RELIANCE ELECTRIC

GV3000/SE Operator Interface Module (OIM) User Guide Version 2.0

M/N 2RK3000

Instruction Manual D2-3342-2

Rockwell Automation

The information in this manual is subject to change without notice.

Throughout this manual, the following notes are used to alert you to safety considerations:

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

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

The thick black bar shown on the outside margin of this page will be used throughout this instruction manual to signify new or revised text or figures.

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: DC bus capacitors retain hazardous voltages after input power has been disconnected. After disconnecting input power, wait five (5) minutes for the DC bus capacitors to discharge and then check the voltage with a voltmeter to ensure the DC bus capacitors are discharged before touching any internal components. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: The drive can operate at and maintain zero speed. The user is responsible for assuring safe conditions for operating personnel by providing suitable guards, audible or visual alarms, or other devices to indicate that the drive is operating or may operate at or near zero speed. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: Do not install or remove modification kits with power applied to the drive. Disconnect and lock out incoming power before attempting such installation or removal. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: Pressing RUN or JOG on the OIM immediately starts the motor if the control source is set to OIM. Make sure the motor and driven machinery are safe to start before pressing these keys. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: The user must provide an external, hardwired emergency stop circuit outside of the drive circuitry. This circuit must disable the system in case of improper operation. Uncontrolled machine operation may result if this procedure is not followed. Failure to observe this precaution could result in bodily injury.

ATTENTION: The user is responsible for conforming with all applicable local, national, and international codes. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

ATTENTION: The user must install an appropriate hardwired equipment ground between the OIM, the drive, and the drive enclosure. This prevents electrostatic discharge within the equipment. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

CONTENTS

List of Figures

List of Tables

CHAPTER 1

Introduction to the OIM

The Operator Interface Module (OIM) is a keypad and display that connects to Reliance GV3000/SE™ drives. It is compatible with version 6.0 and older versions of the GV3000/SE drive software. The OIM communicates serially to the Regulator board.

The OIM allows you to:

- access and change drive parameters, which tune the drive, scale the inputs and outputs, program drive limits, and configure remote interfaces
- operate the drive
- review and clear the faults
- review active alarms
- monitor drive outputs such as motor speed and motor current
- view text in English, German, French, Spanish, or Italian

The OIM has two operating modes: monitor and program. Monitor mode is the normal operating mode and allows you to view up to six drive outputs. Program mode allows you to access and change drive parameter settings.

Through the OIM, the drive can be programmed for either volts/hertz (V/Hz) or vector regulation. The type of regulation that is selected will determine which parameters you can access and which outputs are displayed in monitor mode. V/Hz regulation provides open-loop volts per hertz regulation, which is appropriate for general purpose applications.

For vector regulation, you may select either flux vector control (FVC) or sensorless vector control (SVC). FVC uses the actual encoder value for speed feedback, and therefore requires an encoder mounted to the motor and connected to the drive. SVC is an extension of the FVC regulator. It provides performance close to FVC without using an encoder. Control is based on estimated speed feedback.

1.1 Differences Between the OIM and the Front Panel Keypad/Display

In most cases, the OIM performs the same functions as the keypad/display on the front panel of the GV3000/SE drive. Actions performed on the OIM are reflected in the front panel keypad/display. For example, if the auto/manual status or the reference is changed through the OIM, it is also changed on the front panel keypad/display.

Although most functions are the same, some functions are performed differently with the OIM than they are with the front panel keypad/display. Some important differences are:

- Pressing JOG or RUN on the OIM immediately starts the motor if the control source is set to OIM. Make sure the motor and driven machinery are safe to start before pressing either of these keys.
- For V/Hz regulation, the identification procedure (IDENTIFICATION ROST. H.020) cannot be performed using the OIM. It must be performed through the front panel keypad/display. You can review the results of the identification through the OIM by viewing IDENTIFICATION RESULT (H.019).
- The control source is selected with a key (CONTROL SOURCE SELECT) in addition to a parameter (P.000).
- The parameter names used in this instruction manual (IM) are shown as they appear on the OIM display. They are slightly different than the names that are used in the GV9000/SE software IM.
- SECOND MENU PASSWORD (P.006) only affects the GV3000/SE front panel keypad/display and cannot be accessed through the OIM.
- Scaled speed units are set independently for the OIM and the front panel keypad/display. This allows you to set different units for the two displays; for example, RPM on the front panel keypad/display and inches per second (IPS) for the OIM display. Front panel keypad/display units are set by FRONT PNL SPD SCALING (P.028). OIM units are set by Define Speed Units in the Speed Control menu.

1.2 Related Publications

This instruction manual (IM) describes how to use the OIM with the GV3000/SE drive.

For information on drive hardware, such as drive installation and start up, see the hardware IM that corresponds to your system:

- D2-3360 GV3000/SE AC Power Modules Hardware Reference, Installation, and Troubleshooting
- D2-3388 GV3000/SE AC Drive Hardware Reference, Installation, and Troubleshooting 1-20 HP @ 230 VAC
- D2-3392 GV3000/SE AC Drive Hardware Reference, Installation, and Troubleshooting 75-200 HP @ 460 VAC
- D2-3417 GV3000/SE AC Drive Hardware Reference, Installation, and Troubleshooting 30-100 HP @ 230 VAC
- D2-3427 GV3000/SE AC Bookshelf Drive Hardware Reference, Installation, and Troubleshooting

For parameter descriptions, fault information, and troubleshooting procedures, see the software I/M that corresponds to your system:

- D2-3359 GV3000/SE AC General Purpose (Volts/Hertz) and Vector Duty Drive Software Start-Up and Reference Manual
- D2-3387 GV3000/SE 1-20 HP @ 230 VAC General Purpose (Volts/Hertz) and Vector Duty Drive Software Start-Up and Reference Manual
- D2-3391 GV3000/SE 75-200 HP @ 460 VAC General Purpose (Volts/Hertz) and Vector Duty Drive Software Start-Up and Reference Manual
- D2-3416 GV3000/SE 30-100 HP @ 230 VAC General Purpose (Volts/Hertz) and Vector Duty Drive Software Start-Up and Reference Manual
- D2-3426 GV3000/SE AC General Purpose (Volts/Hertz) and Vector Duty Bookshelf Drive Software Start-Up and Reference Manual

1.3 Getting Assistance from Reliance Electric

If you have any questions or problems with the products described in this instruction manual, contact your local Reliance Electric sales office. For technical assistance, call 1-800-726-8112.

CHAPTER 2

Description of the OIM Keypad, Display, and Indicators

This chapter describes how to use the keypad, display, and indicators on the OIM to program, monitor, and control the drive.

Figure 2.1 shows the OIM in program mode with keys, indicators, and screen information called out.

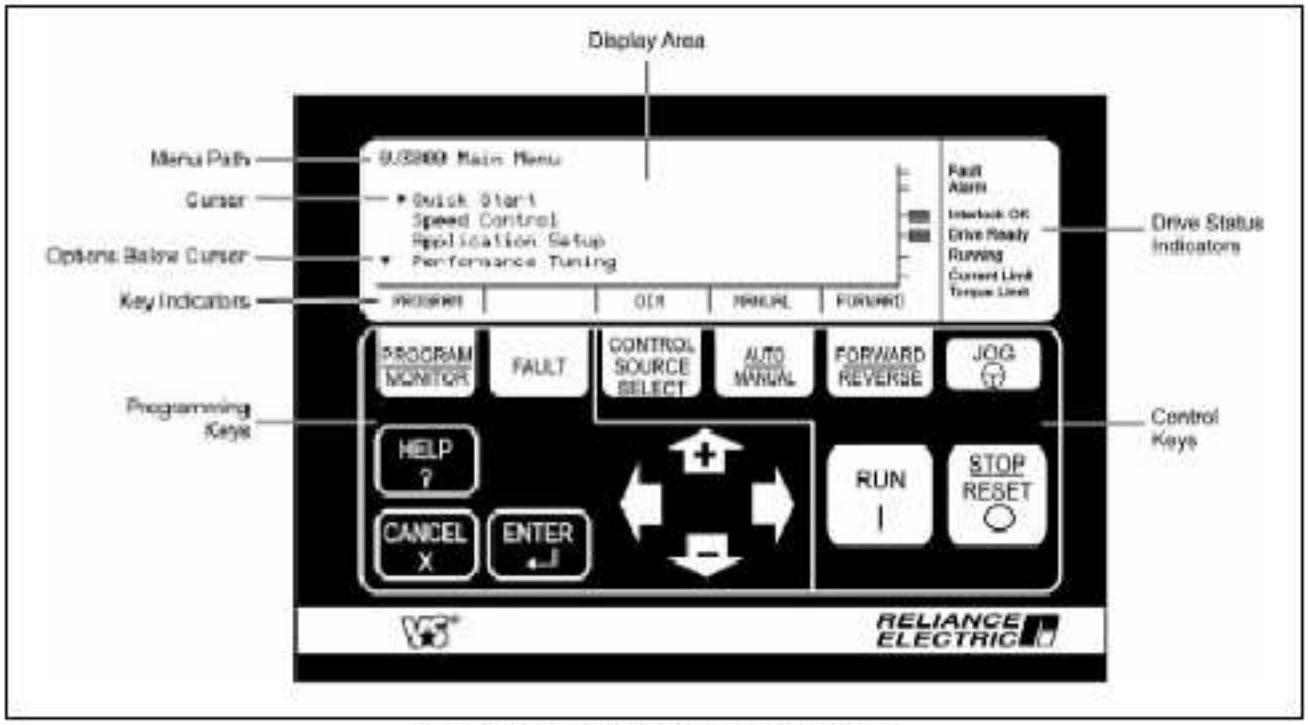


Figure 2.1 — OIM Keypad, Display, and Indicators

2.1 The Keypad

The OIM keys are grouped by programming and control functions, as shown in figure 2.1.

The control keys FORWARD REVERSE, JOG, and RUN are only active if the control source is set to OIM. Programming keys are always active.

Programming keys are described in table 2.1. Control keys are described in table 2.2.

Table 2-1 – Programming Key Descriptions

Key	Mode	Function
PROGRAM MONITOR	Program or Monitor	Cycles between program and the three monitor mode screens. If you switch back to program mode, you are returned to the menu or parameter entry screen you were in before going to monitor mode. In fault, alarm, or diagnostics menus, returns you to the screen you were in before pressing FAULT.
FAULT	Program or Monitor	Cycles through the following menus: • Fault • Alarm • Diagnostics Through these menus, you can review and clear the fault log, review active alarms, and display diagnostic information for troubleshooting the drive. See chapter 7 for more information on faults, alarms, and diagnostics.
HELP ?	Program	Provides help for menus or parameters in the selected language. In the Main Menu, provides information about using the menus. In other menus, it gives a brief overview of the options available in that menu. In a parameter entry screen, HELP ? displays the parameter name, number, input or output, retentive or non-retentive, and units of measure. To exit a help screen and return to program mode, press CANCEL X.
CANCEL X	Monitor	Displays the status indicators in the selected language. Press CANCEL X to return to the monitor mode display.
	Program or Monitor	If a fault or alarm message is displayed, clears the message and returns to the previous screen. In a fault, alarm, or diagnostics menu, returns to the previous screen. In a help screen, exits help and returns to the previous screen.
	Program	In menus, goes to the previous menu. In parameter entry screens: • If you have started making a change to a value, restores the original value. • If you have not made any changes, returns to the menu. • If you have already pressed ENTER ↵ to accept the parameter change, CANCEL X returns to the menu and keeps the new value.
	Monitor	Goes to program mode from any of the monitor screens.
ENTER ↵	Program	In a menu, selects the option at the cursor. In a parameter entry screen, allows you to change input parameter values. If a list is available for the parameter, selects the value at the cursor. When the parameter value has been changed, saves the new value.

Table 2.1 – Programming Key Descriptions (Continued)

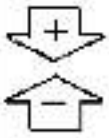
Key	Mode	Function
	Program	Move the cursor between menu items or between the parameters and options in the menus. After you select a parameter to change, these keys increase or decrease the digit at the cursor, or move between items in a list. Hold down one of these keys to change values more quickly. See chapter 4 for more information on changing values. In help screens and fault messages, these keys move up more text if it is available.
	Monitor	Increase or decrease the manual reference. See section 6.1.4 for information on changing the reference.
	Program or Monitor	In menus and the monitor mode screen, ⇦ accesses the Language Selection screen. See section 3.4 for more information on selecting a language. In menus and the monitor mode screen, ⇨ accesses the Contrast Adjustment screen. See section 3.3 for more information on adjusting the contrast of the display. In parameter entry screens, ⇦ and ⇨ move the cursor left or right.

Table 2.2 – Control Key Descriptions

Key	Mode	Function
CONTROL SOURCE SELECT	Program or Monitor	Allows you to select from a list of possible sources for the drive control signals. CONTROL SOURCE SELECT is not active when the drive is running or jogging and during quick start and self-tuning. See section 6.2 for more information on selecting a control source.
AUTO MANUAL	Program or Monitor	Determines which reference the drive uses. See section 6.1.4 for more information on selecting the reference. Refer to the P.052 (AUTO/MAN Key Disable) and P.053 (Manual Reference Preset Enable) parameter descriptions in the software I/M for more information about the AUTO/MAN key. This key is not active if the control source is set to LOCAL. **ATTENTION:** When switching from AUTO to MANUAL or from MANUAL to AUTO, the drive will ramp to the reference level provided by the new source at the rate specified in ACCEL TIME (P.001), DECEL TIME (P.002), ACCEL TIME - SECONDARY (P.017), or DECEL TIME - SECONDARY (P.018). Be aware that an abrupt speed change might occur depending on the new reference level and the rate specified in these parameters. Failure to observe this precaution could result in bodily injury.
FORWARD REVERSE	Program or Monitor	Toggles direction of motor rotation when the control source is set to OIM. The direction can be changed at any time. Note that if the reference is zero, pressing this key will not alter the state of the key indicator. Refer to the P.027 (Forward/Reverse Configuration) parameter description in the software I/M for more information.

Table 2.2 – Control Key Descriptions (Continued)

Key	Mode	Function
JOG	Program or Monitor	**ATTENTION:** Pressing JOG on the OIM immediately starts the motor if the control source is set to OIM. Make sure the motor and driven machinery are safe to start before pressing this key. Failure to observe this precaution could result in severe bodily injury or loss of life. When the control source is set to OIM, jogs the motor when held down (and the drive is ready). The motor ramp stops when it is released. When JOG is pressed, the motor ramps up to the JOG SPEED REFERENCE (P.020) at the speed set by JOG RAMP ACCEL TIME (P.021). When it is released, the drive ramps down to zero at the speed set by JOG RAMP DECEL TIME (P.022).
RUN	Program or Monitor	**ATTENTION:** Pressing RUN on the OIM immediately starts the motor if the control source is set to OIM. Make sure the motor and driven machinery are safe to start before pressing this key. Failure to observe this precaution could result in severe bodily injury or loss of life. When the control source is set to OIM, applies power to the motor. RUN is only active if the drive ready indicator is on.
STOP RESET	Program or Monitor	If the drive is running, the drive is stopped as selected by STOP TYPE (P.025). When the OIM is connected and communicating with the drive, STOP RESET is active, regardless of the control source. If the drive is not running and the control source is set to OIM, STOP RESET resets any active faults. See chapter 7 for more information on resetting faults. Refer to the P.055 (STOP/RESET Key Disable) parameter description in the software HM for more information about STOP RESET. **ATTENTION:** When P.055 is set to ON, STOP RESET is functional only from the selected control source. As a safety precaution, Reliance Electric recommends that an emergency stop push button be located near the drive in an easily accessible location. As a further safety precaution, the user should post a warning on the drive to alert personnel that STOP RESET is not functional. Failure to observe this precaution could result in severe bodily injury or loss of life. **ATTENTION:** The user must provide an external, hardwired emergency stop circuit outside the drive circuitry. This circuit must disable the system in case of improper operation or OIM failure. Uncontrolled machine operation can result if the procedure is not followed. Failure to observe this precaution could result in bodily injury.

2.2 The Display

OIM screens allow you to program and monitor the drive. Figure 2.2 shows the OIM display at the Main Menu in program mode.

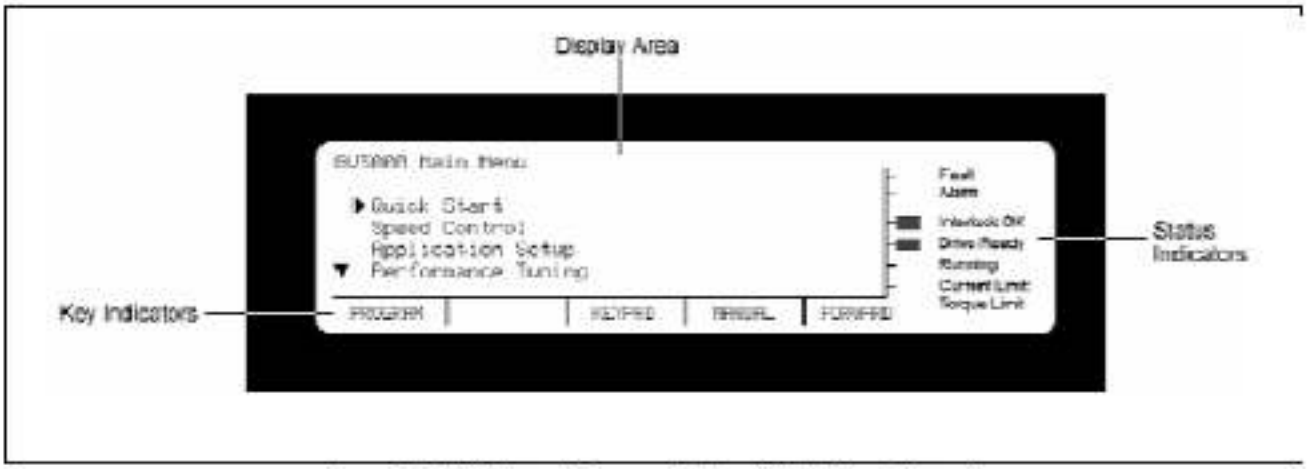


Figure 2.2 – OIM Display in Program Mode with Main Menu Displayed

The display contains three main areas:

- the normal display area, where the program or monitor mode information is displayed. See chapter 4 for information on program mode. See chapter 6 for information on monitor mode.
- the status indicator area. See section 2.2.1 for more information.
- the key indicator area. See section 2.2.2 for more information.

2.2.1 Drive Status Indicators

The drive status indicators on the right side of the display allow you to quickly check the status of the drive. In figure 2.2, the Interlock OK and Drive Ready indicators are on. Drive status indicators are described in table 2.3.

Table 2.3 – Drive Status Indicators

Indicator	State	Description
Fault	On	At least one fault has occurred. See chapter 7 for information on faults.
	Off	There are no drive faults.
Alarm	On	At least one alarm has occurred. See chapter 7 for information on alarms.
	Off	There are no drive alarms.

Table 2.5 – Drive Status Indicators (Continued)

Indicator	State	Description
Interlock OK	On	The terminal strip function loss input is closed. See the hardware I/M for more information. Also see the description of Function Loss Response (P.026) in the software I/M for a description of the types of responses available on function loss.
	Off	The terminal strip function loss input is open. See the hardware I/M for more information.
Drive Ready	On	The drive is ready to run or jog. See chapter 7 for more information.
	Off	The drive is not ready. See chapter 7 for more information.
Running	On	Output power is being applied to the motor (the motor is running or jogging).
	Off	Output power is not being applied to the motor.
Current Limit Torque Limit	On	The drive is in current or torque limit.
	Off	The drive is not in current or torque limit.

2.2.2 Key Indicators

The key indicators at the bottom of the display indicate the states of the keys directly below them. In figure 2.2, the keys are set to PROGRAM, OIM, MANUAL, and FORWARD. Key indicators are described in table 2.4.

Table 2.4 – Key Indicators

Key	Indication	Description
PROGRAM MONITOR	PROGRAM	The OIM is in program mode.
	MONITOR	The OIM is in monitor mode.
	(blank)	The OIM is in a fault, alarm, or diagnostic menu.
FAULT	FAULT	The Fault Menu is displayed.
	ALARM	The Alarm Menu is displayed.
	DIAGS	The Diagnostics Menu is displayed.
CONTROL SOURCE SELECT	LOCAL	The drive's front panel keypad/display is used to control the drive.
	TERMBLK	The signals at the Regulator board terminal strip are used for control.
	OPTION	An option board, such as the AutoMax Communication Network Option board, is controlling drive operation. Blinks when the option board is not communicating on the network.
	OIM	The OIM keys control drive operation.

Table 2.4 – Key Indicators (Continued)

Key	Indication	Description
AUTO / MANUAL	AUTO	The drive is receiving the reference from the terminal strip input or network option.
	MANUAL	The drive is receiving the reference set by the front panel keypad/display or the OIM.
FORWARD / REVERSE	FORWARD	The drive is set to run the motor in the forward direction. Blinks when forward is selected but the drive is not yet running forward.
	REVERSE	The drive is set to run in the motor in the reverse direction. Blinks when reverse is selected but the drive is not yet running in reverse.

2.2.3 Special Display Characters

There are several special display characters you might see on the screen. These characters are described in Table 2.5.

Table 2.5 – Special Display Characters

Display Character	Description
► or ■	Cursor. Indicates the currently selected option. Use ⊕ and ⊖ to move the ► cursor. Use ⇦ and ⇨ to move the ■ cursor.
▲	More items above. This is displayed if more text or options are available above the top selection. Use ⊕ to view the additional information.
▼	More items below. This is displayed if more text or options are available below the bottom selection. Use ⊖ to view the additional information.
🔒	Locked cursor. Displayed instead of ► if a menu option is not available.

CHAPTER 3

Installing, Powering, and Adjusting the OIM

This chapter tells you how to install the OIM, what to expect on power up, and how to make adjustments you might need for your application.

3.1 Installing or Replacing the OIM

Installation consists of mounting the OIM and connecting it to the GV3000/SE drive. Replacing the OIM consists of removing the old OIM and installing a new one.

Note that the OIM is connected to the RS-232 serial port on the GV3000/SE Regulator board. Therefore, it cannot be used at the same time that another serial connection is in effect, such as the one required by the CS3000 software.

ATTENTION: Only qualified personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, and/or service this equipment. Read and understand this manual in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: The user must provide an external, hardwired emergency stop circuit outside the drive circuitry. This circuit must disable the system in case of improper operation or OIM failure. Uncontrolled machine operation can result if this procedure is not followed. Failure to observe this precaution could result in bodily injury.

