34.2	43.3	65	83	105	120	160
77	3.31	5.16	7.62	9.32	14.6	18.5	23.1	27.0	34.7	43.9	65	84	106	122	162
78	3.35	5.23	7.72	9.44	14.8	18.7	23.4	27.3	35.1	44.5	66	85	108	123	165
79	3.40	5.29	7.82	9.56	15.0	19.0	23.7	27.7	35.6	45.0	67	86	109	125	167
80	3.44	5.36	7.92	9.68	15.2	19.2	24.0	28.0	36.0	45.6	68	87	110	126	169
81	3.48	5.43	8.02	9.80	15.4	19.4	24.3	28.4	36.5	46.2	69	88	112	128	171
82	3.53	5.49	8.12	9.92	15.6	19.7	24.6	28.7	36.9	46.7	70	89	113	130	173
83	3.57	5.56	8.22	10.04	15.8	19.9	24.9	29.1	37.4	47.3	71	90	115	131	175
84	3.61	5.63	8.32	10.16	16.0	20.2	25.2	29.4	37.8	47.9	71	92	116	133	177
85	3.66	5.70	8.42	10.29	16.2	20.4	25.5	29.8	38.3	48.5	72	93	117	134	179
86	3.70	5.76	8.51	10.41	16.3	20.8	25.8	30.1	38.7	49.0	73	94	119	136	181
87	3.74	5.83	8.61	10.53	16.5	20.9	26.1	30.5	39.2	49.6	74	95	120	137	184
88	3.78	5.90	8.71	10.65	16.7	21.1	26.4	30.8	39.6	50.2	75	96	121	139	186
89	3.83	5.96	8.81	10.77	16.9	21.4	26.7	31.2	40.1	50.7	76	97	123	141	188
90	3.87	6.03	8.91	10.89	17.1	21.6	27.0	31.5	40.5	51.3	77	98	124	142	190
91	3.91	6.10	9.01	11.01	17.3	21.8	27.3	31.9	41.0	51.9	77	99	126	144	192
92	3.96	6.16	9.11	11.13	17.5	22.1	27.6	32.2	41.4	52.4	78	100	127	145	194
93	4.00	6.23	9.21	11.25	17.7	22.3	27.9	32.6	41.9	53.0	79	101	128	147	196
94	4.04	6.30	9.31	11.37	17.9	22.6	28.2	32.9	42.3	53.6	80	102	130	149	198
95	4.09	6.37	9.41	11.50	18.1	22.8	28.5	33.3	42.8	54.2	81	104	131	150	200
96	4.13	6.43	9.50	11.62	18.2	23.0	28.8	33.6	43.2	54.7	82	105	132	152	202
97	4.17	6.50	9.60	11.74	18.4	23.3	29.1	34.0	43.7	55.3	82	106	134	153	204
98	4.21	6.57	9.70	11.86	18.6	23.5	29.4	34.3	44.1	55.9	83	107	135	155	206
99	4.26	6.63	9.80	11.98	18.8	23.8	29.7	34.7	44.6	56.4	84	108	137	156	208
100	4.30	6.70	9.90	12.10	19.0	24.0	30.0	35.0	45.0	57.0	85	109	138	158	210
101	4.34	6.77	10.00	12.22	19.2	24.2	30.3	35.4	45.5	57.6	86	110	139	160	212
102	4.39	6.83	10.10	12.34	19.4	24.5	30.6	35.7	45.9	58.1	87	111	141	161	214
103	4.43	6.90	10.20	12.46	19.6	24.7	30.9	36.1	46.4	58.7	88	112	142	163	216
104	4.47	6.97	10.30	12.58	19.8	25.0	31.2	36.4	46.8	59.3	88	113	144	164	218
105	4.52	7.04	10.40	12.71	20.0	25.2	31.5	36.8	47.3	59.9	89	114	145	166	221
106	4.56	7 10	10.49	12.83	20.1	25.4	31.8	37 1	47.7	60.4	90	115	146	168	223
107	4.60	7 17	10.59	12.95	20.3	25.7	32.1	37.5	48.2	61.0	91	116	148	169	225
108	4.64	7.24	10.69	13.07	20.5	25.9	32.4	37.8	48.6	61.6	92	117	149	171	227
109	4.69	7.30	10.79	13.19	20.7	26.2	32.7	38.2	49.1	62.1	93	118	150	172	229
110	4.73	7.37	10.89	13.31	20.9	26.4	33.0	38.5	49.5	62.7	94	120	152	174	231
111	4.77	7.44	10.99	13.43	21.1	26.6	33.3	38.9	50.0	63.3	94	121	153	175	233
112	4.82	7.50	11.09	13.55	21.3	26.9	33.6	39.2	50.4	63.8	95	122	155	177	235
113	4.86	7.57	11.19	13.67	21.5	27 1	33.9	39.6	50.9	64.4	96	123	156	179	237
114	4.90	7.64	11.29	13.79	21.7	27.4	34.2	39.9	51.3	65.0	97	124	157	180	239
115	4.95	7.71	11.39	13.92	21.9	27.6	34.5	40.3	51.8	65.6	98	125	159	182	242