3.1.1 OIM Kit Contents

Table 3.1 lists the contents of the OIM kit (M/N 2RK3000).

Table 3.1 OIM Kit Contents

Description	Quantity	Part Number
OIM Assembly	1	807909-R
Serial Cable	1	610273-49S
Gasket	1	410273-4B
M4x125mm CCWS Screws	2	419062-1PGM
Bezel	1	179099-B

3.1.2 Equipment Needed to Install or Replace the OIM

To install or replace the OIM, you will need:

- OIM kit (M/N 2RK3000)
- Drill with 5.0 mm drill bit
- #1 Phillips-head screwdriver
- Strain relief for serial cable

3.1.3 Installing the OIM

To install the OIM:

Step 1. Disconnect power from the drive.

ATTENTION: Do not install or remove modification kits with power applied to the drive. Disconnect and lock out incoming power before attempting such installation or removal. Failure to observe this precaution could result in severe bodily injury or loss of life.

Step 2. Select the mounting location. The mounting location should be:

- within 5 meters (16.4 ft.) of the drive
- at eye level
- easily accessible

Step 3. At the desired mounting location, drill two 5.0 mm holes and cut out the opening in the enclosure door. Refer to figure 3.1 for enclosure cutout dimensions.

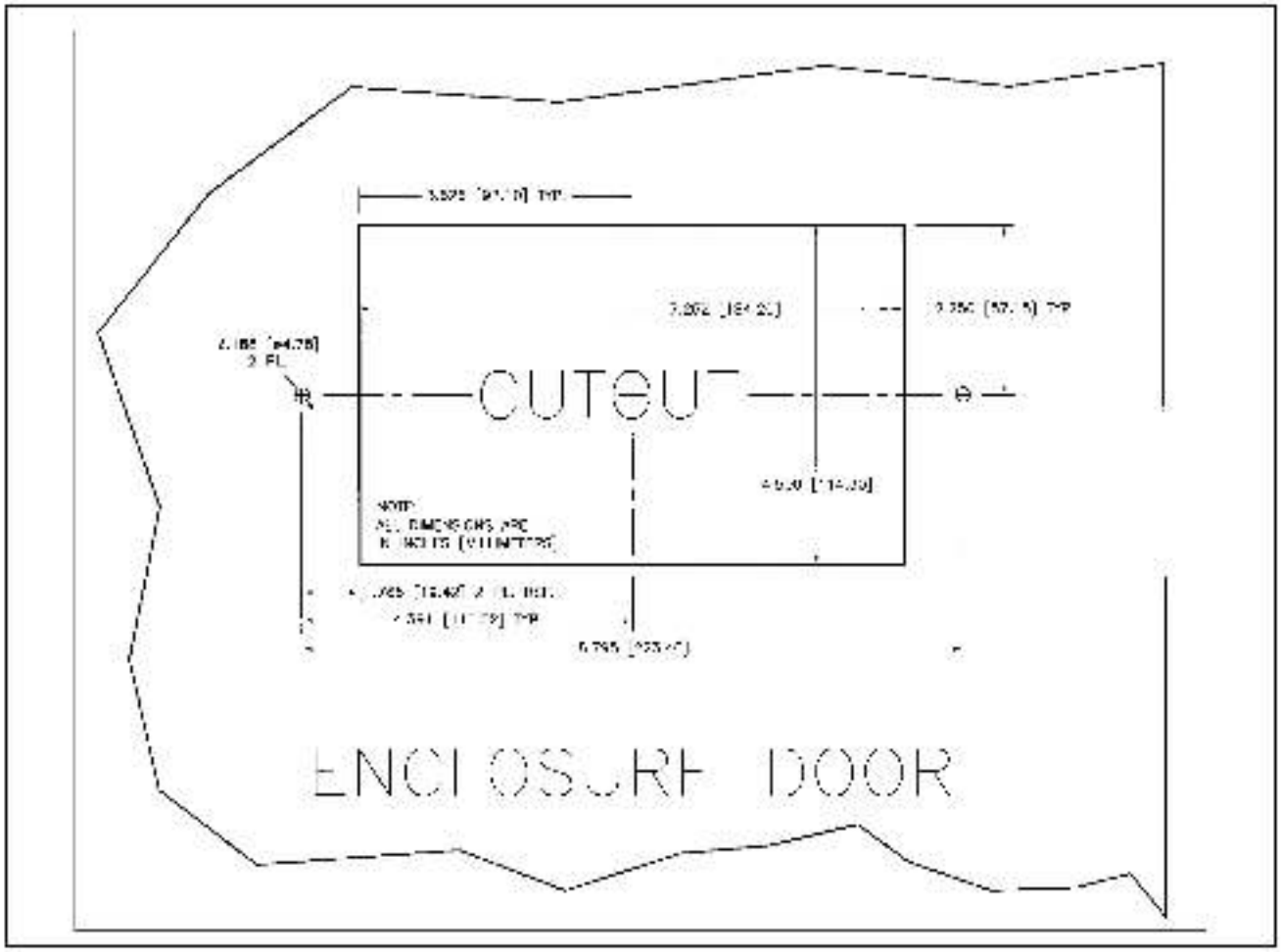


Figure 3.1 — Enclosure Cutout Dimensions

Step 4. Deburr the drilled holes and cutout.

Step 5. Remove the backing from the gasket. Place the gasket around the cutout on the inside of the enclosure door.

Step 6. Place the OIM on the gasket and align the mounting holes.

Step 7. Place the bezel around the cutout on the outside of the enclosure hole and align the mounting holes.

Step 8. Secure the bezel and the OIM to the enclosure door using the hardware included in the kit.

Step 9. Attach the serial cable to the OIM. Provide appropriate strain relief support for the cable.

ATTENTION: The user must install an appropriate hardwired equipment ground between the OIM, the drive, and the drive enclosure. This prevents electrostatic discharge within the equipment. Failure to observe this precaution could result in damage to or destruction of the equipment.

Step 10. Connect the OIM ground wire to an appropriate enclosure ground.

Step 11. Open the hatch labeled COM PORT ACCESS on the front cover of the GV3000/SE drive. (For Bookshelf drives, you will need to remove the breakout panel above the RS-232 connector.) Plug the serial cable into the 10-pin serial port connector. Make sure it locks into place.

You can now power up the drive, which will power the OIM. See section 3.2 for more information on OIM power up.

3.1.4 Replacing the OIM

ATTENTION: Do not install or remove modification kits with power applied to the drive. Disconnect and lock out incoming power before attempting such installation or removal. Failure to observe this precaution could result in severe bodily injury or loss of life.

To replace the OIM:

Step 1. Disconnect power from the drive. This will also remove power to the OIM.

Step 2. Unplug the serial cable from the GV3000/SE drive. You will need to press down on the locking clip to unplug the cable.

Step 3. Disconnect the OIM ground wire.

Step 4. Disconnect the serial cable from the OIM.

Step 5. Remove the hardware that secures the OIM to the enclosure door.

Step 6. If the gasketing needs to be replaced, remove it from the enclosure door. Replace it with gasketing from the new kit.

Step 7. Connect the new OIM using the appropriate steps in section 3.1.3.

3.2 Powering Up the OIM

The OIM is powered when the drive is powered. During power up, the OIM establishes communication with the drive and reads drive information from the Regulator board. The OIM indicators are off and the display goes through the power up sequence shown in figure 3.2.

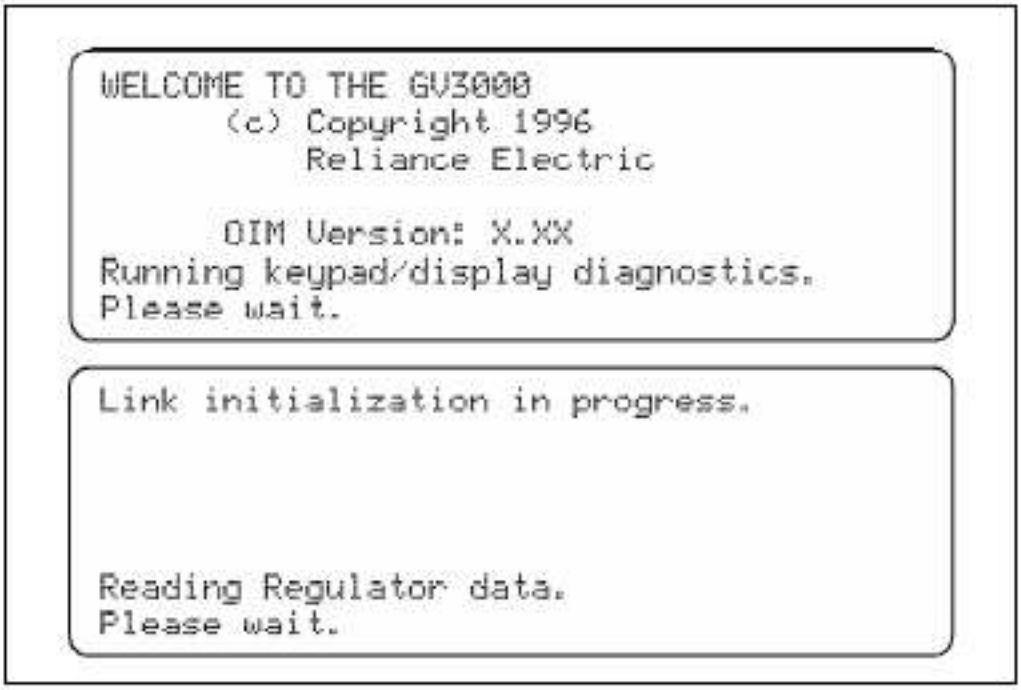


Figure 3.2 OIM Power Up Sequence

When the power-up sequence is complete, the OIM enters either program mode or monitor mode, depending on the mode the drive was in at power down. Any faults or alarms that are detected during power up are displayed before you see the normal displays. See chapter 7 of this manual for information on alarms and faults. See the GV3000/SE hardware IM for instructions on powering up the drive.

3.3 Adjusting the Screen Contrast

If the display is difficult to read, you can adjust the contrast. The contrast can be adjusted at any time except when you are in a parameter entry screen or during self-tuning.

Note that it might be necessary to change the display contrast periodically because of ambient temperature changes.

To adjust the screen contrast:

Step 1. Press ⇨. The contrast adjustment screen is displayed, as shown in figure 3.3.

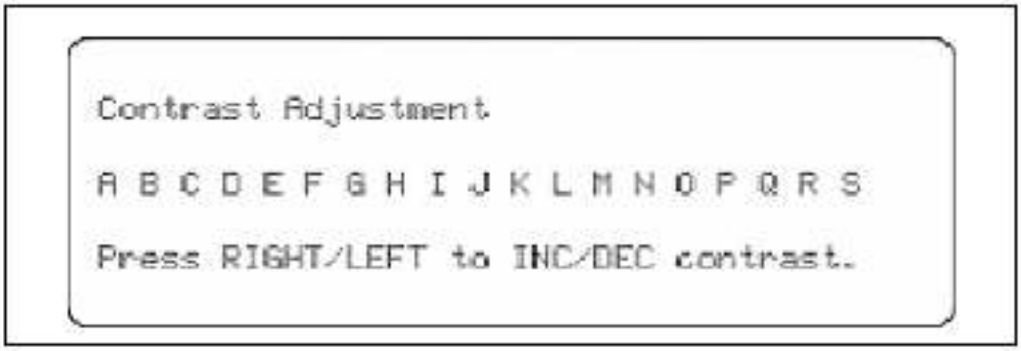


Figure 3.3 – Contrast Adjustment Screen

Step 2. Use ⇨ to increase the contrast (make the screen darker) or ⇦ to decrease the contrast (make the screen lighter).

Step 3. Press ENTER to save the new contrast setting and return to the previous screen.

3.4 Changing the Language Displayed on the OIM

The OIM can display text in English, German, French, Spanish, or Italian. The default language is English. You can change the language at any time except when you are in a parameter entry screen or during self-tuning.

To change the language:

Step 1. Press ⇦. The language select screen is displayed, as shown in figure 3.4. The currently selected option is displayed in the upper right.

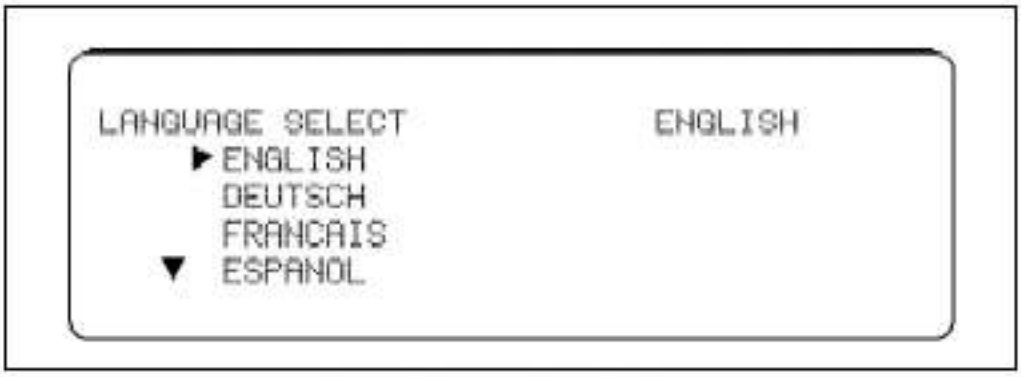


Figure 3.4 – Language Selection Screen

Step 2. Press ⇧ or ⇩ until the cursor (▶) is pointing to the language you want.

Step 3. Press ENTER to accept the new language.

The message "Please Wait" in the new language is displayed for a few seconds. The display then returns to the previous screen, with the text shown in the new language.

3.5 Scaling Speed Units for Your Application

You can scale the speed units to match your application's requirements. Scaled speed units are used on the OIM display only.

If vector regulation is selected, you can scale speed units for RPM, % of MOTOR TOP SPEED (U.017), or your own units.

If V/Hz regulation is selected, you can scale speed units for HERTZ, % of MOTOR NAMEPL BASE FRQ (H.001), or your own units.

All speed parameters are displayed in the defined units and all parameter values must be entered in these units. The parameters and displays that are affected by scaling are:

- MINIMUM SPEED (P.003)
- MAXIMUM SPEED (P.004)
- JOG SPEED REFERENCE (P.020)
- PRESET SPEEDS 1 through 8 (P.031 through P.038)
- Motor Speed
- Auto Reference
- Manual Reference

Note that scaled speed units affect equipment, such as the OIM or CS3000 software, attached to the drive through the serial port. It does not affect the front panel keypad/display. Front panel keypad/display speed units are scaled using FRONT PNL SPD SCALING (P.028).

3.5.1 Scaling Speed Units

To scale the speed units:

Step 1. Press PROGRAM/MONITOR until the key indicator reads PROGRAM. Make sure you are at the Main Menu by pressing CANCEL until GV3000/SE Main Menu is displayed at the top of the screen.

Step 2. Press ↓ until the cursor (►) is pointing to Speed Control. Press ENTER.

Step 3. Move the cursor to Define Speed Units. Press ENTER. The Define Speed Units screen is displayed, as shown in figure 3.5. The currently selected units are shown on the right side of the screen.

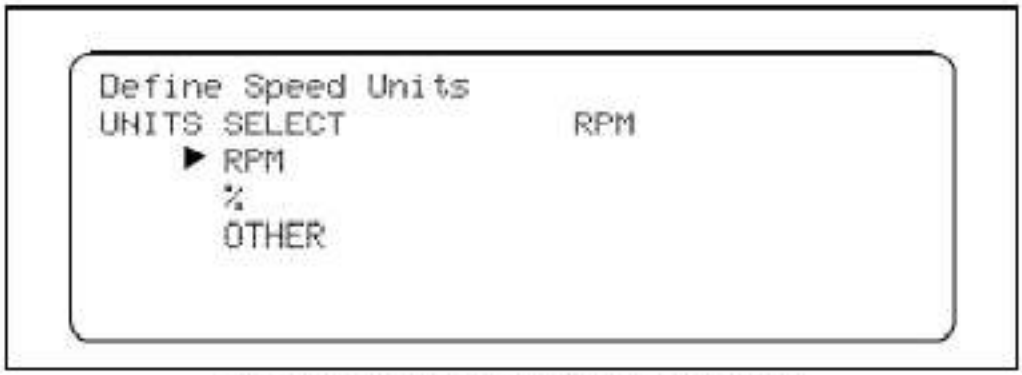


Figure 3.5 – Define Speed Units Screen – Vector Regulation

Step 4. Move the cursor to the units of measure that you want. Press ENTER.

If **you selected RPM (Vector)**, HERTZ (V/Hz), or **% (Both)**: The units are changed and you are returned to the previous screen.

If **you selected OTHER**: See section 3.5.2.

3.5.2 Setting OTHER Speed Units

If you selected OTHER for the speed units, the Define Units Tag screen is displayed, as shown in figure 3.6.

ATTENTION: If you exit from the procedure for setting OTHER speed units before completing it, incorrect values might be displayed for the parameters and displays affected by scaling. If you exit before completion, repeat the Define Speed Units procedure above to reset the scaling to RPM, HERTZ, or %, as appropriate for your application. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

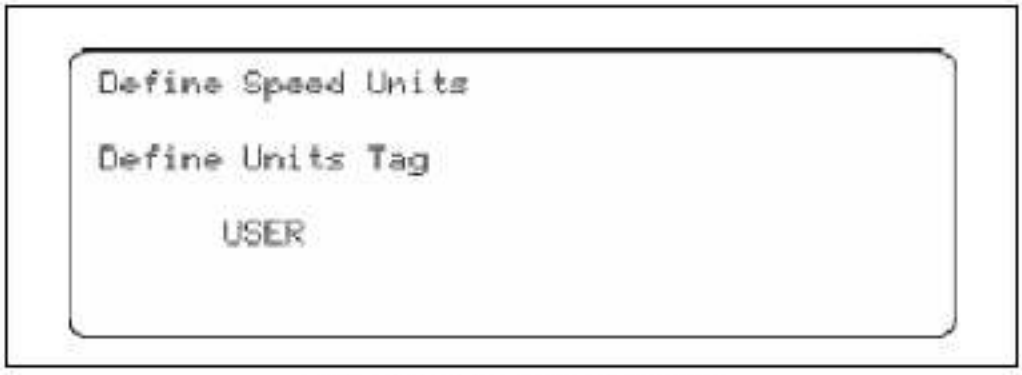


Figure 3.6 – Define Speed Units Tag Screen

Step 1. In this screen, you define the units of measure that will be used on the display. The tag can be up to six characters long. To create the tag:

- Press ↑ or ↓ to scroll through the characters until the character you want is displayed.
- Press → to move to the next character. Select the next character.
- Repeat this procedure until the tag is complete.

Step 2. Press ENTER when the tag is correct. The full scale value screen is displayed, as shown in figure 3.7.

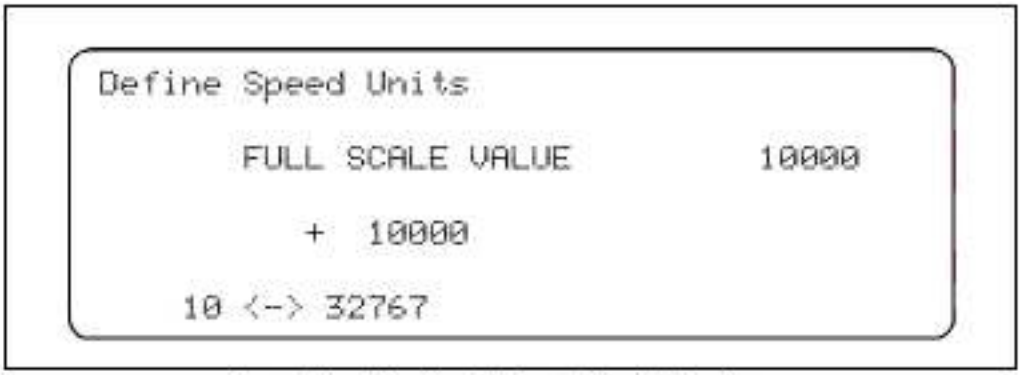


Figure 3.7 – Define Speed Units - Full Scale Value Screen

Step 3. Determine the full scale value. The full scale value is the value that is displayed when the motor speed is equal to the MOTOR NAMEPL BASE FRQ, H.001 (V/Hz regulation), or MOTOR TOP SPEED, U.017 (vector regulation). The full scale value can be from 10 to 32,767.

For example, to scale the speed units for feet per minute, if the full scale value of MOTOR TOP SPEED (U.017) = 1750 RPM and 1750 RPM = 500 FT/MIN, you would enter 500 for the full scale value.

The OIM calculates the display values as follows:

- For vector regulation, the user-defined units correspond to the MOTOR TOP SPEED (U.017) value:

$$\frac{\text{Actual Speed (RPM)} \times \text{Full Scale Value}}{\text{MOTOR TOP SPEED (RPM)}}$$

- For V/Hz regulation, the user defined units correspond to the MOTOR NAMEPL BASE FRQ (H.001):

$$\frac{\text{Actual Speed (Hz)} \times \text{Full Scale Value}}{\text{MOTOR NAMEPL BASE FRQ (Hz)}}$$

Using the example of a full scale value of 500.0 and MOTOR TOP SPEED of 1750, the OIM would convert the speed units as follows:

Actual Speed (RPM)	Conversion	Displayed Value (ft/min)
1750	$\frac{1750 * 500.0}{1750}$	500.0
875	$\frac{875 * 500.0}{1750}$	250.0
350	$\frac{350 * 500.0}{1750}$	100.0
0	$\frac{0 * 500.0}{1750}$	0.0

Note that normalized values in the drive remain at 1 count in 4095 regardless of the full scale value setting.

Step 4. To set the full scale value, move the cursor (▮) to the number or the sign that needs to change. (You will set the decimal point in step 5.) Press ⇧ or ⇩ to change the number. Press ⇦ or ⇨ to move between the numbers. Press ENTER when the constant is correct.

For full scale values less than 2000, you can set one decimal place. For full scale values less than 200, you can set up to two decimal places.

If the full scale value you set allows decimal places, the decimal place screen is displayed, as shown in figure 3.8. Continue to step 5.

If the value you set does not allow a decimal place, go to step 6.

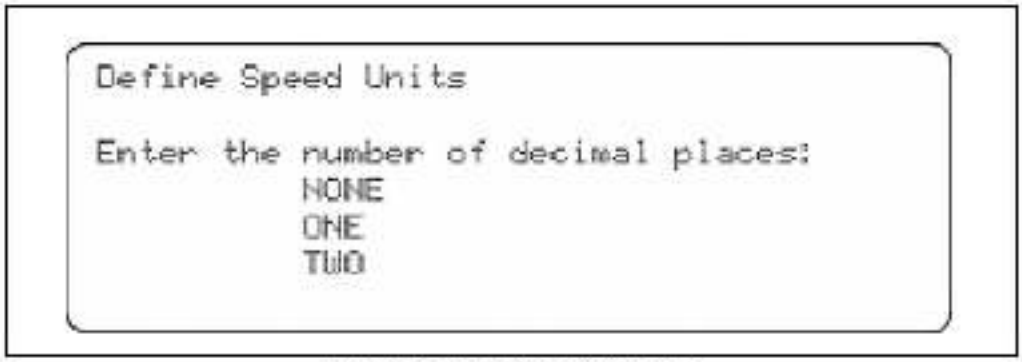


Figure 3.8 – Define Speed Units Screen

Step 5. Press ⇩ to move the cursor (►) to the number of decimal places you want. Press ENTER.

Step 6. Speed units programming is complete and you are returned to the menu.

CHAPTER 4

Basics of Programming the Drive Using the OIM

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, and/or service this equipment. Read and understand this section in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

To program the drive using the OIM, you change the settings for parameters that affect your application. This chapter describes how to:

- access the parameters and make changes to them
- restore factory default values for the parameters
- use a password to protect your programming

For parameter descriptions and general information about parameters, see the software I/M.

Appendix A of this I/M lists the OIM parameter names cross-referenced to the parameter names used in the software I/M.

Appendix B of this I/M describes the full menu paths for accessing the parameters.

4.1 Accessing OIM Menus and Parameters

OIM menus and parameters are accessed in program mode. To select program mode, press PROGRAM/MONITOR until the key indicator says PROGRAM.

If you exit from a menu or parameter list using PROGRAM/MONITOR, the last menu or parameter that was displayed is displayed when you return to program mode. To go to the Main Menu in this case, press CANCEL until GV3000 Main Menu is displayed at the top of the screen.

4.1.1 Accessing the Menus

When you enter program mode for the first time after power up, the Main Menu is displayed, as shown in figure 4.1. Other menus are accessed from the Main Menu.

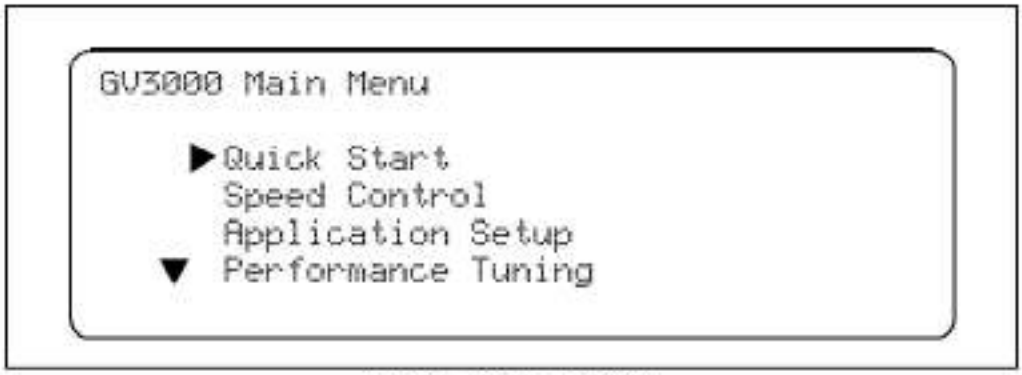


Figure 4 - Main Menu Screen

To view the rest of the menu, press . The full Main Menu includes:

- Quick Start
- Speed Control
- Application Setup
- Performance Tuning
- Motor Data
- Drive Status
- Regulator Terminal Strip
- Option Port Configuration
- Memory Functions
- Additional Parameters

Menus contain other menus and parameters.

To select an item in a menu, press or until the cursor (▶) is pointed at the item.

Press ENTER. The menu or parameters in that menu item are displayed.

4.1.2 Using Help In Program Mode

In program mode, you can access help for the menus and parameter entry screens. To access help, press HELP when the menu or parameter entry screen is displayed. When you are done viewing the help screen, press CANCEL to return to the previous screen.

If ▲ or ▼ is shown on the help screen, more text is available. Press or to display the rest of the text.

The Main Menu help screen is shown in figure 4.2.

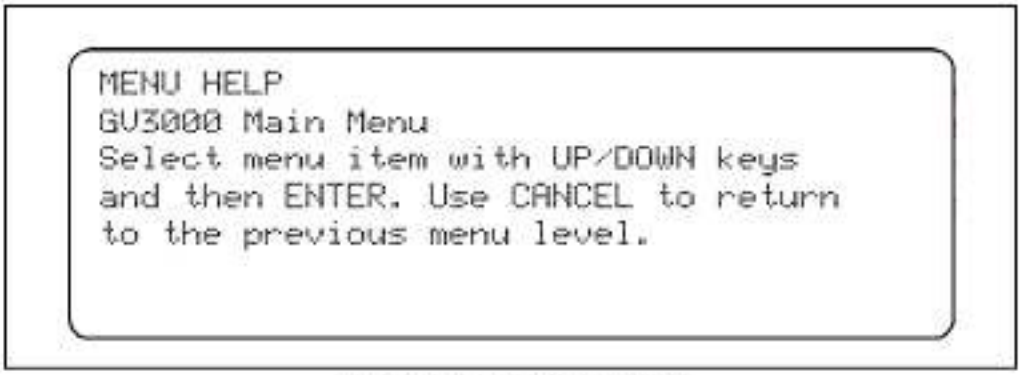


Figure 4.2 – Main Menu Help Screen

In a menu, help gives an overview of the options available in the menu. An example of the Speed Control menu help is shown in figure 4.3.

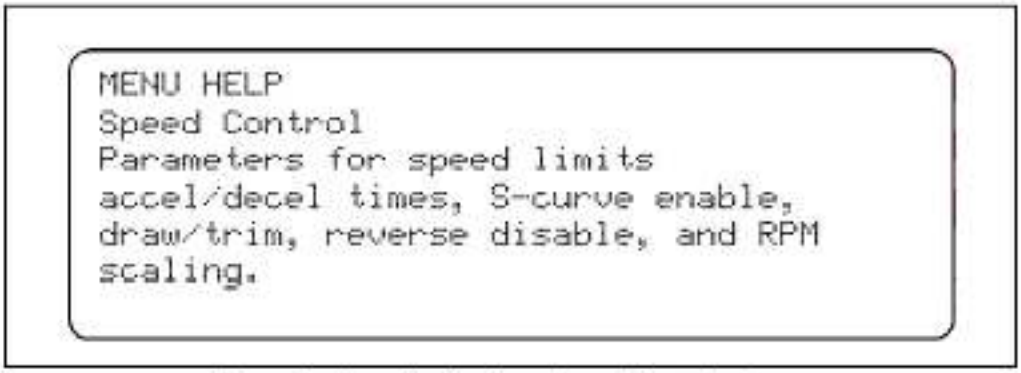


Figure 4.3 – Example of the Speed Control Menu Help Screen

In a parameter entry screen, the help screen gives you the parameter name, number, type, and units of measure of the parameter. An example of a parameter help screen is shown in figure 4.4.

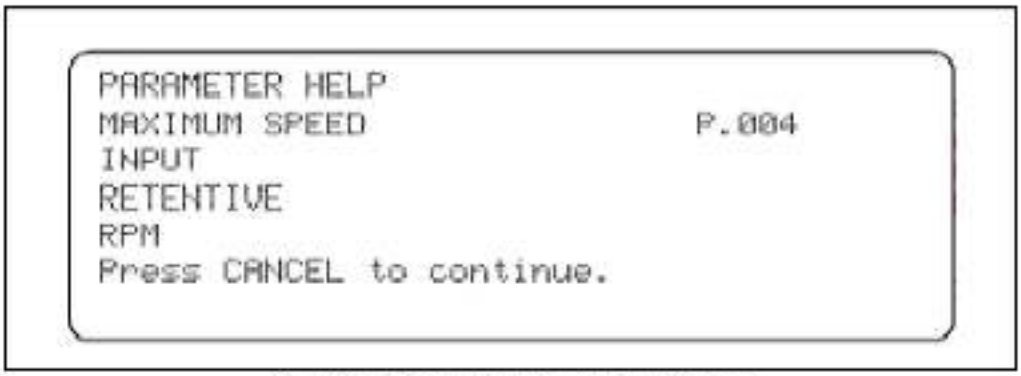


Figure 4.4 – Example of a Parameter Help Screen

In the help screen shown in figure 4.4:

- The name of the parameter is MAXIMUM SPEED.
- The parameter number is P.004.

- The parameter type is INPUT. This means you can change the value.
- The save type is RETENTIVE. This means the parameter is saved through a power cycle.
- The units of measure are RPM. If units of measure do not apply, this line is blank.

For full descriptions of parameters, see the software I/M.

4.1.3 Accessing the Parameters

Parameters are accessed through the menus. The menu paths to get to parameters are listed in Appendix B.

Some parameter options are only available if the appropriate option is installed. If a parameter is not available, the cursor changes to the locked symbol ( ).

If you exit program mode when you are in a parameter entry screen, that menu or parameter is displayed again when you return to program mode.

The basic steps for accessing a parameter are provided here. A detailed example follows.

Step 1. Select the menu that contains the parameter.

Step 2. Press ENTER. The next menu or parameter list is displayed. Repeat steps 1 and 2 for each menu until the parameter list you want is displayed.

Step 3. Move the cursor to the parameter you want to change. Press ENTER.

The parameter entry screen is displayed. In this screen, you can look at or change parameter values.

Example

The following detailed steps use parameter JOG RAMP ACCEL TIME (P021) as an example. To select JOG RAMP ACCEL TIME:

Step 1. At the Main Menu, use ⇦ to move the cursor (►) until it points to Speed Control as shown in figure 4.5.

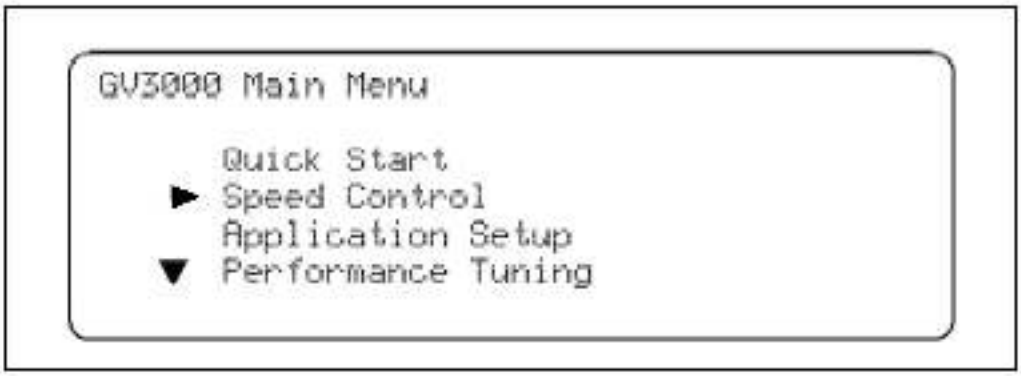


Figure 4.5 – Selecting the Speed Control Menu

Step 2. Press ENTER. The Speed Control Menu is displayed, as shown in figure 4.6.

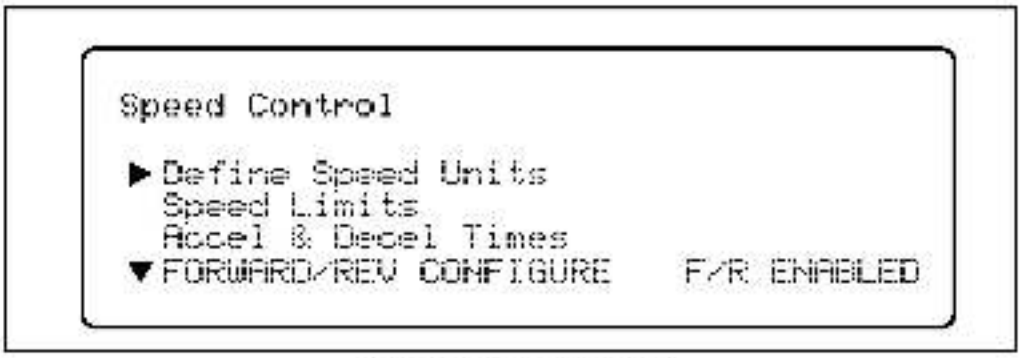


Figure 4.6 – Speed Control Menu

Step 3. Use ⇩ to move the cursor until it points to Jog Configure, as shown in figure 4.7.

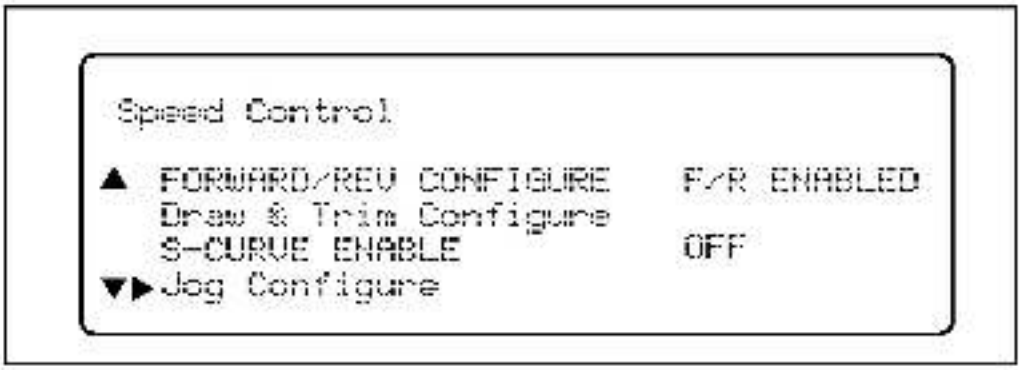


Figure 4.7 – Speed Control Menu with Cursor at Jog Configure

Step 4. Press ENTER. The Jog Configure menu is displayed, as shown in figure 4.8.

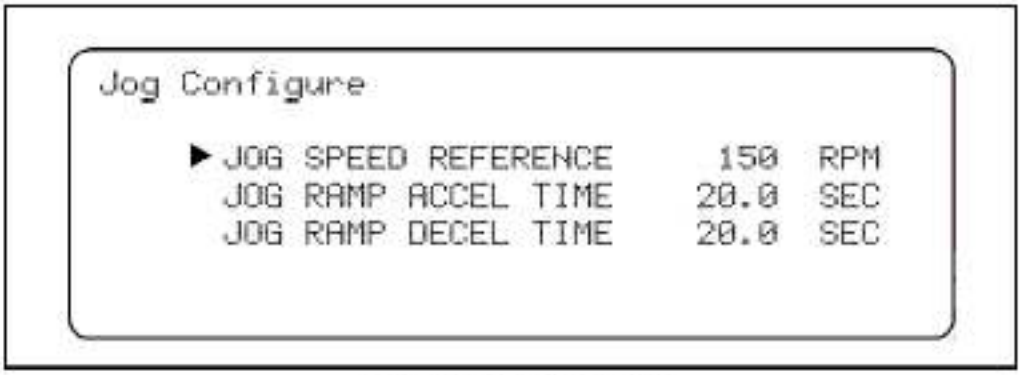


Figure 4.8 – Jog Configure Menu

At this point, you can view or change parameter values. See the following sections for this information.

4.1.4 Viewing Parameter Values

In the parameter lists, parameter values are shown to the right of the parameter name, as shown in figure 4.8. After you have looked at the parameter values, press CANCEL X to return to the previous menu.

Note that read-only (output) parameter values are updated from the drive approximately two times per second.

4.1.5 Changing Parameter Values

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, and/or service this equipment. Read and understand this section in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

You can change the values of input parameters in the parameter entry screens. (You cannot change the value of read-only parameters.) Figure 4.9 shows an example of the parameter entry screen for JOG RAMP ACCEL TIME (P.021).

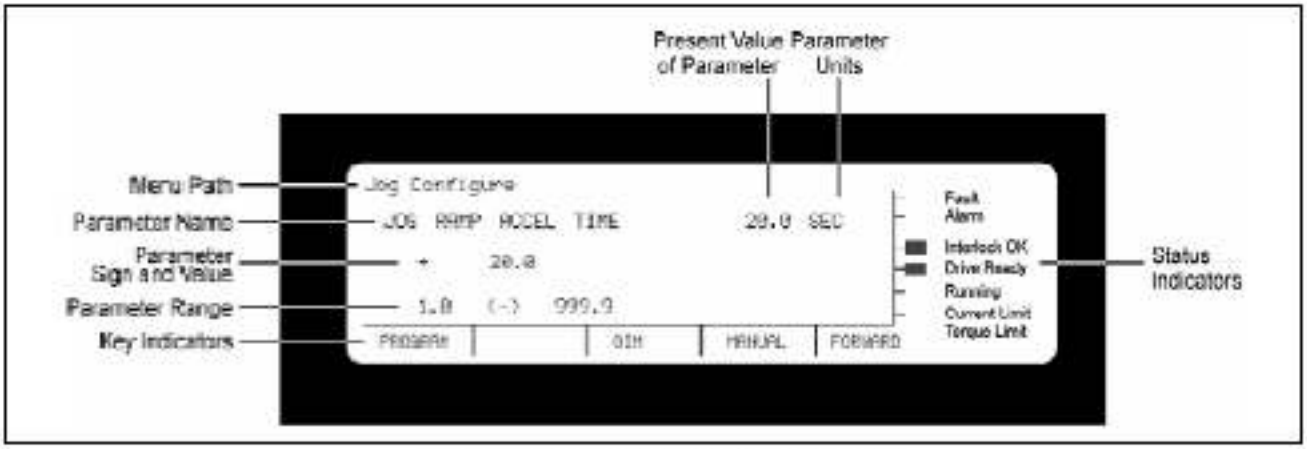


Figure 4.9 – Example of a Parameter Entry Screen

To exit a parameter entry screen without making any changes, press CANCEL X.

To change a parameter value:

Step 1. Go to the menu that contains the parameter you want to change by using the procedure in section 4.1.3.

Step 2. Use ⇦⇨ to move the cursor until it points to the parameter. Press ENTER ↵.

Step 3. You will see either:

- the existing value with the cursor blinking at the far right digit, like the screen shown in figure 4.9.
- a list of options, like the screen shown in figure 4.10

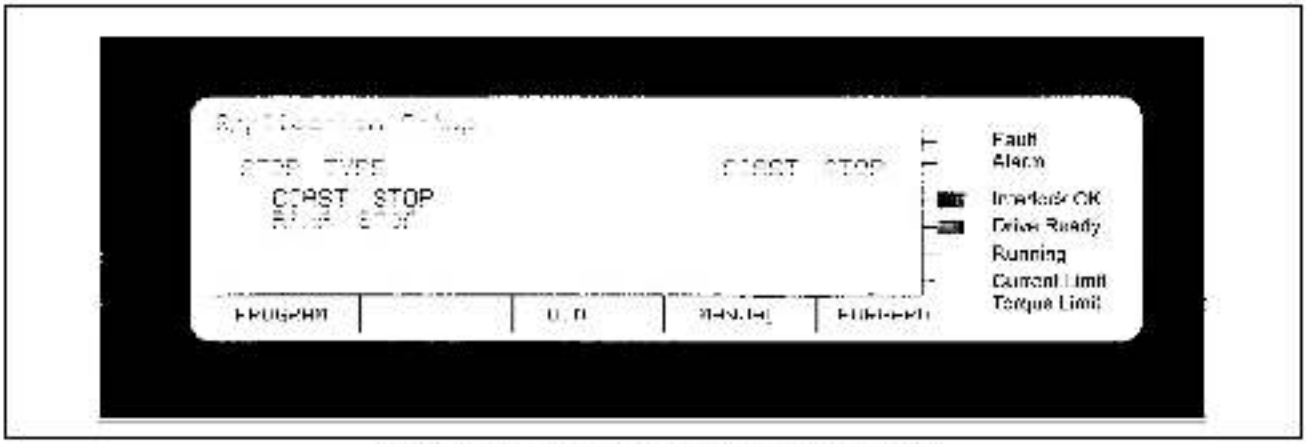


Figure 4.10 – Parameter Entry Screen with a List of Options

Step 4. If the existing value is shown, go to step 5. If you see a list of options:

a. Move the cursor to the option you want to select.

b. Press ENTER to accept the option.

c. Go to step 6.

Step 5. If you see the existing value:

a. Use ⇦ and ⇨ to move the cursor ( ) to the digit or sign (+ or -) that needs to change.

b. Press ⇧ or ⇩ to change the number or sign. When changing the numbers:

- If the right-most digit is increased past 9, the digit to the left is increased by one. Incrementing any other digit does not increase the digit to the left. For example, if 199 is displayed, pressing ⇧ changes the value to 200. However, if 199 is displayed, pressing ⇧ changes the value to 109.
- If the field is blank and you fill in the left-most digit, the digits to the right are automatically filled in with zeros.
- You cannot enter a number out of the parameter's range. The drive clamps values to a minimum or maximum.
- Press CANCEL to restore the previous value. You can then either change the value or press CANCEL again to exit the parameter entry screen without accepting any changes.
- Press ENTER to save the changed value. Go to step 6.

Step 6. Press CANCEL to return to the list of parameters.

Step 7. Record changes to parameter values in Appendix C.

4.1.6 Parameter Values that Cannot be Changed

In some cases, you cannot change parameter values. If this is the case, an error message is displayed when you try to select it. The situations in which you cannot change parameter values are:

- When the drive is running and the parameter you are changing is configurable. Configurable parameters cannot be changed while the drive is running or jogging. Stop the drive to change the parameter.
- When programming protection is enabled. See section 4.2 of this chapter for more information.
- If the parameter is read-only (output). Read-only parameters can only be viewed.

4.2 Using a Password to Protect Programming

To prevent changes to parameters, you can use program protection. Program protection prevents changes to parameters, and to the language and contrast settings. It does not affect:

- keypad control, including the manual reference
- fault and alarm options
- monitor mode
- language setting
- display contrast adjustments

ATTENTION: It is the user's responsibility to distribute the security password. Reliance Electric is not responsible for unauthorized access violations within the user's organization. Failure to observe this precaution could result in bodily injury.