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% Load/Current Conversion

Table 6.A — % Load/Current Conversion for Drive Ratings B003-B200

Example: Parameter 2 = 52
Drive rating = B003
Rated Power = 52% = 50% + 2% = 3.0 + 0.1 = 3.1 Amps

%	B003	B005	B007	B010	B015	B020	B025	B030	B040	B050	B075	B100	B125	B150	B200
1	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.8	1.2	1.5	1.8	2.2	2.9
2	0.1	0.2	0.3	0.3	0.5	0.7	0.8	1.0	1.2	1.5	2.4	3.0	3.6	4.4	5.8
3	0.2	0.3	0.4	0.5	0.8	1.0	1.2	1.4	1.8	2.3	3.6	4.5	5.4	6.7	8.7
4	0.2	0.4	0.5	0.7	1.0	1.3	1.6	1.9	2.4	3.0	4.8	6.0	7.2	8.9	11.6
5	0.3	0.5	0.7	0.9	1.3	1.7	2.1	2.4	3.0	3.8	6.0	7.5	9.0	11.1	14.5
6	0.4	0.6	0.8	1.0	1.5	2.0	2.5	2.9	3.6	4.5	7.2	9.0	10.8	13.3	17.4
7	0.4	0.7	0.9	1.2	1.8	2.3	2.9	3.4	4.2	5.3	8.4	10.5	12.6	15.5	20.3
8	0.5	0.8	1.0	1.4	2.0	2.6	3.3	3.8	4.8	6.0	9.6	12.0	14.4	17.8	23.2
9	0.5	0.9	1.2	1.5	2.3	3.0	3.7	4.3	5.4	6.8	10.8	13.5	16.2	20.0	26.1
10	0.6	1.0	1.3	1.7	2.5	3.3	4.1	4.8	6.0	7.5	12.0	15.0	18.0	22.2	29.0
20	1.2	1.9	2.6	3.4	5.0	6.6	8.2	9.6	12.0	15.0	24.0	30.0	36.0	44.4	58.0
30	1.8	2.9	3.9	5.1	7.5	9.9	12.3	14.4	18.0	22.5	36.0	45.0	54.0	66.6	87.0
40	2.4	3.8	5.2	6.8	10.0	13.2	16.4	19.2	24.0	30.0	48.0	60.0	72.0	88.8	116.0
50	3.0	4.8	6.5	8.5	12.5	16.5	20.5	24.0	30.0	37.5	60.0	75.0	90.0	111.0	145.0
60	3.6	5.8	7.8	10.2	15.0	19.8	24.6	28.8	36.0	45.0	72.0	90.0	108.0	133.2	174.0
70	4.2	6.7	9.1	11.9	17.5	23.1	28.7	33.6	42.0	52.5	84.0	105.0	126.0	155.4	203.0
80	4.8	7.7	10.4	13.6	20.0	26.4	32.8	38.4	48.0	60.0	96.0	120.0	144.0	177.6	232.0
90	5.4	8.6	11.7	15.3	22.5	29.7	36.9	43.2	54.0	67.5	108.0	135.0	162.0	199.8	261.0
100	6.0	9.6	13.0	17.0	25.0	33.0	41.0	48.0	60.0	75.0	120.0	150.0	180.0	222.0	290.0
110	6.6	10.6	14.3	18.7	27.5	36.3	45.1	52.8	66.0	82.5	132.0	165.0	198.0	244.2	319.0
120	7.2	11.5	15.6	20.4	30.0	39.6	49.2	57.6	72.0	90.0	144.0	180.0	216.0	266.4	348.0
130	7.8	12.5	16.9	22.1	32.5	42.9	53.3	62.4	78.0	97.5	156.0	195.0	234.0	288.6	377.0
140	8.4	13.4	18.2	23.8	35.0	46.2	57.4	67.2	84.0	105.0	168.0	210.0	252.0	310.8	406.0
150	9.0	14.4	19.5	25.5	37.5	49.5	61.5	72.0	90.0	112.5	180.0	225.0	270.0	333.0	435.0

Table 6.B — % Load/Current Conversion for Drive Ratings C003-C200

Example: Parameter 2 = 52
Drive rating = C003
Rated Power = 52% = 50% + 2% = 2.2 + 0.1 = 2.3 Amps

%	C003	C005	C007	C010	C015	C020	C025	C030	C040	C050	C075	C100	C125	C150	C200
1	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.9	1.1	1.4	1.6	2.1
2	0.1	0.1	0.2	0.2	0.4	0.5	0.6	0.7	0.9	1.1	1.7	2.2	2.7	3.1	4.2
3	0.1	0.2	0.3	0.4	0.6	0.7	0.9	1.1	1.4	1.7	2.6	3.3	4.1	4.7	6.3
4	0.2	0.3	0.4	0.5	0.8	1.0	1.2	1.4	1.8	2.3	3.4	4.4	5.5	6.3	8.4
5	0.2	0.3	0.5	0.6	1.0	1.2	1.5	1.8	2.3	2.9	4.3	5.5	6.9	7.9	10.5
6	0.3	0.4	0.6	0.7	1.1	1.4	1.8	2.1	2.7	3.4	5.1	6.5	8.2	9.4	12.6
7	0.3	0.5	0.7	0.8	1.3	1.7	2.1	2.5	3.2	4.0	6.0	7.6	9.6	11.0	14.7
8	0.3	0.5	0.8	1.0	1.5	1.9	2.4	2.8	3.6	4.6	6.8	8.7	11.0	12.6	16.8
9	0.4	0.6	0.9	1.1	1.7	2.2	2.7	3.2	4.1	5.1	7.7	9.8	12.3	14.1	18.9
10	0.4	1.0	1.0	1.2	1.9	2.4	3.0	3.5	4.5	5.7	8.5	10.9	13.7	15.7	21.0
20	0.9	2.0	2.0	2.4	3.8	4.8	6.0	7.0	9.0	11.4	17.0	21.8	27.4	31.4	42.0
30	1.3	3.0	3.0	3.6	5.7	7.2	9.0	10.5	13.5	17.1	25.5	32.7	41.1	47.1	63.0
40	1.7	2.7	4.0	4.8	7.6	9.6	12.0	14.0	18.0	22.8	34.0	43.6	54.8	62.8	84.0
50	2.2	3.4	5.0	6.1	9.5	12.0	15.0	17.5	22.5	28.5	42.5	54.5	68.5	78.5	105.0
60	2.6	4.0	5.9	7.3	11.4	14.4	18.0	21.0	27.0	34.2	51.0	65.4	82.2	94.2	126.0
70	3.0	4.7	6.9	8.5	13.3	16.8	21.0	24.5	31.5	39.9	59.5	76.3	95.9	109.9	147.0
80	3.4	5.4	7.9	9.7	15.2	19.2	24.0	28.0	36.0	45.6	68.0	87.2	109.6	125.6	168.0
90	3.9	6.0	8.9	10.9	17.1	21.6	27.0	31.5	40.5	51.3	76.5	98.1	123.3	141.3	189.0
100	4.3	6.7	9.9	12.1	19.0	24.0	30.0	35.0	45.0	57.0	85.0	109.0	137.0	157.0	210.0
110	4.7	7.4	10.9	13.3	20.9	26.4	33.0	38.5	49.5	62.7	93.5	119.9	150.7	172.7	231.0
120	5.2	8.0	11.9	14.5	22.8	28.8	36.0	42.0	54.0	68.4	102.0	130.8	164.4	188.4	252.0
130	5.6	8.7	12.9	15.7	24.7	31.2	39.0	45.5	58.5	74.1	110.5	141.7	178.1	204.1	273.0
140	6.0	9.4	13.9	16.9	26.6	33.6	42.0	49.0	63.0	79.8	119.0	152.6	191.8	219.8	294.0
150	6.5	10.1	14.9	18.2	28.5	36.0	45.0	52.5	67.5	85.5	127.5	163.5	205.5	235.5	315.0

Chapter 7

% Power/HP Conversion

Table 7.A — % Power/HP Conversion

Example: Parameter 3 = 36
Drive rating = B005 or C005
Rated Power = 36% = 30% + 6% = 1.5 + 0.3 = 1.8 HP