PROGRAMMING DISABLE (P.051) toggles program protection. If program protection is enabled, this procedure disables it. If it is disabled, this procedure enables it.

When password program protection is enabled and you select a parameter, the message "Do you wish to enter the password to DISABLE program protection" is displayed. If you select YES, you must enter the factory-set password to change the parameter.

Note that disabling software program protection for one parameter disables it for all parameters. To re-enable software program protection, repeat the following procedure.

Important: The OIM is not affected by the setting of the Second Menu Password (P.006).

To enable or disable programming:

Step 1. Press PROGRAM MONITOR until the key indicator reads PROGRAM.

Step 2. Go to the Main Menu by pressing CANCEL X until CV3000 Main Menu is displayed at the top of the screen.

Step 3. Select the Memory Functions menu.

Step 4. Select the PROGRAMMING DISABLE (P.051) parameter. If programming is currently:

- **Disabled:** The message "Do you wish to enter the password to ENABLE program protection?" is displayed.
- **Enabled:** The message "Do you wish to enter the password to DISABLE program protection?" is displayed.

Step 5. Select YES or NO. Press ENTER.

- **YES**: Advances you to the PROGRAMMING DISABLE parameter entry screen, as shown in figure 4.11.
- **NO**: Keeps the current setting. You are returned to the Memory Functions menu.

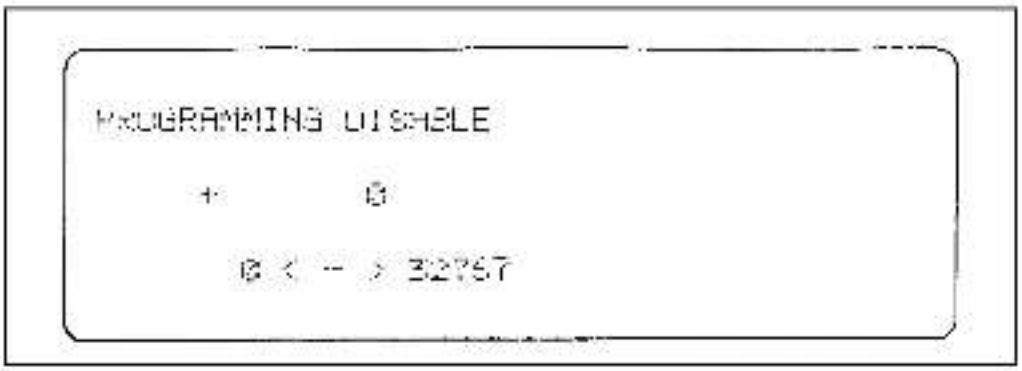


Figure 4.11 PROGRAMMING DISABLE Parameter Entry Screen

Step 6. Press ⊕ to change the value to 26. (You cannot use a different password.)

Step 7. Press ENTER. You are returned to the Memory functions menu and the PROGRAMMING DISABLE setting is changed.

If you select NO or enter the wrong password when you try to change a parameter, the message "PROGRAM ERROR! PASSWORD PROTECTION IS ENABLED" is displayed.

4.3 Restoring Factory Default General Parameters

You can restore the factory default values of General (P.---) Parameters. To restore the factor defaults:

Step 1. Press PROGRAM/MONITOR until the key indicator reads PROGRAM. Make sure you are at the Main Menu by pressing CANCEL until GV3000 Main Menu is displayed at the top of the screen.

Step 2. Select Memory Functions. Press ENTER.

Step 3. Select RESTORE DEFAULTS (P.050). Press ENTER. The RESTORE DEFAULTS parameter entry screen is displayed.

Step 4. Select ON. Press ENTER. The defaults are restored and you are returned to the Memory Functions menu.

The restore defaults operation is complete. After restoring the factory defaults, perform the Quick Start procedure described in chapter 5.

CHAPTER 5

Using Quick Start to Program the Drive

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, and/or service this equipment. Read and understand this chapter in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: Some of the parameters in Quick Start can cause the drive to operate improperly if they are entered incorrectly. Incorrect values can cause the drive to operate outside of the recommended operating conditions. Verify that the values of these parameters are appropriate for your application before changing them. Failure to observe these precautions could result in bodily injury.

The Quick Start feature on the OIM lets you program the most commonly used parameters through one menu. This helps you set up the drive as quickly as possible.

This procedure is intended for use with the OIM only. If you are configuring the drive using the front panel keypad/display, refer to the software I/M.

Brief descriptions of the Quick Start parameters are provided in section 5.4. For full parameter descriptions, see the software I/M.

Record your parameter settings in Appendix C of this I/M or in the software I/M.

5.1 Preparing for Quick Start

Before performing Quick Start, you must:

- be qualified to program the drive and be familiar with vector and V/Hz regulation.
- be familiar with operation of the OIM. Refer to chapter 2.
- have completed all hardware installation as described in the hardware I/M.
- have connected all equipment.
- record the following motor data from the motor nameplate for use during Quick Start:

  Motor rated amps: _____

  Motor rated volts:

  Motor base frequency: _____

  Encoder PPR (if used):

- connect the drive to the motor.

5.2 Using the Quick Start Exit Menu

Quick Start automates the process of entering the values for selected parameters by taking you to the next Quick Start parameter when a parameter value is accepted. If you want to go back to a previous parameter or exit Quick Start before the process is complete, press CANCEL X. The Quick Start exit menu is displayed, as shown in figure 5.1.

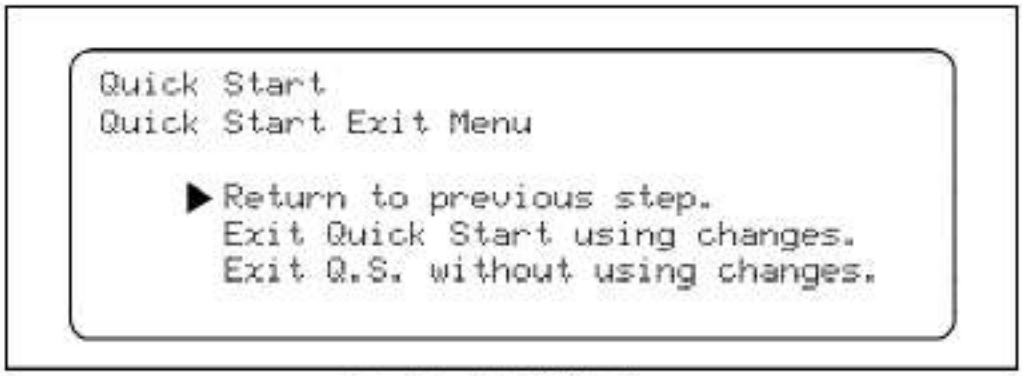


Figure 5.1 – Quick Start Exit Menu

The exit options are:

- Return to previous step: Goes back to the previous parameter. After you accept that parameter value, Quick Start resumes from that parameter. To go back several parameters, you can press CANCEL X and select "Return to previous step" as many times as needed.
- Exit Quick Start using changes: Exits Quick Start and accepts any changes.
- Exit Q.S. without using changes: Exits Quick Start and ignores all changes.
- Press CANCEL X to leave the exit menu and return to the Quick Start parameter entry screen you were in.

To select an option, use ↑ or ↓ to move the cursor to the option you want. Then press ENTER ↵.

5.3 Programming the Drive Using Quick Start

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, and/or service this equipment. Read and understand this chapter in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: Some of the parameters in Quick Start can cause the drive to operate improperly if the values are entered incorrectly. Incorrect values can cause the drive to operate outside of the recommended operating conditions. Verify that the values of these parameters are appropriate for your application before changing them. Failure to observe these precautions could result in bodily injury.

Important: If program protection is enabled, you cannot change Quick Start parameters. See section 4.2, Using a Password to Protect Programming, to disable program protection.

To use Quick Start:

Step 1. Make sure the drive is stopped (the Running status indicator is off).

Step 2. Make sure the control source is set to OIM. See section 6.2 for instructions on changing the control source.

Step 3. Press PROGRAM/MONITOR until its key indicator reads PROGRAM.

Step 4. Select the Quick Start menu from the Main Menu. Press ENTER. Quick Start begins and the first Quick Start parameter is displayed, as shown in figure 5.2.

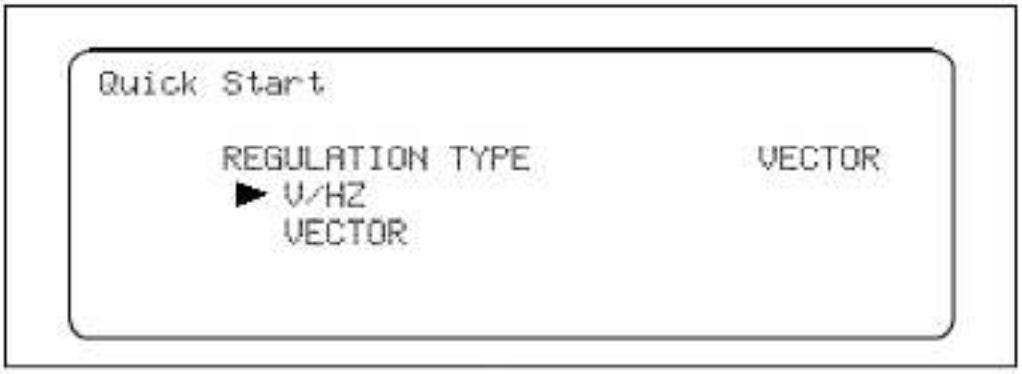


Figure 5.2 – First Quick Start Parameter Entry Screen

Step 5. Use the ↑ and ↓ keys to select V/Hz or Vector regulation. When the selection is correct, press ENTER. (Refer to chapter 4 for the procedure to change parameter values.)

Step 6. You are now at the next parameter entry screen.

Continue going through the Quick Start parameters, changing the values as needed. Select ENTER to accept the value and move to the next parameter entry screen.

Step 7. After CURRENT LIMIT (P.005), what happens next depends on the regulation type. If you selected:

- V/Hz Regulation: Quick Start is complete and you are returned to the Main Menu.
- Vector Regulation: The self-tuning screen is displayed, as shown in figure 5.3. Go to step 8.

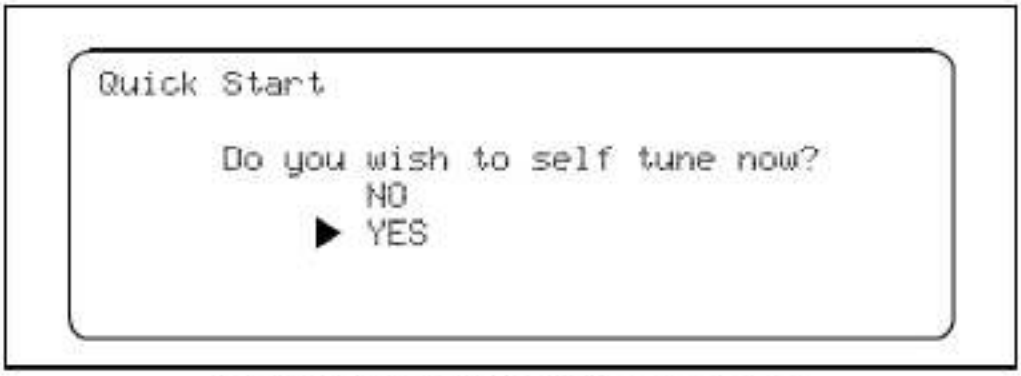


Figure 5.3 – Quick Start Self-Tuning Screen – Vector Regulation

Step 8. If you want the drive to self-tune, select YES. See section 5.4 for information about self-tuning. When self-tuning is complete, Quick Start is complete, and you are returned to the Main Menu.

If you do not want the drive to self-tune, select NO. The parameter entry screen for MAGNET CURRENT PRCNT (U.006) is displayed. After you have programmed this parameter, Quick Start is complete, and you are returned to the Main Menu.

Important: If you do not select SENSORLESS for the ENCODER PPR parameter (U.001), and you select NO to self-tuning, you must ensure that the value in ENCODER PPR (U.001) is accurate.

5.4 Self-Tuning Drives Programmed for Vector Regulation

Self-tuning helps you set up the drive. It determines the proper no-load current value for MAGNET CURRENT PRCNT (U.006) and, for flux vector control, the encoder PPR value for ENCODER PPR (U.001). These values must be accurate to ensure that rated motor torque, speed, and horsepower can be developed for drives programmed for vector regulation (FVC or SVC).

Self-tuning can be performed as part of the Quick Start procedure, or as a separate procedure.

ATTENTION: The motor will rotate during self-tuning. Stay clear of rotating machinery. Failure to observe this precaution could result in bodily injury.

ATTENTION: The motor must be uncoupled from the driven load during self-tuning. If the motor is not uncoupled, incorrect parameter values will result. The motor must also be uncoupled from any shaft-coupled devices, such as reducers, belts, and brakes. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

ATTENTION: The motor will rotate in the reverse direction during self-tuning. Uncouple the motor from the driven load before self-tuning. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

5.4.1 Setting Up the OIM for Self-Tuning

To prepare for self-tuning:

- Perform the Quick Start procedure (described in section 5.1).
- Make sure the motor is unloaded.
- Stop the drive if it is running.
- Set the control source to OIM. See section 6.2 for information on setting the control source.
- Clear any faults from the fault log. See chapter 7 for information on clearing faults.

If these conditions are not met, an error message is displayed when you attempt to start self-tuning.

5.4.2 Performing Self-Tuning

Before self-tuning, complete the steps in section 5.4.1.

To perform self-tuning:

Step 1. Access Torque Self Tune from either the menus or from Quick Start.

- From the menus:

  a. Select the Performance Tuning menu. Press ENTER.

  b. Select the Self Tuning Parameters menu. Press ENTER.

  c. Select the Torque Self Tune. Press ENTER.

- From Quick Start Torque Self Tune is displayed after you have programmed the other Quick Start parameters.

Step 2. The message "Do you wish to self tune now?" is displayed (This message is displayed twice if you select self-tuning from Quick Start.) Select YES to enable self-tuning.

Press ENTER. Self-tuning is enabled and the screen shown in figure 5.4 is displayed.

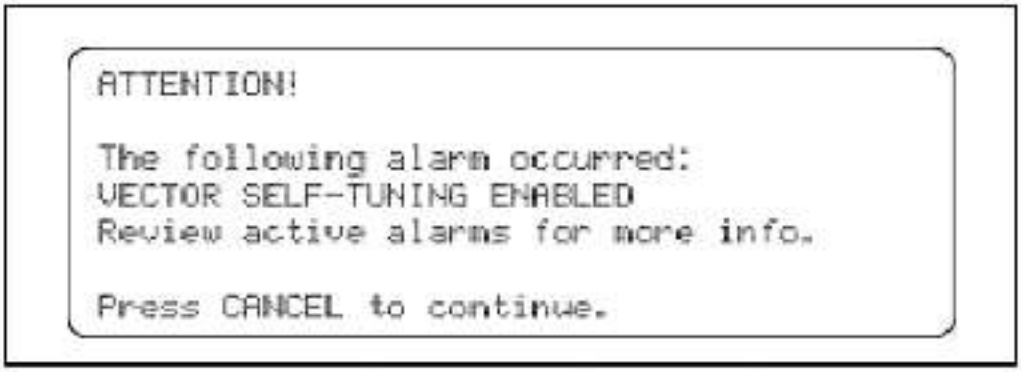


Figure 5.4 – Attention Screen Displayed After Enabling Self-Tuning

Step 3. Press CANCEL to clear the screen and continue. The screen shown in figure 5.5 is displayed.

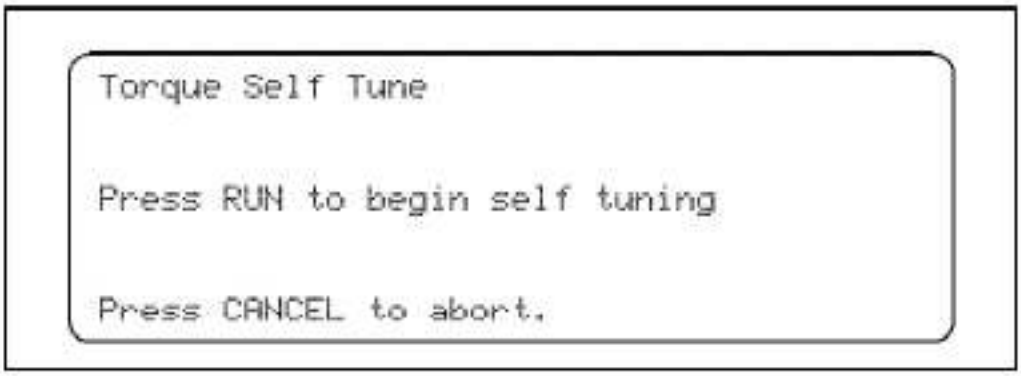


Figure 5.5 – Self Tuning Enabled Screen

Step 4. Press RUN to start self-tuning. A message and the motor speed during self-tuning are displayed, as shown in figure 5.6. In the few minutes that self-tuning takes, you can view other outputs by going to monitor mode.

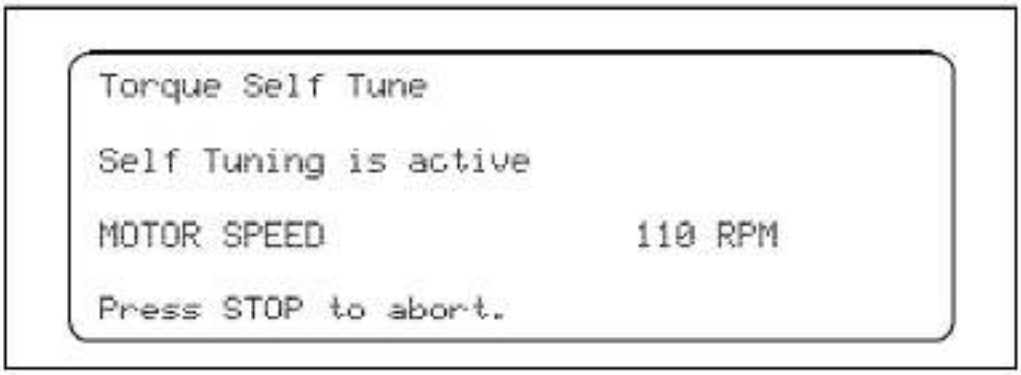


Figure 5.6 – Self Tuning Active Screen

Note that if you go into monitor mode during self-tuning, you must return to program mode at the completion of self-tuning to see the following screens. Self-tuning is complete when the drive stops running.

Step 5. When self-tuning is complete, the OIM displays one of these messages:

- Self Tuning has updated the gains: Self-tuning was successfully completed.
- Emergency stop or fault stop occurred during self-tuning. Self-tuning aborted: The self-tuning was not completed because of a fault or because  was pressed. See TORQUE SELF-TUNE RSLT, U.009 (in the Self Tuning Parameters menu), and the software HM for descriptions of the possible results. Repeat self-tuning when the problem is corrected.

Step 6. Press CANCEL to clear the message and return to the Main Menu (if self-tuning was performed as part of the Quick Start procedure) or the Self Tuning Parameters menu.

5.4.3 Exiting Before Self-Tuning is Complete

If you have not activated self-tuning by pressing  , you can stop self-tuning by pressing CANCEL. You are returned to the Main Menu if self-tuning was enabled from Quick Start, or to the Self Tune Parameters menu.

If self-tuning has been activated, press  to stop self-tuning. This causes a self-tuning drive fault. See the next section for more information on self-tuning drive faults.

5.4.4 What To Do If a Fault Occurs During Self-Tuning

If a fault occurs during self-tuning:

- the motor coasts to stop, regardless of the setting of STOP TYPE (P.025).
- the drive logs a self-tuning fault, which must be reset and cleared. See chapter 7 for more information on clearing and resetting faults.

Once the drive is stopped, the results of the self-tuning are stored in TORQUE SELF-TUNE RSLT (U.009). See the software HM for more information.

When the problem that caused the fault is corrected, repeat the self-tuning procedure.

5.5 Quick Start Parameter Descriptions

Brief descriptions of the Quick Start parameters are provided here for your reference. Full descriptions of the parameters are provided in the software I/M. These descriptions are listed in the order that they are displayed during the Quick Start procedure for vector-regulated drives. For V/Hz regulated drives, fewer parameters are displayed and the order is slightly different.

> **ATTENTION:** Incorrect programming of Quick Start parameters can cause an overspeed condition. These parameters must be programmed by a qualified person who understands the significance of programming them accurately. Verify that the values of these parameters are programmed accurately for your application. Failure to observe this precaution could result in bodily injury.

REGULATION TYPE (P.048)

Programs the drive regulator type to volts/hertz (V/Hz) or vector.

Parameter Range:	V/HZ VECTOR
Default Setting:	V/HZ
Parameter Type:	Configurable

For V/Hz control, the drive provides open-loop volts per hertz regulation, which is appropriate for general purpose applications.

For vector control, you may select either flux vector control (FVC) or sensorless vector control (SVC).

Flux vector control uses the actual encoder value for speed feedback and, therefore, requires an encoder mounted to the motor and connected to the drive. You program the drive for FVC by first selecting VECTOR in the REGULATION TYPE parameter (P.048) and then selecting the PPR value of the encoder in the ENCODER PPR parameter (J.001).

Sensorless vector control is an extension of the FVC regulator. It provides performance close to FVC without using an encoder. Control is based on estimated speed feedback. You program the drive for SVC by first selecting VECTOR in the REGULATION TYPE parameter (P.048) and then selecting SENSORLESS in the ENCODER PPR parameter (J.001).

Switching from one regulator type to the other takes approximately ten seconds.

Changing this parameter restores the default values of all General Parameters (P.---) except for REGULATION TYPE and DEFAULTS TYPE (P.049).

ENCODER PPR (U.001)

Selects the number of pulses per revolution (PPR) of the encoder being used or selects sensorless vector control (SVC) if no encoder is used.

Parameter Range:	512,1024, 2048, 4096 PPR, SENSORLESS
Default Setting:	1024 PPR
Parameter Type:	Configurable

If SENSORLESS is not selected, the value of this parameter is automatically set if torque control self-tuning is performed successfully.