%	B003 C003	B005 C005	B007 C007	B010 C010	B015 C015	B020 C020	B025 C025	B030 C030	B040 C040	B050 C050	B075 C075	B100 C100	B125 C125	B150 C150	B200 C200
1	< 0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.8	1.0	1.3	1.5	2.0
2	0.1	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.8	1.0	1.5	2.0	2.5	3.0	4.0
3	0.1	0.1	0.2	0.3	0.4	0.6	0.7	0.9	1.2	1.5	2.3	3.0	3.8	4.5	6.0
4	0.1	0.2	0.3	0.4	0.6	0.8	1.0	1.2	1.6	2.0	3.0	4.0	5.0	6.0	8.0
5	0.2	0.2	0.4	0.5	0.7	1.0	1.2	1.5	2.0	2.5	3.8	5.0	6.3	7.5	10.0
6	0.2	0.3	0.4	0.6	0.9	1.2	1.5	1.8	2.4	3.0	4.5	6.0	7.5	9.0	12.0
7	0.2	0.3	0.5	0.7	1.0	1.4	1.7	2.1	2.8	3.5	5.3	7.0	8.8	10.5	14.0
8	0.2	0.4	0.6	0.8	1.2	1.6	2.0	2.4	3.2	4.0	6.0	8.0	10.0	12.0	16.0
9	0.3	0.4	0.7	0.9	1.3	1.8	2.2	2.7	3.6	4.5	6.8	9.0	11.3	13.5	18.0
10	0.3	0.5	0.7	1.0	1.5	2.0	2.5	3.0	4.0	5.0	7.5	10.0	12.5	15.0	20.0
20	0.6	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0	10.0	15.0	20.0	25.0	30.0	40.0
30	0.9	1.5	2.2	3.0	4.5	6.0	7.5	9.0	12.0	15.0	22.5	30.0	37.5	45.0	60.0
40	1.2	2.0	3.0	4.0	6.0	8.0	10.0	12.0	16.0	20.0	30.0	40.0	50.0	60.0	80.0
50	1.5	2.5	3.7	5.0	7.5	10.0	12.5	15.0	20.0	25.0	37.5	50.0	62.5	75.0	100.0
60	1.8	3.0	4.5	6.0	9.0	12.0	15.0	18.0	24.0	30.0	45.0	60.0	75.0	90.0	120.0
70	2.1	3.5	5.2	7.0	10.5	14.0	17.5	21.0	28.0	35.0	52.5	70.0	87.5	105.0	140.0
80	2.4	4.0	6.0	8.0	12.0	16.0	20.0	24.0	32.0	40.0	60.0	80.0	100.0	120.0	160.0
90	2.7	4.5	6.7	9.0	13.5	18.0	22.5	27.0	36.0	45.0	67.5	90.0	112.5	135.0	180.0
100	3.0	5.0	7.5	10.0	15.0	20.0	25.0	30.0	40.0	50.0	75.0	100.0	125.0	150.0	200.0
110	3.3	5.5	8.2	11.0	16.5	22.0	27.5	33.0	44.0	55.0	82.6	110.0	137.5	165.0	220.0
120	3.6	6.0	9.0	12.0	18.0	24.0	30.0	36.0	48.0	60.0	90.0	120.0	150.0	180.0	240.0
130	3.9	6.5	9.7	13.0	19.5	26.0	32.5	39.0	52.0	65.0	97.5	130.0	162.5	195.0	260.0
140	4.2	7.0	10.5	14.0	21.0	28.0	35.0	42.0	56.0	70.0	105.0	140.0	175.0	210.0	280.0
150	4.5	7.5	11.2	15.0	22.5	30.0	37.5	45.0	60.0	75.0	112.5	150.0	187.5	225.0	300.0

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Chapter 8

% Power/kW Conversion

Table 8.A — % Power/kW Conversion

Example: Parameter 3 = 36
Drive rating = B005 or C005
Rated Power = 36% = 30% + 6% = 1.1 + 0.2 = 1.3 kW