> **ATTENTION:** The setting of parameters U.001 (Encoder PPR), U.002 (Motor Poles), U.003 (Motor Nameplate Base Frequency), and U.005 (Motor Nameplate RPM) determines the motor maximum speed. These parameters must be set by a qualified person who understands the significance of setting them accurately. Failure to observe this precaution could result in bodily injury.
>
> **ATTENTION:** Do not use a 4096 PPR encoder with a 2-pole motor. Overspeed and motor damage can result. Failure to observe this precaution could result in bodily injury.

The PPR must be selected based on a 125 kHz maximum input frequency limitation. The encoder PPR selection affects the minimum and the maximum operating speed in RPM and also affects the speed range.

The maximum input frequency is determined by the formula:

$$Fmax = \frac{U.017 \times U.001}{60}$$

where Fmax is the maximum frequency in pulses per second (125 kHz).

MOTOR POLES (U.002)

Identifies the number of poles in the motor.

.

Parameter Range:	2, 4, 6, or 8 POLE MOTOR
Default Setting:	4 POLE MOTOR
Parameter Type:	Configurable

> **ATTENTION:** The setting of parameters U.001 (Encoder PPR), U.002 (Motor Poles), U.003 (Motor Nameplate Base Frequency), and U.005 (Motor Nameplate RPM) determines the motor maximum speed. These parameters must be set by a qualified person who understands the significance of setting them accurately. Failure to observe this precaution could result in bodily injury.
>
> **ATTENTION:** Do not use a 4096 PPR encoder with a 2-pole motor. Overspeed and motor damage can result. Failure to observe this precaution could result in bodily injury.

If you do not know the number of poles, see the software I/M for calculations.

MOTOR NAMEPL BASE FRQ (H.001 or U.003)

In vector regulation, this parameter identifies the motor base frequency as it appears on the motor nameplate.

Parameter Range:	15.0 to 240.0 HERTZ (vector) 30.0 to 200.0 HERTZ (V/Hz)
Default Setting:	60.0 HERTZ
Parameter Type:	Configurable

ATTENTION: The setting of parameters U.001 (Encoder PPR), U.002 (Motor Poles), U.003 (Motor Nameplate Base Frequency), and U.005 (Motor Nameplate RPM) determine the motor maximum speed. These parameters must be set by a qualified person who understands the significance of setting them accurately. Failure to observe this precaution could result in bodily injury.

In V/Hz regulation, this parameter configures the V/Hz ratio. Base frequency is the frequency at which the output voltage reaches MOTOR NAMEPL VOLTS (H.000). Below base frequency, the output voltage varies with output frequency according to the V/Hz adjustment in VHZ-CURVE TYPE (H.018). Above base frequency, output voltage is held constant as frequency increases (constant horsepower range).

The V/Hz ratio is affected by the selection of VHZ-CURVE TYPE (H.018) and the setting of TORQUE BOOST VOLTAGE (H.003).

MOTOR NAMEPL RPM (U.005)

Identifies the motor rated RPM as it appears on the motor nameplate.

Parameter Range:	675 to 3596*
Default Setting:	Power Module dependent. See the software I/M for more information.
Parameter Type:	Configurable

*The actual range of this parameter is based on the values of MOTOR POLES (U.002) and MOTOR NAMEPL BASE FRQ (U.009). See the software I/M for calculations.

If the value of this parameter is too close to the synchronous RPM, the drive might be unstable. This value directly affects torque linearity and the maximum attainable horsepower.

MOTOR NAMEPL HP (U.022)

Identifies the motor horsepower as it appears on the motor nameplate.

Parameter Range:	0.3 to 600.0 HP
Default Setting:	Power Module-dependent. See the software I/M for more information
Parameter Type:	Configurable

MOTOR NAMEPL VOLTS (H.000 or U.007)

Identifies the motor rated (nominal) voltage as it appears on the motor nameplate.

Parameter Range:	100 to 690 VOLTS
Default Setting:	460 VOLTS
Parameter Type:	Configurable

MOTOR NAMEPL AMPS (H.002 or U.004)

Identifies the motor rated amps as it appears on the motor nameplate.

Parameter Range:	Power Module-dependent. See the software I/M for more information.
Default Setting:	Power Module-dependent. See the software I/M for more information.
Parameter Type:	Configurable

ATTENTION: This parameter must not exceed the rated amps found on the motor nameplate. Overcurrent or excessive heating of the motor could result if rated amps are exceeded. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

ACCEL TIME (P.001)

Specifies the time it takes for the motor to increase from zero speed to MAXIMUM SPEED, P.004 (V/Hz regulation), or MOTOR TOP SPEED, U.017 (vector regulation).

Parameter Range:	1.0 to 999.9 SEC (V/Hz) 0.1 to 999.9 SEC (vector)
Default Setting:	20.0 SEC
Parameter Type:	Tunable

The time the motor takes to increase speed is directly proportional to the value in this parameter. This parameter does not apply to jog.

If the motor load inertia is high, or the CURRENT LIMIT (P.005) setting is too low, actual motor acceleration time will be longer than the time set in ACCEL TIME. If ACCEL TIME is set too short, an overcurrent fault might occur.

DECEL TIME (P.002)

Specifies the time it takes for the motor speed to decrease to zero speed from MAXIMUM SPEED, P.004 (V/Hz regulation) or MOTOR TOP SPEED, U.017 (vector regulation).

Parameter Range:	1.0 to 999.9 SEC (V/Hz) 0.1 to 999.9 SEC (vector)
Default Setting:	20.0 SEC
Parameter Type:	TUNABLE

The time the motor takes to decrease speed (except during a coast-to-rest stop) is directly proportional to the value in this parameter. This parameter does not apply to jog.

Note that motor load inertia and input line conditions can extend the deceleration time to a value greater than the preset time. With fast deceleration times, regenerative motor voltage might charge up the DC bus voltage, causing a HIGH DC BUS VOLTAGE fault. To avoid the fault condition, extend the deceleration time. If a deceleration time faster than the acceptable range is required, installing an optional Snubber Resistor Kit or Regenerative Braking Module Kit might prevent the fault.

For V/Hz regulation with dynamic braking (snubber resistor) disabled (INPUT PWR/SNUB CONFIG, H.017 programmed to 0, 2, or 4) the deceleration time can be extended to prevent a high DC bus voltage condition.

MINIMUM SPEED (P.003)

Limits the reference. Regardless of the supplied reference, the regulator will not command a speed less than the value programmed for this parameter.

Parameter Range:	0.5 to MAXIMUM SPEED (P.004) HERTZ (V/Hz) 0 to MAXIMUM SPEED (P.004) RPM (vector)
Default Setting:	5.0 HERTZ (V/Hz) 150 RPM (vector)
Parameter Type:	Tunable

ATTENTION: The drive can operate at and maintain zero speed. The user is responsible for assuring safe conditions for operating personnel by providing suitable guards, audible or visual alarms, or other devices to indicate that the drive is operating or can operate at or near zero speed. Failure to observe this precaution could result in severe bodily injury or loss of life.

Note that in V/Hz regulation, the drive can decrease output frequency below MINIMUM SPEED, but not below 0.5 Hz, to avoid an overcurrent fault.

MAXIMUM SPEED (P.004)

Limits the reference. Regardless of the supplied reference, the regulator will not command a speed greater than the value programmed for this parameter.

Parameter Range:	15.0 to OVERFREQUENCY LIMIT (H.022) HERTZ (V/Hz) 10 to MOTOR TOP SPEED (J.017) RPM (vector)
Default Setting:	60.0 HERTZ (V/Hz) 1722 RPM (vector)
Parameter Type:	Tunable

ATTENTION: The user is responsible for ensuring that driven machinery, all drive-train mechanisms, and application material can safely operate at the maximum operating speed of the drive. Overspeed detection in the drive determines when the drive shuts down. For vector regulation, this is factory programmed to 130% of maximum speed. For volts/hertz regulation, this is fixed at the frequency level programmed in overfrequency limit (H.022). Failure to observe this precaution can result in bodily injury.

For V/Hz regulation, this parameter specifies the maximum allowed speed in hertz. The drive is equipped with configurable overspeed protection at the frequency level programmed in OVERFREQUENCY LIMIT (H.022).

For vector regulation, this parameter specifies the maximum allowed speed in RPM. The drive is equipped with fixed overspeed protection at 130% of MAXIMUM SPEED.

CURRENT LIMIT (P.005)

Provides the means to limit motor stator current while running at constant speed or during acceleration.

Parameter Range:	50 to 110%* (V/Hz) MAGNET CURRENT PRCNT (J.006) to 150% (vector)
Default Setting:	100% (V/Hz) 150% (vector)
Parameter Type:	Tunable

*For M/N 125R4140, the maximum CURRENT LIMIT setting is 100% when P.047 = 8 kHz carrier frequency.

For V/Hz regulation: Current limit is set as a percentage of the Power Module rated amps with a maximum value of 110%. 110% current limit equals the current value in P/M OUTPUT AMPS (P.095). When the output current attempts to exceed the present current limit, the output voltage and frequency are lowered as the CV3000/SF drive reduces output current.

For vector regulation: Current limit is a percentage of the value entered for MOTOR NAMEPL AMPS (J.004). The output current will be limited to the current limit value, which might result in decreasing motor speed or extended acceleration and deceleration time.

MAGNET CURRENT PRCNT (U.006)

Identifies the percentage of magnetizing current (no-load amps) with respect to motor rated amps.

Parameter Range:	10.0 to 80.0%
Default Setting:	Power Module-dependent. See the software I/M for more information.
Parameter Type:	Configurable

ATTENTION: If this parameter is set incorrectly, overcurrent or excessive heating of the motor could result. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

If the motor nameplate shows the no-load current, this parameter value can be calculated using the following formula. If no load current is not on the motor nameplate, perform the self tuning procedure to automatically calculate the result.

$$\text{Magnetizing Current} = \frac{\text{No-Load Amps}}{\text{Motor Rated Amps}} \times 100$$

Note that this parameter is only displayed if REGULATION TYPE (P.048) is set to VECTOR and if self-tuning was not performed.

The value of this parameter is automatically set if torque-control self-tuning is performed successfully.

CHAPTER 6

Using the OIM to Monitor and Control the Drive

The OIM allows you to monitor the outputs to the motor, such as speed, voltage, amperage, and power. You can choose one of several viewing options.

The OIM also allows you to control the motor. Motor control options available through the OIM include starting, stopping, jogging, and setting the manual reference and control source.

6.1 Using the OIM to Monitor Drive Outputs

You can monitor up to six drive outputs when the OIM is in monitor mode. To enter monitor mode, press PROGRAM MONITOR until the key indicator reads MONITOR. A sample of the six-output monitor mode screen when vector regulation is selected is shown in figure 6.1.

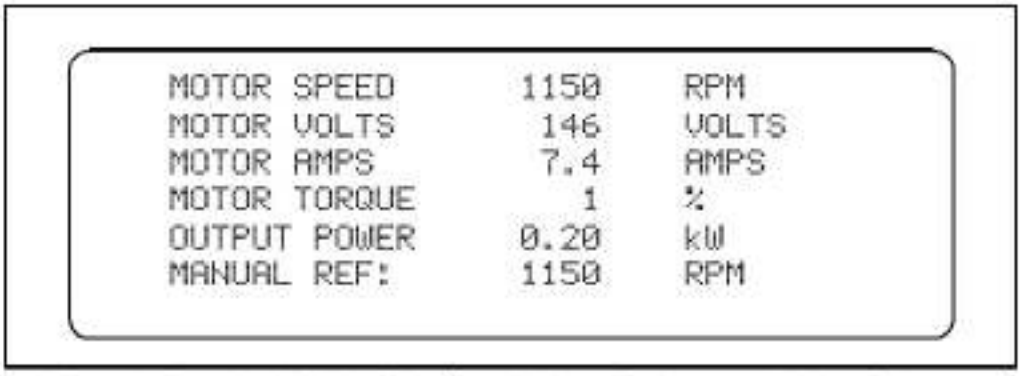


Figure 6.1 — Example of a Monitor Mode Screen for Vector Regulation with Six Outputs Displayed

The items that can be monitored depend on the regulation type set for the drive.

6.1.1 Description of the Monitor Mode Outputs

You can monitor:

- Motor speed: The actual speed of the motor as measured by a speed feedback device or regulator calculation. Displayed as a percentage, RPM (Vector regulation), hertz (V/Hz regulation), or user-defined speed units.
- Motor voltage: Drive output volts. This value is not DC bus volts.
- Motor amperage: Drive output amps.
- Motor torque: Vector regulation only. Motor output torque in percent.
- Output frequency: V/Hz regulation only. Drive output frequency in hertz.

- Output power: Output power of the drive in kilowatts. This is intended for display purposes as a general indication of output power in kilowatts.
- Reference: The speed or torque the drive attempts to reach when the drive is running. The reference will be Manual or Auto if the drive is regulating speed, or Torque Reference if the drive is regulating torque.

6.1.2 Selecting the Outputs to Monitor

You can view one of three monitor mode screens. The first monitor mode screen shows all six of the monitored outputs. The second monitor mode screen shows four of the monitored outputs in a larger text size. The third monitor mode screen shows two of the outputs without labels, in larger text so the values can be read from a distance. You can change the outputs you want to monitor at any time.

To select monitor mode:

Step 1. Press PROGRAM/MONITOR until the key indicator switches from PROGRAM to MONITOR. The monitor mode screen with six outputs is displayed, as shown in figure 6.1.

Step 2. To display the four-output monitor mode screen, press PROGRAM/MONITOR again. The screen shown in figure 6.2 is displayed.

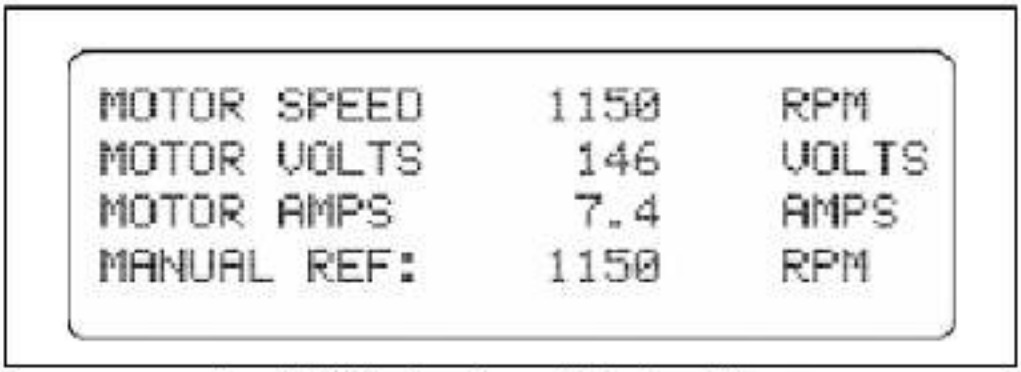


Figure 6.2 – Monitor Mode Screen with Four Outputs Displayed

Step 3. To display the two-output monitor mode screen, press PROGRAM/MONITOR again. A sample of this screen is shown in figure 6.3. You cannot change the value of the manual reference while this screen is displayed.

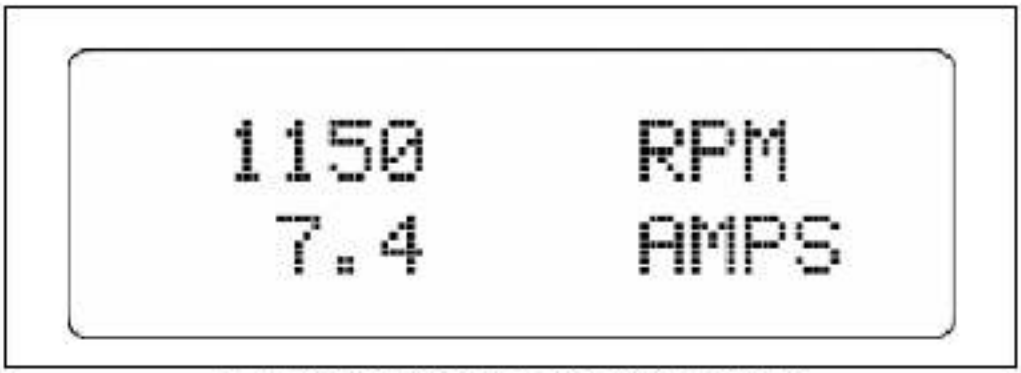


Figure 6.3 – Monitor Mode Screen with Two Outputs Displayed

Step 4. To go to program mode, press PROGRAM/MONITOR again. As you press PROGRAM/MONITOR, you will cycle between program mode and the three monitor mode screens.

6.1.3 Using Help in Monitor Mode

Pressing HELP ? in monitor mode displays the labels for the drive status indicators in the selected language. To return to monitor mode, press CANCEL X.

6.1.4 Changing the Manual Reference Using the OIM

The reference is displayed on the six- and four-output monitor mode screens. This is the speed or torque the drive attempts to reach when the drive is running. You can use the reference to adjust the drive when the control source is set to OIM, TERMBLK, or OPTION.

> **ATTENTION:** If MAN REF PRESET ENABLE is set to OFF, when switching from AUTO to MANUAL or from MANUAL to AUTO, the drive will ramp to the reference level provided by the new source at the rate specified in ACCEL TIME (P.001), DECEL TIME (P.002), ACCEL TIME - SECONDARY (P.017), or DECEL TIME - SECONDARY (P.018). Be aware that an abrupt speed change might occur depending on the new reference and the rate specified in these parameters. Failure to observe this precaution could result in bodily injury.

To change the manual reference:

Step 1. Make sure the control source is set to OIM, TERMBLK, or OPTION.

Step 2. Press PROGRAM/MONITOR until the six- or four-output monitor mode screen appears.

Step 3. Press ↑ to increase the manual reference or ↓ to decrease it. The change is displayed as you enter it.

While AUTO is selected, AUTO REF on the display changes to MANUAL REF when you press ↑ or ↓. The current manual reference is displayed as the change is made. When you release ↑ or ↓, the display returns to AUTO REF after 10 seconds.

Step 4. To use the new manual reference, set AUTO/MANUAL to MANUAL by pressing AUTO/MANUAL until the key indicator reads MANUAL.

If you cannot switch between AUTO and MANUAL using the AUTO/MAN key on the OIM, the AUTO/MAN key may be disabled by AUTO/MAN KEY DISABLE (P.052). Refer to P.052 parameter description in the software PM for information about this feature.

If the program error "LOCAL MUST NOT BE THE SELECTED CONTROL SOURCE" is displayed, the control source must be changed to OIM, TERMBLK, or OPTION before you can change the manual reference.

You can change the manual reference at any time. If AUTO/MANUAL is set to AUTO, the new manual reference will not take effect until AUTO/MANUAL is set to MANUAL.

Note that the setting of MAN REF PRESET ENABLE (P.050) affects the reference value when you go to MANUAL.

6.2 Selecting the Control Source

Use CONTROL SOURCE SELECT to select the control source for the drive.

The control source can be set to one of four options:

- **LOCAL:** The drive's front panel keypad/display is used to control the drive.
- **TERMBLK:** The signals at the Regulator board terminal strip control the drive.
- **OPTION:** An option board, such as the AutoMax Communication Network board, controls the drive.
- **OIM:** The OIM keys control the drive.

To select the control source:

Step 1. Stop the drive if it is running.

Step 2. Press CONTROL SOURCE SELECT. The CONTROL SOURCE SELECT screen is displayed, as shown in figure 6.4.

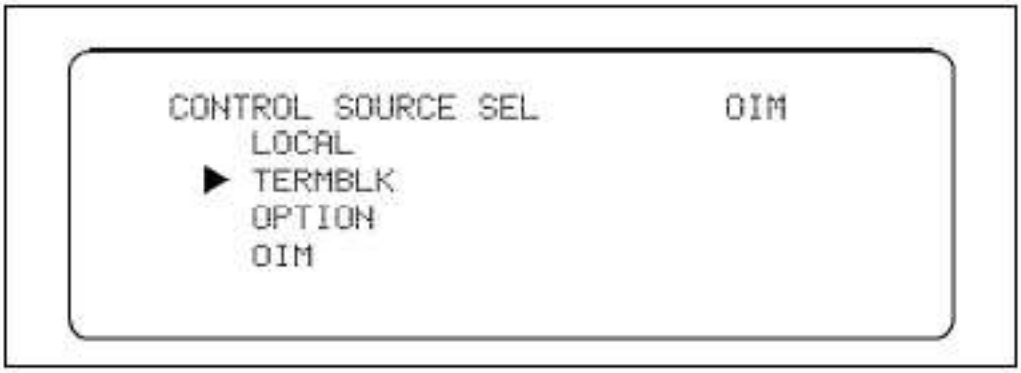


Figure 6.4 CONTROL SOURCE SELECT Screen

Step 3. Use ↑ or ↓ to move the cursor to the control source you want.

Step 4. Press ENTER to accept the new control source and return to the previous screen.

When the control source is changed to OPTION or TERMBLK, AUTO MANUAL is automatically set to AUTO. When the control source is changed from OPTION or TERMBLK to OIM or LOCAL, AUTO MANUAL is automatically set to MANUAL. When the control source is changed from OIM to LOCAL or vice versa, the AUTO MANUAL setting is not changed.

6.3 Using the OIM to Control the Drive

When the control source is set to OIM, the OIM can be used to control the drive.

> **ATTENTION:** Pressing JOG or RUN on the OIM immediately starts the motor if the control source is set to OIM. Make sure the motor and driven machinery are safe to start before pressing either of these keys. Failure to observe this precaution could result in severe bodily injury or loss of life.

6.3.1 Starting the Drive

From the OIM, you can run or jog the motor when the control source is set to OIM and the Drive Ready indicator is on.

To Run the Drive:

Press RUN to start the motor and allow it to accelerate to the reference.

To Jog the Drive:

Press JOG to jog the motor. The motor runs as long as JOG is held down. The motor ramps to stop when it is released.

6.3.2 Stopping the Drive

When the drive is running, STOP RESET stops the drive as set in STOP TYPE (P.025). When the OIM is connected and communicating with the drive, STOP RESET is always active, regardless of the control source setting.

> **ATTENTION:** The user must provide an external, hardwired emergency stop circuit outside the drive circuitry. This circuit must disable the system in case of improper operation. Uncontrolled machine operation can result if this procedure is not followed. Failure to observe this precaution could result in bodily injury.

6.3.3 Changing the Direction of the Drive

You can change the direction of motor rotation through the OIM by pressing FORWARD REVERSE.