%	B003 C003	B005 C005	B007 C007	B010 C010	B015 C015	B020 C020	B025 C025	B030 C030	B040 C040	B050 C050	B075 C075	B100 C100	B125 C125	B150 C150	B200 C200
1	< 0.1	< 0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.6	0.7	0.9	1.1	1.5
2	< 0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.4	0.6	0.7	1.1	1.5	1.9	2.2	3.0
3	0.1	0.1	0.2	0.2	0.3	0.4	0.6	0.7	0.9	1.1	1.7	2.2	2.8	3.4	4.5
4	0.1	0.1	0.3	0.3	0.4	0.6	0.7	0.9	1.2	1.5	2.2	3.0	3.7	4.5	6.0
5	0.1	0.2	0.3	0.4	0.6	0.7	0.9	1.1	1.5	1.9	2.8	3.7	4.7	5.6	7.5
6	0.1	0.2	0.3	0.4	0.7	0.9	1.1	1.3	1.8	2.2	3.4	4.5	5.6	6.7	9.0
7	0.2	0.3	0.4	0.5	0.8	1.0	1.3	1.6	2.1	2.6	3.9	5.2	6.5	7.8	10.4
8	0.2	0.3	0.4	0.6	0.9	1.2	1.5	1.8	2.4	3.0	4.5	6.0	7.5	9.0	11.9
9	0.2	0.3	0.5	0.7	1.0	1.3	1.7	2.0	2.7	3.4	5.0	6.7	8.4	10.1	13.4
10	0.2	0.4	0.6	0.7	1.1	1.5	1.9	2.2	3.0	3.7	5.6	7.5	9.3	11.2	14.9
20	0.4	0.7	1.1	1.5	2.2	3.0	3.7	4.5	6.0	7.5	11.2	14.9	18.7	22.4	29.8
30	0.7	1.1	1.7	2.2	3.4	4.5	5.6	6.7	9.0	11.2	16.8	22.4	28.0	33.6	44.8
40	0.9	1.5	2.2	3.0	4.5	6.0	7.5	18.9	11.9	14.9	22.4	29.8	37.3	44.8	59.7
50	1.1	1.9	2.8	3.7	5.6	7.5	9.3	11.2	14.9	18.7	28.0	37.3	46.6	56.0	74.6
60	1.3	2.2	3.4	4.5	6.7	8.9	11.2	13.4	17.9	22.4	33.6	44.8	56.0	67.1	89.5
70	1.6	2.6	3.9	5.2	7.8	10.4	13.1	15.7	20.9	26.1	39.2	52.2	67.3	78.3	104.4
80	1.8	3.0	4.5	6.0	8.9	11.9	14.9	17.9	23.9	29.8	44.8	59.7	74.6	89.5	119.4
90	2.0	3.4	5.0	6.7	10.1	13.4	16.8	20.1	26.9	33.6	50.4	67.1	83.9	100.7	134.3
100	2.2	3.7	5.6	7.5	11.1	14.9	18.6	22.4	29.8	37.3	56.0	74.6	93.3	111.9	149.2
110	2.5	4.1	6.1	8.2	12.3	16.4	20.5	24.6	32.8	41.0	61.5	82.1	102.6	123.1	164.1
120	2.7	4.5	6.7	8.9	13.4	17.9	22.4	26.9	35.8	44.8	67.1	89.5	111.9	134.3	179.0
130	2.9	4.8	7.3	9.7	14.5	19.4	24.2	29.1	38.8	48.5	72.7	97.0	121.2	145.5	194.0
140	3.1	5.2	7.8	10.4	15.7	21.0	26.1	31.3	41.8	52.2	78.3	104.4	130.6	156.7	208.9
150	3.4	5.6	8.4	11.2	16.8	22.4	28.0	33.6	44.8	56.0	83.9	111.9	139.9	167.9	223.8

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Local and Serial Port Parameter Settings

Table 9.A — Parameters 0 to 50 — Firmware Version 1.01-3.01

Parameters 0 to 50 can be accessed through either the local port or the serial port.

Parameter Number	Parameter Text	Units	Local Port Min/Max Values	Serial Port Min/Max Values	Factory Setting
0	PARAMETER MODE	None	0/0	0/0	0
1	OUTPUT VOLTS	Volts	0/575	0/575	0
2	OUTPUT CURRENT	% of Rated Output Current	0/200	0/200	0
3	OUTPUT POWER	% of Rated Output Power	0/200	0/200	0
4	LAST FAULT	Code	0/37	0/37	0
5	FREQUENCY SELECT 1	Code	0/5	0/5	0
6	FREQUENCY SELECT 2	Code	0/5	0/5	0
7	ACCEL TIME 1	Seconds	0/600	0.00/600.00	5
8	DECEL TIME 1	Seconds	0/600	0.00/600.00	5
9	DC BOOST SELECT	Code	0/1	0/12	2
10	STOP SELECT	Code	0/2	0/2	0
11	DECEL FREQUENCY HOLD	Off/On	0/1	0/1	0
12	DC HOLD TIME	Seconds	0/15	0/15	0
13	DC HOLD VOLTS	Volts	0/115	0/115	0
14	AUTO RESTART	Off/On	0/1	0/1	1
15	FACTORY SET — DO NOT CHANGE	None	0/0	0/0	0
16	MINIMUM FREQUENCY	Hertz	0/120	0/120	0
17	BASE FREQUENCY	Hertz	40/120	40/120	60
18	BASE VOLTS	Volts	115/575	115/575	460/575 ❶
19	MAXIMUM FREQUENCY	Hertz	40/250	40/250	60
20	MAXIMUM VOLTS	Volts	115/575	115/575	460/575 ❶
21	LOCAL RUN	Off/On	0/1	0/1	1
22	LOCAL REVERSE	Off/On	0/1	0/1	1
23	LOCAL JOG	Off/On	0/1	0/1	1
24	JOG FREQUENCY	Hertz	.0/120	0.00/120.00	.0
25	ANALOG OUTPUT	Code	0/1	0/1	0
26	PRESET/2ND ACCEL	Code	0/1	0/1	0
27	PRESET FREQUENCY 1	Hertz	.0/250	0.00/250.00	.0
28	PRESET FREQUENCY 2	Hertz	.0/250	0.00/250.00	.0
29	PRESET FREQUENCY 3	Hertz	.0/250	0.00/250.00	.0

❶ Drive ratings B003-B200 factory set to 460 — Drive ratings C003-C200 factory set to 575.

Table 9.A — Parameters 0 to 50 — Firmware Version 1.01-3.01

Parameter Number	Parameter Text	Units	Local Port Min/Max Values	Serial Port Min/Max Values	Factory Setting
30	ACCEL TIME 2	Seconds	0/600	0.00/600.00	5
31	DECEL TIME 2	Seconds	0/600	0.00/600.00	5
32	SKIP FREQUENCY 1	Hertz	0/250	0/250	250
33	SKIP FREQUENCY 2	Hertz	0/250	0/250	250
34	SKIP FREQUENCY 3	Hertz	0/250	0/250	250
35	SKIP FREQUENCY BAND	Hertz	0/15	0/15	0
36	MOPC	% of Rated Output Current	50/150	50/150	150
❷ 37	SERIAL BAUD RATE	Code	0/1	0/1	1
❸ 38	OVERLOAD CURRENT	% of Rated Output Current	50/115	50/115	115
39	FAULT CLEAR	Off/On	0/1	0/1	1
40	POWER FAULT	Off/On	0/1	0/1	0
❸ 41	MOTOR TYPE	Code	0/2	0/2	0
❸ 42	SLIP COMPENSATION	Hertz	.0/5.0	0.00/5.00	.0
43	DWELL FREQUENCY	Hertz	0/120	0/120	0
44	DWELL TIME	Seconds	0/10	0/10	0
45	PWM FREQUENCY	kHZ	.40/2.00	0.40/2.00	.40
46	PULSE SCALE FACTOR	Ratio	1/255	1/255	64
47	LANGUAGE	Code	0/5	0/5	0
❹ 48	START BOOST	Volts	0/115	0/115	0
❹ 49	BREAK FREQ	Hertz	0/120	0/120	0
❹ 50	BREAK VOLTS	Volts	0/230	0/230	0

❷ Only available on drives with Main Control Board Firmware Version 1.10 or greater.

❸ Only available on drives with Main Control Board Firmware Version 1.10 or greater and Base Driver/Power Supply Board Firmware Version 1.11 or greater

❹ Only available on drives with Main Control Board Firmware Version 1.11 or greater.

Chapter 9
Local and Serial Port Parameter Settings

Serial Port Parameter Settings

Table 9.B — Parameters 51 to 69 — Firmware Version 1.01-3.01

Parameters 51 to 69 can be accessed only through the Serial Port.

Parameter Number	Parameter Text	Units	Serial Port Min/Max Values	Factory Setting
51	CLEAR FAULT	Code	0/255	0
52	INPUT FAULT	Code	0/99	—
53	DRIVE FAULT	Code	0/99	—
54	LOCAL INPUT	Byte	0/255	—
55	REMOTE INPUT	Byte	0/255	—
56	SERIAL INPUT	Byte	0/255	—
57	SERIAL MASK	Byte	0/255	0
58	DRIVE COMMAND	Byte	0/255	—
59	DRIVE STATUS	Byte	0/255	—
60	DRIVE ALARM	Byte	0/255	—
61	DRIVE TYPE	Byte	0/255	—
62	FREQUENCY SOURCE	Code	0/13	—
63	PULSE INPUT	Hertz	0.00/250.00	—
64	SERIAL FREQUENCY	Hertz	0.00/250.00	0.00
65	FREQUENCY COMMAND	Hertz	0.00/250.00	—
66	OUTPUT FREQUENCY	Hertz	0.00/250.00	—
67	OUTPUT PULSES	1 Rev/256	0/65535/256	—
68	SERIAL PASSWORD	Code	0/9999	0
69	REVERSE STATUS	Code	0/1	0

Local and Serial Port Parameter Settings

Table 9.C — Parameters 70 to 89 — Firmware Version 2.01-3.01

Parameters 70 to 89 are local and serial port parameters that may only be accessed with Firmware Version 2.01 and 3.01.