The key indicator will flash the new direction (FORWARD or REVERSE) as the motor changes direction. When the motor is running in the new direction, the key indicator no longer flashes.

Refer to the P.027 (Forward/Reverse Configuration) parameter description in the software HM for more information.

CHAPTER 7

Troubleshooting the Drive Using the OIM

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, operate, and/or service this equipment. Read and understand this section in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

Using the OIM, you can troubleshoot drive problems using one of several methods.

- If a fault or alarm message is displayed, you can use the message and the Fault or Alarm Menu to identify the problem.
- If the drive is not ready, you can use the Diagnostics Menu to identify the problem.
- If a program error message is displayed, you can use the message to identify the problem.

7.1 Identifying Problems Indicated by Faults or Alarms

The OIM identifies problems as faults or alarms. A fault is a condition that stops the drive or prevents it from running. An alarm is a condition that you should be aware of, but it does not stop the drive or prevent it from running.

When a fault occurs:

- the fault indicator turns on.
- the fault is logged.
- the drive coasts to a stop.
- a fault message is displayed on the OIM screen, such as the one shown in figure 7.1.

```
ATTENTION!

The following fault occurred:
HIGH LINE VOLTAGE
Review fault log for more information.

Press CANCEL to continue.
```

Figure 7.1 – Example of a Fault Screen

The fault screen tells you which fault occurred - in this example, the HIGH LINE VOLTAGE fault. If more faults occur, they are displayed after CANCEL is pressed to clear the first fault.

When an alarm occurs:

- the alarm or fault indicator turns on.
- alarms are not logged.
- an alarm message is displayed on the OIM screen, such as the one shown in figure 7.2.

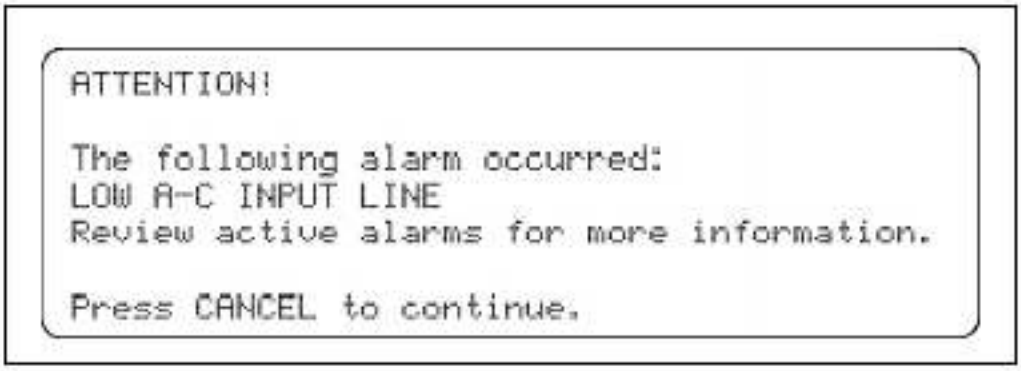


Figure 7.2 Example of an Alarm Screen

The alarm message screen tells you which alarm occurred - in this example, the LOW AC INPUT LINE alarm. Press CANCEL to clear the screen.

If a fault and an alarm occur at the same time, the fault message is displayed. If multiple faults and alarms have occurred, you can review them one at a time using the Fault and Alarm Menus.

To identify the problem when a fault or alarm occurs, use the Fault or Alarm Menu or the tables provided in chapter 5 of the software I/M. The screens in the menus and the tables give the probable cause and corrective action to take when a fault or alarm occurs.

Tables 7.3 and 7.4 in this chapter cross-reference the alarm and fault messages you will see on the OIM with the fault and alarm codes as they are listed in the software I/M and displayed on the front panel keypad/display.

When a fault is corrected, you must reset the faults before starting the drive. Alarms are automatically reset when the problem is corrected.

7.2 Reviewing and Resetting Faults Using the Fault Menu

Through the Fault Menu, you can review and reset faults. To access the Fault Menu, press [FAULT]. The key indicator displays FAULT and the Fault Menu is displayed, as shown in figure 7.3.

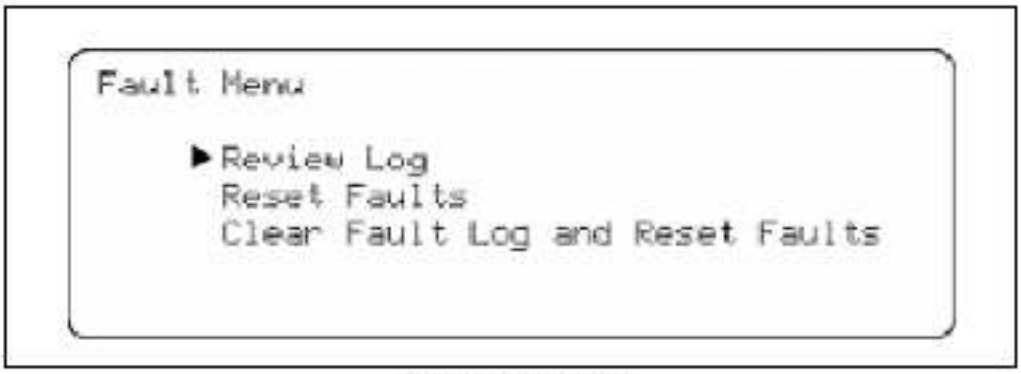


Figure 7.3 – Fault Menu

7.2.1 Reviewing the Fault Log

You can review the fault log to check fault messages and to determine when faults occurred.

Step 1. Select Review Log from the Fault Menu. The Review Log is displayed. A sample is shown in figure 7.4.

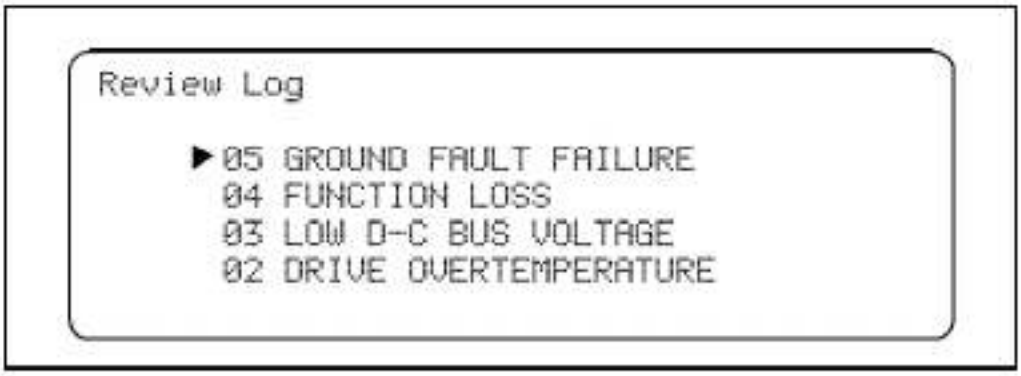


Figure 7.4 – Example of a Fault Log Screen

Log entries start with the most recent fault. If a fault is detected while you are in the log, the display is updated to show the new entry.

Step 2. To view more information about a particular fault, move the cursor to the fault and press ENTER. The fault detail screen is displayed. An example is shown in figure 7.5.

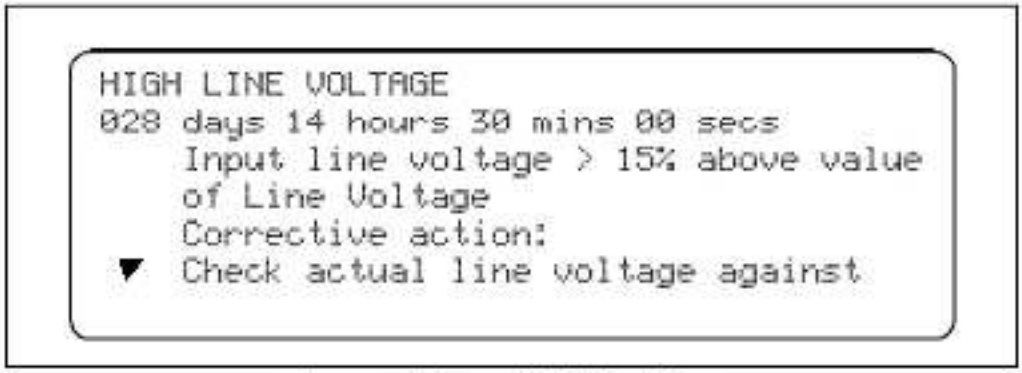


Figure 7.5 Example of a Fault Detail Screen

The first line is the one-line description of the fault.

The second line is the system day and time that the fault occurred. This information is based on a relative 248-day counter. The counter runs whenever the drive is powered. You can reset the counter using ELPSD TIME METER RST (P.030).

The rest of the screen is a description and corrective action to take. If the ▼ symbol is displayed, more information is available. Press ⇩ to read the rest of the screen.

Press CANCEL to exit this display and return to the Review Log screen.

Step 3. Repeat step 2 for any faults for which you want to view detail. When you are done, press CANCEL to exit the Review Log screen and return to the Fault Menu.

The fault log holds the 10 most recent faults that have occurred. Once the log is full, older faults are discarded from the log as new faults occur. All the entries in the fault log are retained, even if power is lost.

7.2.2 Resetting Faults and Clearing the Fault Log

You can reset faults without clearing the fault log, or reset the faults and clear the log. Note that if FLT AUTO RESET COUNTS (P.043) is not set to 0, some faults are automatically reset. See the software FM for more information on this parameter.

To reset faults without clearing the fault log:

Step 1. Select Reset Fault from the Fault Menu. Press ENTER.

Step 2. The message "ATTENTION! DRIVE FAULTS HAVE BEEN RESET" is displayed. The FAULT indicator is turned off and the faults are reset.

Step 3. Press CANCEL to return to the Fault Menu.

Faults can also be reset without clearing the fault log by:

- Pressing [STOP/RESET] when the drive is stopped and the control source is set to OIM.
- Asserting fault reset from the selected control source.

To reset the faults and clear the fault log:

Step 1. Select Clear Fault Log and Reset Faults from the Fault Menu. Press [ENTER].

Step 2. The message "ATTENTION! DRIVE FAULTS HAVE BEEN RESET. FAULT LOG HAS BEEN CLEARED" is displayed. The FAULT indicator is turned off, the faults are reset, and the fault log is cleared.

Step 3. Press [CANCEL] to return to the Fault Menu.

Step 4. Press [CANCEL] again to return to program or monitor mode.

Important: You cannot clear individual faults. This procedure clears the entire fault log.

7.3 Reviewing Active Alarms Using the Alarm Menu

You can review active alarms using the Alarm Menu. Alarms are not logged.

To review active alarms:

Step 1. Press [FAULT] until ALARM is displayed in the key indicator. The screen shown in figure 7.6 is displayed.

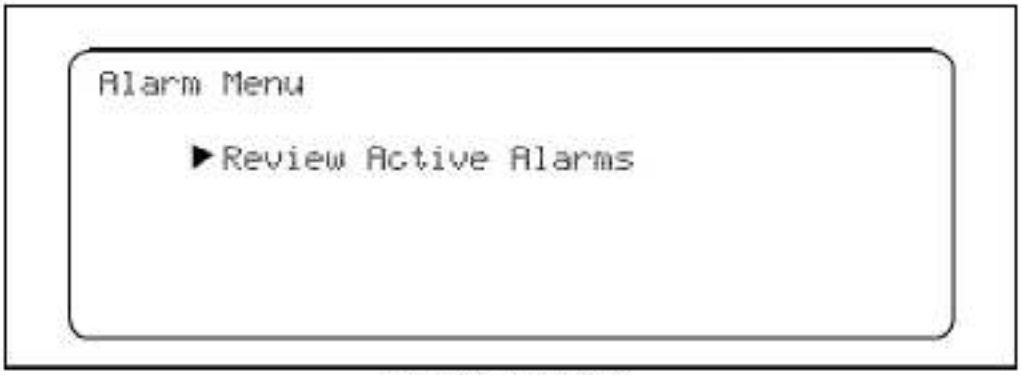


Figure 7.6 – Alarm Menu

Step 2. Select Review Active Alarms by pressing ENTER. A sample of the screen is shown in figure 7.7.

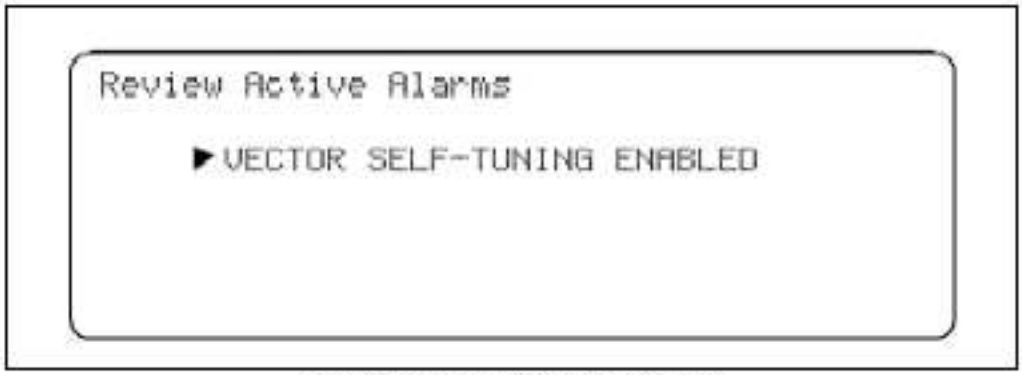


Figure 7.7 – Review Active Alarms Screen

Step 3. Move the cursor to the alarm you would like more information on. Press ENTER. The alarm detail screen for that alarm is displayed. If the ▼ symbol is displayed, more information is available. Press ⇨ to read the rest of the screen.

Step 4. Press CANCEL to the Alarm Menu.

Step 5. Press CANCEL again to return to program or monitor mode.

The alarms are cleared from the review screen when the situation that caused the alarm is resolved.

7.4 Using Diagnostics to Troubleshoot Drive Problems

The Diagnostics Menu provides information on why the drive is not ready. The diagnostics screen is continually updated with the status of the drive.

To use diagnostics:

Step 1. Press FAULT until the key indicator reads DIAGS. The Diagnostics Menu screen is displayed, as shown in figure 7.8.

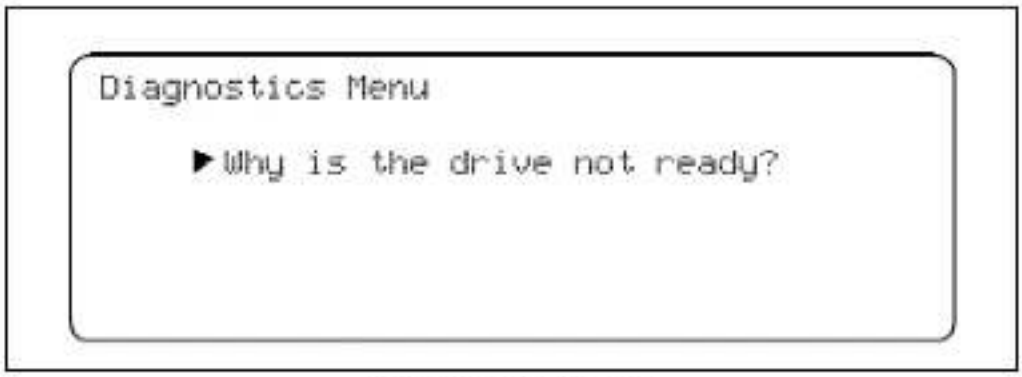


Figure 7.8 Diagnostics Menu

Step 2. If the DRIVE READY indicator is off, the drive is not ready to start. If this is the case, move the cursor to "Why is the drive not ready?" and press ENTER. The screen shows possible explanations of why the drive is not ready. If the ▼ symbol is displayed, more information is available. Press → to read the rest of the screen. Table 7.1 lists all possible responses.

Step 3. Press CANCEL to exit the screen.

Step 4. Press CANCEL again at the Diagnostics Menu to return to program or monitor mode.

Table 7.1 Possible OIM Responses to "Why is the Drive Not Ready?"

Display	Description
PRE-CHARGE IS NOT READY	The DC bus is not within required tolerance.
FP STOP ACTIVE	The front-panel STOP key is asserted.
SERIAL STOP ACTIVE	The serial port (CS3000) stop input is asserted.
ACTIVE CS STOP ACTIVE	The active control source stop input is asserted.
DRIVE NOT IDENTIFIED	The Power Module has not been identified to the regulator.
DOWNLOAD IN PROGRESS	The CS3000 configuration download procedure is in progress.
COAST/DB STOP OPEN	The coast/DB stop input (TS 29) is open.
CUSTOMER INTERLOCK OPEN	The function loss input (TS 20) is open.
MEMORY OPERATION IN PROGRESS	Non-volatile memory is being restored.
DRIVE IS IN PROCESS OF STOPPING	The drive is in the process of stopping.
THERE IS A DRIVE FAULT(S)	The drive is faulted.
THE DRIVE IS READY.	The drive is ready to run.
A STOP INPUT IS ACTIVE	A keypad stop key or the selected control source stop input is asserted.

7.5 Clearing a Programming Error Screen

Programming errors occur if you select an option that is not valid, such as attempting to set a read-only parameter. These errors do not affect drive operation and are not logged. To remove the programming error message, press CANCEL.

7.6 OIM Failures

There are three OIM failure states: link failure, fatal OIM errors, and fatal regulator failures. If one of these failures occurs, a message is displayed if possible. Refer to table 7.2 for a list of OIM failure causes and corrective actions.

If the OIM is not the control source, an OIM failure does not affect drive operation. If the OIM is the control source, an OIM failure causes the drive to stop.

ATTENTION: STOP is not active if an OIM failure occurs. Use another control source to stop the drive. Failure to observe this precaution could result in severe bodily injury or loss of life.

Table 7.2 – OIM Failure Causes and Corrective Actions

Failure State	Cause	Corrective Action
Link Failure	Communication between the OIM and Regulator board is lost. This can occur if the cable between them is disconnected.	Check the cable between the OIM and the Regulator board. The OIM attempts to re-establish communication. If it succeeds, the message "Press CANCEL to continue" is displayed. Press CANCEL to return to program or monitor mode.
Fatal OIM Error (FATAL KEYPAD ERROR is displayed on OIM)		
• FAULT CODE – 14	A version 1.x OIM is connected to a version 6.x or later GV3000/SE drive.	Replace the version 1.x OIM with a version 2.x or later OIM.
• FAULT CODE – 22	A FlexPak 3000 OIM is connected to the GV3000/SE drive.	Replace the FlexPak 3000 OIM with a GV3000/SE OIM.
• All Other Fatal OIM Errors	The OIM did not pass self-diagnostics.	Cycle drive power. If this does not correct the problem, contact Reliance Electric for assistance.
Fatal Regulator Failure	There is a problem with the drive.	Cycle drive power. If this does not correct the problem, contact Reliance Electric for assistance.

7.7 Alarm and Fault Names Cross-Referenced to Front Panel Keypad/Display Codes

The following tables list the fault and alarm messages that can occur on the OIM. They are cross-referenced to the fault and alarm messages as listed in chapter 5 of the software I/M.

Table 7.3 – List of Alarms Cross-Referenced to Front Panel Keypad/Display Alarm Codes

OIM Alarm Name	Front Panel Keypad/Display Code	Software I/M Alarm Description
ANALOG IN SIGNAL LOSS[1]	AIn	Analog input signal loss
HIGH DC BUS VOLTAGE[2]	HIdc	High DC bus voltage
LOW AC INPUT LINE	LIL	Low AC input line
VECTOR SELF-TUNING ACTIVE	S-Ac	Vector self-tuning active
VECTOR SELF-TUNING ENABLED	S-En	Vector self-tuning enabled
V/HZ IDENT PROCEDURE ACTIVE	I-Ac	V/Hz identification procedure active
V/HZ IDENT PROCEDURE ENABLED	I-En	V/Hz identification procedure enabled

[1]Only supported with GV3000/SE drive version 6.03 and later.
[2]Only supported with GV3000/SE drive versions 6.0 and later.

Table 7.4 – List of Fault Codes Cross-Referenced to Front Panel Keypad/Display Fault Codes

OIM Fault Name	Front Panel Keypad/Display Code	Software I/M Fault Description
ANALOG IN SIGNAL LOSS[1]	AIn	Analog input signal loss
ASYMMETRICAL BUS CHARGE	UbS	Asymmetrical bus charge
COMM LOSS BETWEEN REGULATOR/PC	Srl	Communication loss between regulator/PC
DC BUS CHARGING BYPASS CONTACTOR	bYC	DC bus charging bypass contactor
DEFAULT PARAMETER RESTORE	CHS	Default parameter restore (checksum error)
DRIVE OVERTEMPERATURE	OH	Drive overtemperature
DRIVE POWER ELECTRONIC OVERLOAD	PUo	Drive power electronic overload
ENCODER LOSS	EL	Encoder loss
FUNCTION LOSS	FL	Function loss

Table 7.1 – List of Fault Codes Cross-Referenced to Front Panel Keypad/Display Fault Codes (Continued)

OIM Fault Name	Front Panel Keypad/Display Code	Software I/M Fault Description
GROUND FAULT FAILURE	EC	Earth current failure (ground fault)
HIGH DC BUS VOLTAGE	HU	High DC bus voltage
HIGH LINE VOLTAGE	HIL	High line voltage (Prior to Version 5.1, V/Hz only)
HIGH TIME IDENTIFICATOIN ABORTED	HIc	High time identification aborted
IDENT REQUEST NOT YET PERFORMED	nId	Identification Request not yet performed (V/Hz only)
INPUT PHASE LOSS	IPL	Input phase loss
LOW DC BUS VOLTAGE	LU	Low DC bus voltage
MISSING POWER MODULE ID CONNECTOR	PUc	Missing Power Module ID connector
MOTOR OVERLOAD	OL	Motor overload
MOTOR PHASE LOSS	PH	Motor phase loss
NETWORK COMM LOSS	nCL	Network comm loss
NVRAM WRITE FAILURE	EEr	NVRAM write failure
OUTPUT PHASE LOSS	OPL	Motor output phase loss
OVERCURRENT (AT ACCELERATION)	OCA	Overcurrent (at acceleration)
OVERCURRENT (AT DC BRAKING)	OCb	Overcurrent (at DC braking)
OVERCURRENT (AT DECELERATION)	OCd	Overcurrent (at deceleration)
OVERCURRENT (STEADY STATE)	OC	Overcurrent (steady state)
OVERFREQUENCY	OF	Over requency
OVERSPEED	OSP	Overspeed (vector only)
POWER MODULE NOT IDENTIFIED	PUn	Power Module not identified after default restore
SELF-TUNING STATUS	SF	Self-tuning status (vector only)
SPURIOUS HOST PC COMM INT	JAr	Spurious Host PC comm interrupt

[1]Only supported with GV3000/SE drive versions 6.0 and later.