Parameter Number	Parameter Text	Units	Local Port Min/Max Values	Serial Port Min/Max Values	Factory Setting
70	BASE DRIVER BOARD VERSION	Code	—	—	—
71	CONTROL BOARD VERSION	Code	—	—	—
72	ACTIVATE PARAMETERS 73-76	Off/On	0/1	0/1	0
73	PRESET FREQUENCY 4	Hertz	.0/250	0.00/250.00	.0
74	PRESET FREQUENCY 5	Hertz	.0/250	0.00/250.00	.0
75	PRESET FREQUENCY 6	Hertz	.0/250	0.00/250.00	.0
76	PRESET FREQUENCY 7	Hertz	.0/250	0.00/250.00	.0
77	ABOVE FREQUENCY CONTACT	Hertz	0/250	0/250	0
78	TRAVERSE PERIOD	Seconds	0/30	0.00/30.00	0
79	MAXIMUM TRAVERSE	Hertz	.0/100	0.00/100.00	.0
80	INERTIA COMPENSATION	Hertz	.0/20.0	0.00/20.00	.0
81	SOFT START/STOP ENABLE	Off/On	—	—	—
82	AMP LIMIT FAULT ENABLE	Off/On	0/1	0/1	0
83	RUN BOOST	Volts	0/115	0/115	0
84	ANALOG INVERSE	Off/On	0/1	0/1	0
85	RESTART TRIES	Code	0/9	0/9	0
86	FAULT BUFFER 0	Code	0/37	0/37	
87	FAULT BUFFER 1	Code	0/37	0/37	—
88	FAULT BUFFER 2	Code	0/37	0/37	—
89	FAULT BUFFER 3	Code	0/37	0/37	—

Appendix A

Start and Run Boost Settings

The following setup procedure may be used to maximize starting torque and minimize motor heating. The procedure is written for users who have the optional Handheld Terminal (HHT) or a Control Panel installed, and who are not using a 2-wire drive control scheme. For users without the optional HHT or Control Panel, respective external commands and signals must be substituted to simulate the operation of the HHT or a Control Panel.

ATTENTION: Become familiar with the equipment and read through the wiring, speed selection and adjustment sections of the User Manual before attempting to perform this setup procedure. Adjustments in this setup procedure will be made under load conditions with power applied both to the drive and motor.

Exercise extreme care when performing any drive programming. Failure to do so may result in equipment damage.

Important:

1 Power must be applied to the drive when viewing or changing 1336 parameters. Previous programming may effect the drive status when power is applied.

2. If option L1, L2 or L3 is installed, remote start circuits may be connected to TB3 on the Interface Board. Confirm that all circuits are in a de-energized state before applying power

3. If you cannot complete a procedure, immediately refer to Chapter 10 — Fault Codes in the User Manual. Do not proceed. Determine the cause of the problem and correct the problem first, then return to the startup procedure.

DC Boost

Usually increased starting torque requires more DC boost. High boost may produce unnecessary current at low frequency and contribute to motor overheating. Excessive boost may force the drive into MOPC resulting in poor drive performance. The optimum DC boost is the lowest level that will permit satisfactory starting torque in a properly sized motor and drive application.

Start and Run Boost Settings

By using a combination of start and run boost, the following procedure provides a selectable DC boost voltage to the motor at low drive frequency The correct boost combination will allow the drive and motor to adapt to the different starting torque conditions encountered in both low and high HP applications, while helping to prevent motor overheating.

Parameters Used

Output Current — Parameter 2
DC Boost Select — Parameter 9
Start Boost — Parameter 48
Preset Frequency — Parameters 27, 28, 29, 73, 74, 75 or 76
Run Boost — Parameter 83

Procedure

The following setup procedure is performed with the motor connected to the load. To optimize starting torque and help prevent motor overheating, perform all seven steps. Steps **1**-**3** are performed at low frequency settings (below 10 Hz) — Steps **4**-**7** at the highest operating frequency (typically 60 Hz).

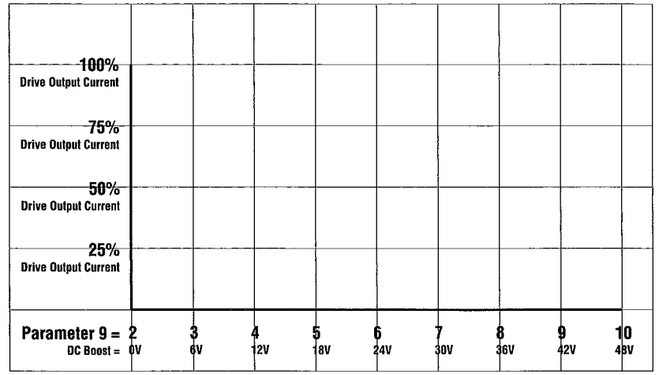
1. Set DC boost (Parameter 9) to its factory setting of **2**, then set the local speed pot or one of the preset frequencies to a value below 10 Hz.

Start the drive.

The motor should accelerate to the value set.

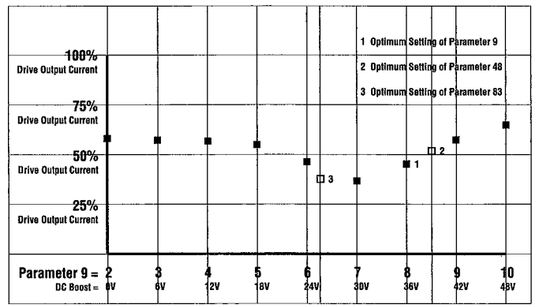
2. If the motor does not accelerate smoothly, DC boost must be added to the motor Gradually increase DC boost (Parameter 9) from **2** to **10** until set speed is reached.

Procedure (cont.)

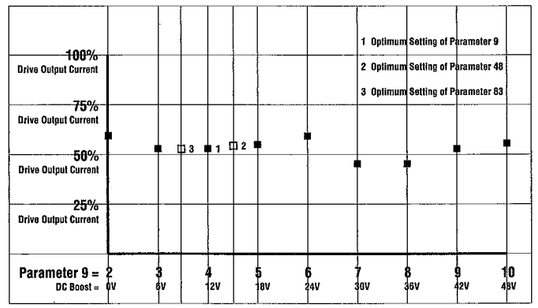


3. Once smooth acceleration is obtained, set DC boost (Parameter 9) to **2**, then **3**, **4**, **5**, **6**, **7**, **8**, **9** and finally **10**. Monitor and record drive output current (Parameter 2) at each setting in the graph above. Compare the values to those provided in the graph below

- If boost voltage is too low, the motor will be under excited and not be able to develop full torque.
- If boost voltage is too high, motor windings may saturate and cause difficulty in starting.
- The optimum setting for developing high motor torque is shown in the graphs below.



Typical Low HP Curve



Typical High HP Curve

Procedure (cont.)

4. Stop the drive and set drive frequency to the highest operating point required by the application (typically 60 Hz).

5. Construct a custom start and run DC boost curve by setting Parameter 9 to **12**.

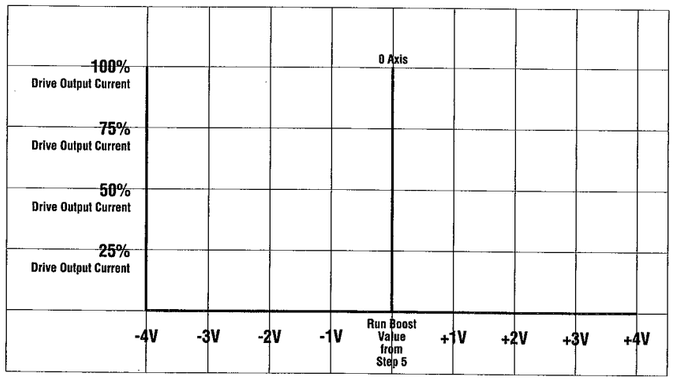
   - Set start boost (Parameter 48) to a value that will be 3 volts greater than the DC boost set in step **3**.
   - Set run boost (Parameter 83) to $^2/_3$ of the value of Parameter 48.

6. Start the drive.

   The motor should accelerate smoothly to the maximum frequency If not, starting torque may be optimized by increasing start boost (Parameter 48) in 1 volt increments.

7. Run the drive at the lowest speed required for the application. Monitor drive output current (Parameter 2) and record its value along the zero axis on the graph below

   - Decrease then increase the run boost value set in Step 5 from –4 to +4V in 1V increments.
   - Monitor and record drive output current (Parameter 2) at each setting in the graph below
   - To allow the motor to run cooler, set the final run boost value (Parameter 83) to the value that produces the lowest current.



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❑ TRAIN/EDUCATE MACHINE USERS
❑ SUPERVISE FLOOR OPERATIONS

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

	NONE	LITTLE	MODERATE	EXTENSIVE
PROGRAMMABLE CONTROL	❑	❑	❑	❑
AC/DC DRIVES	❑	❑	❑	❑
PERSONAL COMPUTERS	❑	❑	❑	❑
NC/CNC CONTROLS	❑	❑	❑	❑
DATA COMMUNICATIONS/LAN	❑	❑	❑	❑

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