APPENDIX A

OIM Parameters Cross-Referenced to Software I/M Parameters and Parameter Numbers

The parameter names used on the OIM and the names listed in the software I/M are slightly different. Table A.1 lists all of the OIM parameter names and the corresponding software I/M parameter name. It also lists the menu path used to access the parameter through the OIM. You can access all of the parameters through the All Parameters menu.

Table A.2 lists parameters by parameter number.

The RMI parameters listed here are described in the Remote Meter Interface (RMI) Board I/M (D2-3341).

Table A.1 – OIM Parameters Cross-Referenced to Software I/M Parameters and Parameter Numbers

OIM Parameter Name	Software I/M Parameter Name	Type	Parameter Number	OIM Menu Path
AC LINE VOLTAGE	AC Line Volts	Input	H.021	Application Setup (V/Hz)
AC LINE VOLTAGE	AC Line Volts	Input	U.018	Application Setup (Vector)
ACCEL TIME	Accel Time 1 (RAMP 1)	Input	P.001	Speed Control ⇒ Accel & Decel Times Quick Start (V/Hz and Vector)
ACCEL TIME - SECONDARY	Accel Time 2 (RAMP 2)	Input	P.017	Speed Control ⇒ Accel & Decel Times
AUTO/MAN KEY DISABLE*	AUTO/MAN Key Disable	Input	P.052	Application Setup (V/Hz and Vector)
AVOID FREQ BAND 1	Avoidance Frequency Band 1	Input	H.011	Application Setup (V/Hz) ⇒ Avoidance Frequencies
AVOID FREQ BAND 2	Avoidance Frequency Band 2	Input	H.013	Application Setup (V/Hz) ⇒ Avoidance Frequencies
AVOID FREQ BAND 3	Avoidance Frequency Band 3	Input	H.015	Application Setup (V/Hz) ⇒ Avoidance Frequencies

Table A.A — OIM Parameters Cross-Referenced to Software I/M Parameters and Parameter Numbers (Continued)

OIM Parameter Name	Software I/M Parameter Name	Type	Parameter Number	OIM Menu Path
AVOID FREQ ENABLE	Avoidance Frequency Enable	Input	H.009	Application Setup (V/Hz) ⇒ Avoidance Frequencies
AVOID FREQ MIDPOINT 1	Avoidance Frequency Midpoint 1	Input	H.010	Application Setup (V/Hz) ⇒ Avoidance Frequencies
AVOID FREQ MIDPOINT 2	Avoidance Frequency Midpoint 2	Input	H.012	Application Setup (V/Hz) ⇒ Avoidance Frequencies
AVOID FREQ MIDPOINT 3	Avoidance Frequency Midpoint 3	Input	H.014	Application Setup (V/Hz) ⇒ Avoidance Frequencies
CARRIER FREQ - KHZ	Carrier Frequency (kHz)	Input	P.047	Application Setup (V/Hz and Vector)
CURRENT COMPOUND GAIN*	Current Compounding Gain	Input	U.026	Performance Tuning (Vector)⇒Speed Loop Tuning
CURRENT LIMIT	Current Limit	Input	P.005	Application Setup (V/Hz and Vector) Quick Start (V/Hz and Vector)
DC BRAKING ENABLE	DC Braking Enable	Input	H.005	Application Setup (V/Hz) ⇒ DC Braking
DC BRAKING START FREQ	DC Braking Start Frequency	Input	H.006	Application Setup (V/Hz) ⇒ DC Braking
DC BRAKING TIME	DC Braking Time	Input	H.008	Application Setup (V/Hz) ⇒ DC Braking
DC BRAKING CURRENT*	DC Braking Current	Input	H.007	Application Setup (V/Hz) ⇒ DC Braking
DECEL TIME	Decel Time 1 (RAMP 1)	Input	P.002	Speed Control ⇒ Accel & Decel Times Quick Start (V/Hz and Vector)
DECEL TIME - SECONDARY	Decel Time 2 (RAMP 2)	Input	P.018	Speed Control ⇒ Accel & Decel Times
DEFAULTS TYPE	Country Defaults	Input	P.049	Memory Functions
DIAGNOSTICS DISPLY	Diagnostics Display	Input	P.091	Drive Status
DIAGNOSTICS SELECT	Diagnostics Source	Input	P.090	Drive Status
DRAW GAIN PERCENT	Draw Gain Percentage	Input	P.016	Speed Control ⇒ Draw & Trim Configure
ELAPSED TIME METER	Elapsed Time Meter	Read only	P.029	Drive Status
ELPSD TIME METER RST	Elapsed Time Meter Reset	Input	P.030	Drive Status

Table A.1 – OIM Parameters Cross-Referenced to Software I/M Parameters and Parameter Numbers (Continued)

OIM Parameter Name	Software I/M Parameter Name	Type	Parameter Number	OIM Menu Path
ENCODER LOSS ENABLE	Encoder Loss Enable	Input	P.039	Application Setup (Vector) ⇒ Fault Functions
ENCODER PPR	Encoder PPR	Input	U.007	Quick Start (Vector) Application Setup (Vector)
FLD-WEAKEN START RPM	Field Weakening Start RPM	Input	U.016	Application Setup (Vector)
FLT AUTO RESET COUNTS	Fault Auto Reset Attempts	Input	P.043	Application Setup (V/Hz and Vector) ⇒ Fault Functions
FLT AUTO RESET TIME	Fault Auto Reset Time	Input	P.044	Application Setup (V/Hz and Vector) ⇒ Fault Functions
FLX REG INT GAIN	Flux Current Regulator Integral Gain	Input	U.020	Performance Tuning (Vector) ⇒ Torque Loop Tuning
FLX REG PROP GAIN	Flux Current Regulator Proportional Gain	Input	U.019	Performance Tuning (Vector) ⇒ Torque Loop Tuning
FORWARD/REV CONFIGURE	Forward/Reverse Configuration	Input	P.027	Speed Control
FRONT PNL SPD SCALING	Speed Display Scaling	Input	P.028	Speed Control
FUNCT LOSS RESPONSE	Function Loss Response	Input	P.026	Application Setup (V/Hz and Vector) ⇒ Fault Functions
HIGH BUS FLT AVOID EN*	High DC Bus Fault Avoidance Enable	Input	U.024	Application Setup (Vector)⇒ Fault Functions
IDENTIFICATION RESULT	Identification Result	Read only	H.019	Performance Tuning (V/Hz)
IDENTIFICATION RQST	Identification Request	Input	H.020	Performance Tuning (V/Hz)
INERTIA COMP GAIN*	Inertia Compensation Gain	Input	U.027	Performance Tuning (Vector)⇒Speed Loop Tuning
INPUT PWR/SNUB CONFIG	Input Power/Snubber Configuration	Input	H.017	Application Setup (V/Hz)
JOG RAMP ACCEL TIME	Jog Ramp Accel Time	Input	P.021	Speed Control ⇒ Jog Configure
JOG RAMP DECEL TIME	Jog Ramp Decel Time	Input	P.022	Speed Control ⇒ Jog Configure
JOG SPEED REFERENCE	Jog Speed Reference	Input	P.020	Speed Control ⇒ Jog Configure

Table A.A — OIM Parameters Cross-Referenced to Software I/M Parameters and Parameter Numbers (Continued)

OIM Parameter Name	Software I/M Parameter Name	Type	Parameter Number	OIM Menu Path
LEVEL SENSE START EN	Level Sense Start Enable	Input	P.054	Application Setup (V/Hz and Vector)
LINE DIP RIDE THRU TM	Line Dip Ride-Through Time	Input	P.042	Application Setup (V/Hz)
LOSSES COMP GAIN	Losses Compensation Gain	Input	U.028	Performance Tuning (Vector)⇒ Speed Loop Tuning
LOW BUS FLT AVOID EN	Low DC Bus Fault Avoidance Enable	Input	U.023	Application Setup (Vector)⇒ Fault Functions
MAGNET CURRENT PRCNT	Magnetizing Current	Input	U.006	Quick Start (Vector) Motor Data (Vector)
MAN REF PRESET ENABLE	Manual Reference Preset Enable	Input	P.053	Application Setup (V/Hz and Vector)
MAXIMUM SPEED	Maximum Speed	Input	P.004	Speed Control ⇒ Speed Limits Quick Start (V/Hz and Vector)
MINIMUM SPEED	Minimum Speed	Input	P.003	Speed Control ⇒ Speed Limits Quick Start (V/Hz and Vector)
MOP ACCEL DECEL TIME	MOP Accel/Decel Time	Input	P.023	Regulator Terminal Strip ⇒ MOP Configuration
MOP RESET CONFIG	MOP Reset Configuration	Input	P.024	Regulator Terminal Strip ⇒ MOP Configuration
MOTOR NAMEPL AMPS	Motor Nameplate Amps	Input	H.002	Motor Data (V/Hz) Quick Start (V/Hz)
MOTOR NAMEPL AMPS	Motor Nameplate Amps	Input	U.004	Quick Start (Vector) Motor Data (Vector)
MOTOR NAMEPL BASE FRQ	Motor Nameplate Base Frequency	Input	H.001	Motor Data (V/Hz) Quick Start (V/Hz)
MOTOR NAMEPL BASE FRQ	Motor Nameplate Base Frequency	Input	U.003	Quick Start (Vector) Motor Data (Vector)
MOTOR NAMEPL HP	Motor Nameplate Horsepower	Input	U.022	Quick Start (Vector) Motor Data (Vector)

Table A.1 – OIM Parameters Cross-Referenced to Software I/M Parameters and Parameter Numbers (Continued)

OIM Parameter Name	Software I/M Parameter Name	Type	Parameter Number	OIM Menu Path
MOTOR NAMEPL RPM	Motor Nameplate RPM	Input	U.005	Quick Start (Vector) Motor Data (Vector)
MOTOR NAMEPL VOLTS	Motor Nameplate Volts	Input	H.000	Motor Data (V/Hz) Quick Start (V/Hz)
MOTOR NAMEPL VOLTS	Motor Nameplate Volts	Input	U.007	Quick Start (Vector) Motor Data (Vector)
MOTOR OVERLOAD ENABLE	Motor Overload Enable	Input	P.040	Application Setup (V/Hz and Vector) ⇒ Fault Functions
MOTOR OVERLOAD TYPE	Motor Overload Type	Input	P.041	Application Setup (V/Hz and Vector) ⇒ Fault Functions
MOTOR POLES	Motor Poles	Input	U.002	Quick Start (Vector) Motor Data (Vector)
MOTOR TOP SPEED	Motor Top Speed	Input	U.017	Application Setup (Vector)
NETW CONNECT TYPE	Network Connection Type	Input	P.061	Option Port Configuration ⇒ Network Configuration
NETW DROP NUMBER	Network Drop Number	Input	P.060	Option Port Configuration ⇒ Network Configuration
NETW COM LOSS RESP	Option Port: Communication Loss Response	Input	P.062	Option Port Configuration ⇒ Network Configuration
NETW REF SOURCE	Option Port: Network Reference Source	Input	P.063	Option Port Configuration ⇒ Network Configuration
NETW TRIM REF SOURCE	Option Port: Network Trim Reference Source	Input	P.064	Option Port Configuration ⇒ Network Configuration
NETW TYPE AND VERS	Option Port: Type and Version	Read only	P.065	Option Port Configuration ⇒ Network Configuration
OCL FEEDBACK SOURCE*	Outer Control Loop Feedback Source	Input	U.040	Performance Tuning (Vector)⇒Outer Control Loop
OCL INTEGRAL GAIN*	Outer Control Loop Integral Gain	Input	U.040	Performance Tuning (Vector)⇒Outer Control Loop
OCL LEAD/LAG LOW FREQ*	Outer Control Loop Lead/Lag Low Frequency	Input	U.042	Performance Tuning (Vector)⇒Outer Control Loop

Table A.F – OIM Parameters Cross-Referenced to Software HIM Parameters and Parameter Numbers (Continued)

OIM Parameter Name	Software HIM Parameter Name	Type	Parameter Number	OIM Menu Path
OCL LEAD/LAG RATIO	Outer Control Loop Lead/Lag Ratio	Input	U.043	Performance Tuning (Vector)⇒Outer Control Loop
OCL LEAD/LAG SELECT	Outer Control Loop Lead/Lag Select	Input	U.041	Performance Tuning (Vector)
OCL PROPORTIONAL GAIN	Outer Control Loop ProportionalGain	Input	U.045	Performance Tuning (Vector)⇒Outer Control Loop
OCL PROP TRIM ENABLE	Outer Control Loop Proportional Trim Enable	Input	U.048	Performance Tuning (Vector)⇒Outer Control Loop
OCL REFERENCE GAIN	Outer Control Loop Reference Gain	Input	U.044	Performance Tuning (Vector)⇒Outer Control Loop
OCL TRIM RANGE PERCNT	Outer Control Loop Trim Range Percentage	Input	U.047	Performance Tuning (Vector)⇒Outer Control Loop
OUTPUT PHASE LOSS EN	Output Phase Loss Enable	Input	P.045	Application Setup (V/Hz and Vector) ⇒ Fault Functions
OUTPUT REG 1 SOURCE	Network Output Register 1 Source	Input	P.066	Option Port Configuration⇒ Network Configuration
OUTPUT REG 2 SOURCE	Network Output Register 2 Source	Input	P.067	Option Port Configuration⇒ Network Configuration
OUTPUT REG 3 SOURCE	Network Output Register 3 Source	Input	P.068	Option Port Configuration⇒ Network Configuration
OUTPUT REG 4 SOURCE	Network Output Register 4 Source	Input	P.069	Option Port Configuration⇒ Network Configuration
OUTPUT RELAY CONFIG	Output Relay Configuration	Input	P.013	Regulator Terminal Strip
OVERFREQUENCY LIMIT	Overfrequency Limit	Input	H.022	Application Setup (V/Hz)
P/M OUTPUT AMPS	Power Module Output Amps	Read only	P.095	Drive Status
PRESET SPEED 1	Preset Speed 1	Input	P.031	Regulator Terminal Strip ⇒ Preset Speed Setup
PRESET SPEED 2	Preset Speed 2	Input	P.032	Regulator Terminal Strip ⇒ Preset Speed Setup
PRESET SPEED 3	Preset Speed 3	Input	P.033	Regulator Terminal Strip ⇒ Preset Speed Setup
PRESET SPEED 4	Preset Speed 4	Input	P.034	Regulator Terminal Strip ⇒ Preset Speed Setup

Table A.1 – OIM Parameters Cross-Referenced to Software I/M Parameters and Parameter Numbers (Continued)

OIM Parameter Name	Software I/M Parameter Name	Type	Parameter Number	OIM Menu Path
PRESET SPEED 5	Preset Speed 5	Input	P.035	Regulator Terminal Strip ⇒ Preset Speed Setup
PRESET SPEED 6	Preset Speed 6	Input	P.036	Regulator Terminal Strip ⇒ Preset Speed Setup
PRESET SPEED 7	Preset Speed 7	Input	P.037	Regulator Terminal Strip ⇒ Preset Speed Setup
PRESET SPEED 8	Preset Speed 8	Input	P.038	Regulator Terminal Strip ⇒ Preset Speed Setup
PROGRAMMING DISABLE	Programming Disable	Input	P.051	Memory Functions ⇒ Programming Enable/Disable
REGULATION TYPE	Volts/Hertz or Vector Regulator	Input	P.048	Quick Start (V/Hz and Vector)
RESTORE DEFAULTS	Restore Defaults	Input	P.050	Memory Functions
RMI ANLG INPUT GAIN	Analog Input Gain	Input	r.011	Option Port Configuration ⇒ RMI Inputs ⇒ RMI Analog Inputs
RMI ANLG INPUT OFFS	Analog Input Offset	Input	r.010	Option Port Configuration ⇒ RMI Inputs ⇒ RMI Analog Inputs
RMI ANLG OUT 1 GAIN	Analog Output 1 Gain	Input	r.003	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Analog Outputs
RMI ANLG OUT 1 OFFS	Analog Output 1 Offset	Input	r.002	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Analog Outputs
RMI ANLG OUT 2 GAIN	Analog Output 2 Gain	Input	r.006	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Analog Outputs
RMI ANLG OUT 2 OFFS	Analog Output 2 Offset	Input	r.005	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Analog Outputs
RMI ANLG OUT 3 GAIN	Analog Output 3 Gain	Input	r.009	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Analog Outputs
RMI ANLG OUT 3 OFFS	Analog Output 3 Offset	Input	r.008	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Analog Outputs

Table A.1 – OIM Parameters Cross-Referenced to Software I/M Parameters and Parameter Numbers (Continued)

OIM Parameter Name	Software I/M Parameter Name	Type	Parameter Number	OIM Menu Path
RMI ANLG OUTPUT 1	Analog Output 1 Source	Input	r.001	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Analog Outputs
RMI ANLG OUTPUT 2	Analog Output 2 Source	Input	r.004	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Analog Outputs
RMI ANLG OUTPUT 3	Analog Output 3 Source	Input	r.007	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Analog Outputs
RMI CURR DET HYSTER	Current Detection Hysteresis	Input	r.060	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Current Compare Levels
RMI CURR DET LEVEL 1	Current Detection Level 1	Input	r.057	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Current Compare Levels
RMI CURR DET LEVEL 2	Current Detection Level 2	Input	r.058	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Current Compare Levels
RMI CURR DET LEVEL 3	Current Detection Level 3	Input	r.059	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Current Compare Levels
RMI DIG INPUT CONFIG	Digital Input Configuration	Input	r.030	Option Port Configuration ⇒ RMI Inputs ⇒ RMI Digital Inputs
RMI DIG OUT1 DLY TIME	Digital Output 1 Delay Time	Input	r.040	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Digital Outputs
RMI DIG OUT2 DLY TIME	Digital Output 2 Delay Time	Input	r.041	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Digital Outputs
RMI DIG OUT3 DLY TIME	Digital Output 3 Delay Time	Input	r.042	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Digital Outputs

Table A.1 – OIM Parameters Cross-Referenced to Software I/M Parameters and Parameter Numbers (Continued)

OIM Parameter Name	Software I/M Parameter Name	Type	Parameter Number	OIM Menu Path
RMI DIG OUT4 DLY TIME	Digital Output 4 Delay Time	Input	r.043	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Digital Outputs
RMI DIG OUTPUT 1 CNF	Digital Output 1 Configuration	Input	r.031	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Digital Outputs
RMI DIG OUTPUT 2 CNF	Digital Output 2 Configuration	Input	r.032	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Digital Outputs
RMI DIG OUTPUT 3 CNF	Digital Output 3 Configuration	Input	r.033	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Digital Outputs
RMI DIG OUTPUT 4 CNF	Digital Output 4 Configuration	Input	r.034	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Digital Outputs
RMI FREQ INPUT GAIN	Frequency Input Gain	Input	r.016	Option Port Configuration ⇒ RMI Inputs ⇒ RMI Frequency Inputs
RMI FREQ INPUT OFFS	Frequency Input Offset	Input	r.015	Option Port Configuration ⇒ RMI Inputs ⇒ RMI Frequency Inputs
RMI FREQ SAMP PERIOD	Frequency Input Sample Period	Input	r.014	Option Port Configuration ⇒ RMI Inputs ⇒ RMI Frequency Inputs
RMI LOW SPD DET LEVEL	Low Speed Detection Level	Input	r.058	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Speed Compare Levels
RMI PI REG INT GAIN	PI Regulator Integral Gain	Input	r.022	Option Port Configuration ⇒ RMI Inputs ⇒ RMI PropInt Configuration
RMI PI REG OFFSET	PI Regulator Offset	Input	r.020	Option Port Configuration ⇒ RMI Inputs ⇒ RMI PropInt Configuration
RMI PI REG PROP GAIN	PI Regulator Proportional Gain	Input	r.021	Option Port Configuration ⇒ RMI Inputs ⇒ RMI PropInt Configuration

Table A.1 – OIM Parameters Cross-Referenced to Software (W) Parameters and Parameter Numbers (Continued)

OIM Parameter Name	Software (W) Parameter Name	Type	Parameter Number	OIM Menu Path
RMI RELAY OUTP 1 CNF	Relay Output 1 (NO) Configuration	Input	r.035	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Relay Outputs
RMI RELAY OUTP 2 CNF	Relay Output 2 (NO/NC) Configuration	Input	r.036	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Relay Outputs
RMI RELAY OUTP 3 CNF	Relay Output 3 (NO/NC) Configuration	Input	r.037	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Relay Outputs
RMI RLY OUT1 DLY TIME	Relay Output 1 Delay Time	Input	r.044	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Relay Outputs
RMI RLY OUT2 DLY TIME	Relay Output 2 Delay Time	Input	r.045	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Relay Outputs
RMI RLY OUT3 DLY TIME	Relay Output 3 Delay Time	Input	r.046	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Relay Outputs
RMI SPEED DET HYSTER	Speed Detection Hysteresis Band	Input	r.053	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Speed Compare Levels
RMI SPEED DET LEVEL 1	Speed Detection Level 1	Input	r.050	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Speed Compare Levels
RMI SPEED DET LEVEL 2	Speed Detection Level 2	Input	r.051	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Speed Compare Levels
RMI SPEED DET LEVEL 3	Speed Detection Level 3	Input	r.052	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Speed Compare Levels
RMI TRQ DET HYSTER	Torque Detection Hysteresis	Input	r.066	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Torque Compare Levels
RMI TRQ DET LEVEL 1	Torque Detection Level 1	Input	r.063	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Torque Compare Levels

Table A.1 – OIM Parameters Cross-Referenced to Software I/M Parameters and Parameter Numbers (Continued)

OIM Parameter Name	Software I/M Parameter Name	Type	Parameter Number	OIM Menu Path
RMI TRQ DET LEVEL 2	Torque Detection Level 2	Input	r.064	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Torque Compare Levels
RMI TRQ DET LEVEL 3	Torque Detection Level 3	Input	r.065	Option Port Configuration ⇒ RMI Outputs ⇒ RMI Torque Compare Levels
RMI TRQ/CURR LIM SRC	Torque/Current Limit Source	Input	r.025	Option Port Configuration ⇒ RMI Inputs
ROTOR TIME CONSTANT	Rotor Time Constant	Input	U.027	Motor Data (Vector)
S-CURVE ENABLE	S-Curve Enable	Input	P.019	Speed Control
SELECTED P/M TYPE	Power Module Type	Read only	P.009	Drive Status
SLIP COMPENSATION	Slip Compensation	Input	H.004	Performance Tuning (V/Hz)
SOFTWARE VERSION NUM	Software Version Number	Read only	P.098	Drive Status
SPEED REG INT GAIN	Speed Regulator Integral Gain	Input	U.013	Performance Tuning (Vector) ⇒ Speed Loop Tuning
SPEED REG PROP GAIN	Speed Regulator Proportional Gain	Input	U.012	Performance Tuning (Vector) ⇒ Speed Loop Tuning
STOP/RST KEY DISABLE	STOP/RESET Key Disable	Input	P.055	Application Setup (V/Hz and Vector)
STOP TYPE	Stop Type	Input	P.025	Application Setup (V/Hz and Vector)
SVC FLUX REG GAIN	SVC Flux Current Regulator Gain	Input	U.032	Performance Tuning (Vector)⇒Sensorless Vector Tuning
SVC SLIP ADJUST	SVC Slip Adjust	Input	U.030	Performance Tuning (Vector)⇒Sensorless Vector Tuning
SVC SYNC DIRECTION	SVC Sync Direction	Input	U.031	Performance Tuning (Vector)⇒Sensorless Vector Tuning
SYNC DIRECTION	Sync Direction	Input	H.016	Performance Tuning (V/Hz)
TORQUE BOOST VOLTAGE	Torque Boost Voltage	Input	H.003	Application Setup (V/Hz)
TORQUE REF SOURCE SEL	Torque Reference Source	Input	U.000	Application Setup (Vector)

Table A.1 — OIM Parameters Cross-Referenced to Software I/M Parameters and Parameter Numbers (Continued)

OIM Parameter Name	Software I/M Parameter Name	Type	Parameter Number	OIM Menu Path
TORQUE REG INT GAIN	Torque Regulator Integral Gain	Input	U.015	Performance Tuning (Vector) ⇒ Torque Loop Tuning
TORQUE REG PROP GAIN	Torque Regulator Proportional Gain	Input	U.014	Performance Tuning (Vector) ⇒ Torque Loop Tuning
TORQUE SELF-TUNE EN	Torque Self-Tune Enable	Input	U.008	Quick Start (Vector) Performance Tuning (Vector) ⇒ Self Tuning Parameters
TORQUE SELF-TUNE RSLT	Torque Self-Tune Result	Read only	U.009	Performance Tuning (Vector) ⇒ Self Tuning Parameters
TRIM GAIN PERCENT	Trim Gain Percentage	Input	P.015	Speed Control ⇒ Draw & Trim Configure
TRIM REF SOURCE	Trim Reference Source	Input	P.014	Speed Control ⇒ Draw & Trim Configure
TS ANALOG IN CONFIG	Terminal Strip Analog Input Configure	Input	P.011	Regulator Terminal Strip
TS ANALOG IN GAIN	Terminal Strip Analog Input Gain	Input	P.010	Regulator Terminal Strip
TS ANALOG IN OFFSET	Terminal Strip Analog Input Offset	Input	P.009	Regulator Terminal Strip
TS ANALOG OUT SOURCE	Terminal Strip Analog Output Source	Input	P.012	Regulator Terminal Strip
TS DIG INPUT CONFIG	Terminal Strip Digital Inputs Configure	Input	P.007	Regulator Terminal Strip
TS SPEED REF SEL	Terminal Strip Speed Reference Source	Input	P.008	Regulator Terminal Strip
V/HZ CURVE TYPE	Volts/Hertz Curve Type	Input	H.018	Application Setup (V/Hz)
ZERO SPEED HOLD TIME*	Zero Speed Hold Time	Input	U.025	Application Setup (Vector)

*Only supported for GV3000/SE Regulator board versions 6.3 and later.

Table A.2 – OIM Parameters Listed by Parameter Number

Parameter Number	OIM Parameter Name
P.000	CONTROL SOURCE SEL
P.001	ACCEL TIME
P.002	DECEL TIME
P.003	MINIMUM SPEED
P.004	MAXIMUM SPEED
P.005	CURRENT LIMIT
P.007	TS DIG INPUT CONFIG
P.008	TS SPEED REF SEL
P.009	TS ANALOG IN OFFSET
P.010	TS ANALOG IN GAIN
P.011	TS ANALOG IN CONFIG
P.012	TS ANALOG OUT SOURCE
P.013	OUTPUT RELAY CONFIG
P.014	TRIM REF SOURCE
P.015	TRIM GAIN PERCENT
P.016	DRAW GAIN PERCENT
P.017	ACCEL TIME - SECONDARY
P.018	DECEL TIME - SECONDARY
P.019	S-CURVE ENABLE
P.020	JOG SPEED REFERENCE
P.021	JOG RAMP ACCEL TIME
P.022	JOG RAMP DECEL TIME
P.023	MOP ACCEL DECEL TIME
P.024	MOP RESET CONFIG
P.025	STOP TYPE
P.026	FUNCT LOSS RESPONSE
P.027	FORWARD/REV CONFIGURE
P.028	FRONT PNL SPD SCALING
P.029	ELAPSED TIME METER
P.030	ELPSD TIME METER RST
P.031	PRESET SPEED 1
P.032	PRESET SPEED 2
P.033	PRESET SPEED 3
P.034	PRESET SPEED 4
P.035	PRESET SPEED 5
P.036	PRESET SPEED 6

Table A.2 – OIM Parameters Listed by Parameter Number (Continued)

Parameter Number	OIM Parameter Name
P.037	PRESET SPEED 7
P.038	PRESET SPEED 8
P.039	ENCODER LOSS ENABLE
P.040	MOTOR OVERLOAD ENABLE
P.041	MOTOR OVERLOAD TYPE SEL
P.042	LINE DIP RIDE THRU TM
P.043	FLT AUTO RESET COUNTS
P.044	FLT AUTO RESET TIME
P.045	OUTPUT PHASE LOSS EN
P.047	CARRIER FREQ - KHZ
P.048	REGULATION TYPE
P.049	DEFAULTS TYPE
P.050	RESTORE DEFAULTS
P.051	PROGRAMMING DISABLE
P.052	AUTO/MAN KEY DISABLE
P.053	MAN REF PRESET ENABLE
P.054	LEVEL SENSE START ENABLE
P.055	STOP/RST KEY DISABLE
P.060	NETW DROP NUMBER
P.061	NETW CONNECT TYPE
P.062	NETW COM LOSS RESP
P.063	NETW REF SOURCE
P.065	NETW TYPE AND VERS
P.066	OUTPUT REG 1 SOURCE
P.067	OUTPUT REG 2 SOURCE
P.068	OUTPUT REG 3 SOURCE
P.069	OUTPUT REG 4 SOURCE
P.090	DIAGNOSTICS SELECT
P.091	DIAGNOSTICS DISPLY
P.095	P/M OJTPUT AMPS
P.098	SOFTWARE VERSION NUM
P.099	SLLLCTLD P/M TYPL
H.000	MOTOR NAMEPL VOLTS
H.001	MOTOR NAMEPL BASE FRQ
H.002	MOTOR NAMLPL AMPS
H.003	TORQUE BOOST VOLTAGE
H.004	SLIP COMPENSATION
H.005	DC BRAKING LNABLE

Table A.2 – OIM Parameters Listed by Parameter Number (Continued)

Parameter Number	OIM Parameter Name
H.006	DC BRAKING START FREQ
H.007	DC BRAKING CURRENT
H.008	DC BRAKING TIME
H.009	AVOID FREQ ENABLE
H.010	AVOID FREQ MIDPOINT 1
H.011	AVOID FREQ BAND 1
H.012	AVOID FREQ MIDPOINT 2
H.013	AVOID FREQ BAND 2
H.014	AVOID FREQ MIDPOINT 3
H.015	AVOID FREQ BAND 3
H.016	SYNC DIRECTION
H.017	INPUT PWR/SNUB CONFIG
H.018	VHZ-CURVE TYPE
H.019	IDENTIFICATION RESULT
H.020	IDENTIFICATION RQST
H.021	AC LINE VOLTAGE
H.022	OVERFREQUENCY LIMIT
J.000	TORQUE REF SOURCE
J.001	ENCODER PPR
J.002	MOTOR POLES
J.003	MOTOR NAMEPL BASE FRQ
J.004	MOTOR NAMEPL AMPS
J.005	MOTOR NAMEPL RPM
J.006	MAGNET CURRENT PRCNT
J.007	MOTOR NAMEPL VOLTS
J.008	TORQUE SELF-TUNE EN
J.009	TORQUE SELF-TUNE RSLT
J.012	SPEED REG PROP GAIN
J.013	SPEED REG INT GAIN
J.014	TORQUE REG PROP GAIN
J.015	TORQUE REG INT GAIN
J.016	FLD WEAKEN START RPM
J.017	MOTOR TOP SPEED
J.018	AC LINE VOLTAGE
J.019	FLX REG PROP GAIN
J.020	FLX REG INT GAIN
J.021	ROTOR TIME CONSTANT
J.022	MOTOR NAMEPLT HP

Table A.2 – OIM Parameters Listed by Parameter Number (Continued)

Parameter Number	OIM Parameter Name
J.023	LOW BUS FLT AVOID EN
J.024	HIGH BUS FLT AVOID EN
J.025	ZERO SPEED HOLD TIME
J.026	CURRENT COMPOJND GAIN
J.027	INERTIA COMP GAIN
J.028	LOSSES COMP GAIN
J.030	SVC SLIP ADJUST
J.031	SVC SYNC DIRECTION
J.032	SVC FLUX REG GAIN
J.040	OCL FEEDBACK SOJRCE
J.041	OCL LEAD/LAG SELECT
J.042	OCL LEAD/LAG LOW FREQ
J.043	OCL LEAD/LAG RATIO
J.044	OCL REFERENCE GAIN
J.045	OCL PROPORTIONAL GAIN
J.046	OCL INTEGRAL GAIN
J.047	OCL TRIM RANGE PERCNT
J.048	OCL PROP TRIM ENABLE
‘.001	RMI ANLG OUTPUT 1
‘.002	RMI ANLG OUT 1 OFFS
‘.003	RMI ANLG OUT 1 GAIN
‘.004	RMI ANLG OUTPUT 2
‘.005	RMI ANLG OUT 2 OFFS
‘.006	RMI ANLG OUT 2 GAIN
‘.007	RMI ANLG OUTPUT 3
‘.008	RMI ANLG OUT 3 OFFS
‘.009	RMI ANLG OUT 3 GAIN
‘.010	RMI ANLG INPUT OFFS
‘.011	RMI ANLG INPUT GAIN
‘.014	RMI FREQ SAMP PERIOD
‘.015	RMI FREQ INPJT OFFS
‘.016	RMI FREQ INPUT GAIN
‘.020	RMI PI REG OFFSET
‘.021	RMI PI REG PROP GAIN
‘.022	RMI PI REG INT GAIN
‘.025	RMI TRQ/CURR LIM SRC
‘.030	RMI DIG INPJT CONFIG
‘.031	RMI DIG OUTPJT 1 CNF

Table A.2 – OIM Parameters Listed by Parameter Number (Continued)

Parameter Number	OIM Parameter Name
032	RMI DIG OUTPUT 2 CNF
033	RMI DIG OUTPUT 3 CNF
034	RMI DIG OUTPUT 4 CNF
035	RMI RELAY OUTP 1 CNF
036	RMI RELAY OUTP 2 CNF
037	RMI RELAY OUTP 3 CNF
040	RMI DIG OUT1 DLY TIME
041	RMI DIG OUT2 DLY TIME
042	RMI DIG OUT3 DLY TIME
043	RMI DIG OUT4 DLY TIME
044	RMI RLY OUT1 DLY TIME
045	RMI RLY OUT2 DLY TIME
046	RMI RLY OUT3 DLY TIME
050	RMI SPEED DET LEVEL 1
051	RMI SPEED DET LEVEL 2
052	RMI SPEED DET LEVEL 3
053	RMI SPEED DET HYSTER
056	RMI LOW SPD DET LEVEL
057	RMI CURR DET LEVEL 1
058	RMI CURR DET LEVEL 2
059	RMI CURR DET LEVEL 3
060	RMI CURR DET HYSTER
063	RMI TRQ DET LEVEL 1
064	RMI TRQ DET LEVEL 2
065	RMI TRQ DET LEVEL 3
066	RMI TRQ DET HYSTER

APPENDIX B

GV3000/SE OIM Menu and Parameter Organization

The organization of the OIM menus depends on the type of regulation that is selected: vector or V/Hz. This section shows the Main Menu for each regulation type and the parameters and options that are available for each menu.

In these listings, items shown in all capital letters are parameter names, such as REGULATION TYPE. Items shown with initial caps are menus, such as Application Setup (Vector).

B.1 Main Menu - Vector Regulation

- Quick Start - see B.1.1
- Speed Control - see B.1.2
- Application Setup (Vector) - see B.1.3
- Performance Tuning (Vector) - see B.1.4
- Motor Data (Vector) - see B.1.5
- Drive Status - see B.1.6
- Regulator Terminal Strip - see B.1.7
- Option Port Configuration - see B.1.8 and B.1.9
- Memory Functions - see B.1.10
- Additional Parameters - see B.1.11

B.1.1 Quick Start

- REGULATION TYPE (P.048)
- ENCODER PPR (U.001)
- MOTOR POLES (U.002)
- MOTOR NAMEPL BASE FRQ (U.003)
- MOTOR NAMEPL RPM (U.005)
- MOTOR NAMEPL HP (U.022)
- MOTOR NAMEPL VOLTS (U.007)
- MOTOR NAMEPL AMPS (U.004)
- ACCEL TIME (P.001)

- DECEL TIME (P.002)
- MINIMUM SPEED (P.003)
- MAXIMUM SPEED (P.004)
- CURRENT LIMIT (P.005)
- Torque Self Tune
- MAGNET CURRENT PRCNT (U.006) (Displayed only if torque self tune is not selected.)

B.1.2 Speed Control

- Define Speed Units
- Speed Limits
  - MINIMUM SPEED (P.003)
  - MAXIMUM SPEED (P.004)
- Accel & Decel Times
  - ACCEL TIME (P.001)
  - DECEL TIME (P.002)
  - ACCEL TIME - SECONDARY (P.017)
  - DECEL TIME - SECONDARY (P.018)
- FORWARD/REV CONFIGURE (P.027)
- Draw & Trim Configure
  - TRIM REF SOURCE (P.014)
  - DRAW GAIN PERCENT (P.016)
  - TRIM GAIN PERCENT (P.015)
- S-CURVE ENABLE (P.019)
- Jog Configure
  - JOG SPEED REFERENCE (P.020)
  - JOG RAMP ACCEL TIME (P.021)
  - JOG RAMP DECEL TIME (P.022)
- FRONT PNL SPD SCALING (P.028)

B.1.3 Application Setup (Vector)

- CURRENT LIMIT (P.005)
- LEVEL SENSE START EN (P.054)
- STOP TYPE (P.025)
- ZERO SPEED HOLD TIME (U.025)
- TORQUE REF SOURCE (U.000)
- ENCODER PPR (U.001)

- FLD-WEAKEN START RPM (U.016)
- MOTOR TOP SPEED (U.017)
- AC LINE VOLTAGE (U.018)
- CARRIER FREQ (KHZ) (P.047)
- Fault Functions
  - MOTOR OVERLOAD ENABLE (P.040)
  - MOTOR OVERLOAD TYPE (P.041)
  - FLT AUTO RESET COUNTS (P.043)
  - FLT AUTO RESET TIME (P.044)
  - FUNCT LOSS RESPONSE (P.026)
  - OUTPUT PHASE LOSS EN (P.045)
  - ENCODER LOSS ENABLE (P.039)
  - LOW BUS FLT AVOID EN (U.023)
  - HIGH BUS FLT AVOID EN (U.024)
- STOP/RST KEY DISABLE (P.055)
- AUTO/MAN KEY DISABLE (P.052)
- MAN REF PRESET ENABLE (P.059)

B.1.4 Performance Tuning (Vector)

- Speed Loop Tuning
  - SPEED REG PROP GAIN (U.012)
  - SPEED REG INT GAIN (U.013)
  - CURRENT COMPOUND GAIN (U.026)
  - INERTIA COMP GAIN (U.027)
  - LOSSES COMP GAIN (U.028)
- Torque Loop Tuning
  - TORQUE REG PROP GAIN (U.014)
  - TORQUE REG INT GAIN (U.015)
  - FLUX REG PROP GAIN (U.019)
  - FLUX REG INT GAIN (U.020)
- Outer Control Loop
  - OCL FEEDBACK SOURCE (U.040)
  - OCL LEAD/LAG SELECT (U.041)
  - OCL LEAD/LAG LOW FREQ (U.042)
  - OCL LEAD/LAG RATIO (U.043)
  - OCL REFERENCE GAIN (U.044)
  - OCL PROPORTIONAL GAIN (U.045)

- OCL INTEGRAL GAIN (U.046)
- OCL TRIM RANGE PERCNT (U.047)
- OCL PROP TRIM ENABLE (U.048)

- Sensorless Vector Tuning
  - SVC SYNC DIRECTION (U.031)
  - SVC SLIP ADJUST (U.030)
  - SVC FLUX REG GAIN (U.032)
- Self Tuning Parameters
  - Torque Self Tune
  - TORQUE SELF-TUNE RSLT (U.009)

B.1.5 Motor Data (Vector)

- MOTOR POLES (U.002)
- MOTOR NAMEPL BASE FRQ (U.003)
- MOTOR NAMEPL RPM (U.005)
- MOTOR NAMEPL HP (U.022)
- MOTOR NAMEPL VOLTS (U.007)
- MOTOR NAMEPL AMPS (U.004)
- MAGNET CURRENT PRCNT (U.006)
- ROTOR TIME CONSTANT (U.021)

B.1.6 Drive Status

- ELAPSED TIME METER (P.029)
- ELPSD TIME METER RST (P.030)
- DIAGNOSTICS SELECT (P.090)
- DIAGNOSTICS DISPLY (P.091)
- P/M OUTPUT AMPS (P.095)
- SOFTWARE VERSION NUM (P.098)
- SELECTED P/M TYPE (P.099)

B.1.7 Regulator Terminal Strip

- TS ANALOG IN OFFSET (P.009)
- TS ANALOG IN GAIN (P.010)
- TS ANALOG IN CONFIG (P.011)
- TS ANALOG OUT SOURCE (P.012)
- OUTPUT RELAY CONFIG (P.013)

- TS DIG INP CONFIG (P.007)
- TS SPEED REF SEL (P.008)
- MOP Configuration
  - MOP ACCEL DECEL TIME (P.023)
  - MOP RESET CONFIG (P.024)
- Preset Speed Setup
  - PRESET SPEED 1 (P.031)
  - PRESET SPEED 2 (P.032)
  - PRESET SPEED 3 (P.033)
  - PRESET SPEED 4 (P.034)
  - PRESET SPEED 5 (P.035)
  - PRESET SPEED 6 (P.036)
  - PRESET SPEED 7 (P.037)
  - PRESET SPEED 8 (P.038)

B.1.8 Option Port Configuration Menu (If the Network Option Board Is Installed)

These menus and parameters are only shown if the Network Option board is installed.

- Network Configuration
  - NETW DROP NUMBER (P.060)
  - NETW CONNECT TYPE (P.061)
  - NETW COMM LOSS RESP (P.062)
  - NETW REF SOURCE (P.063)
  - NETW TRIM REF SOURCE (P.064)
  - NETW TYPE AND VERSION (P.065)
  - OUTPUT REG 1 SOURCE (P.066)
  - OUTPUT REG 2 SOURCE (P.067)
  - OUTPUT REG 3 SOURCE (P.068)
  - OUTPUT REG 4 SOURCE (P.069)

B.1.9 Option Port Configuration Menu (If the Optional RMI Board Is Installed)

Option Port Configuration Menu (if the RMI board is installed)

- **RMI Inputs**
  - RMI Analog Inputs
    - RMI ANLG INPUT OFFS (r.010)
    - RMI ANLG INPUT GAIN (r.011)
  - RMI Digital Inputs
    - RMI DIG INPUT CONFIG (r.030)
  - RMI Frequency Inputs
    - RMI FREQ SAMP PERIOD (r.014)
    - RMI FREQ INPUT OFFS (r.015)
    - RMI FREQ INPUT GAIN (r.016)
  - RMI PropInt Configuration
    - RMI PI RLG OFFSET (r.020)
    - RMI PI RLG PROP GAIN (r.021)
    - RMI PI RLG INT GAIN (r.022)
    - RMI TRQ/CURR LIM SRC (r.025)
- **RMI Outputs**
  - RMI Analog Outputs
    - RMI ANLG OUTPUT 1 (r.001)
    - RMI ANLG OUT 1 OFFS (r.002)
    - RMI ANLG OUT 1 GAIN (r.003)
    - RMI ANLG OUTPUT 2 (r.004)
    - RMI ANLG OUT 2 OFFS (r.005)
    - RMI ANLG OUT 2 GAIN (r.006)
    - RMI ANLG OUTPUT 3 (r.007)
    - RMI ANLG OUT 3 OFFS (r.008)
    - RMI ANLG OUT 3 GAIN (r.009)
  - RMI Digital Outputs
    - RMI DIG OUTPUT 1 CNF (r.031)
    - RMI DIG OUTPUT 2 CNF (r.032)
    - RMI DIG OUTPUT 3 CNF (r.033)
    - RMI DIG OUTPUT 4 CNF (r.034)
    - RMI DIG OUT1 DLY TIME (r.040)
    - RMI DIG OUT2 DLY TIME (r.041)

- RMI DIG OUT3 DLY TIME (r.042)
- RMI DIG OUT4 DLY TIME (r.043)

- RMI Relay Outputs
  - RMI RELAY OUTP 1 CNF (r.035)
  - RMI RELAY OUTP 2 CNF (r.036)
  - RMI RELAY OUTP 3 CNF (r.037)
  - RMI RLY OUT1 DLY TIME (r.044)
  - RMI RLY OUT2 DLY TIME (r.045)
  - RMI RLY OUT3 DLY TIME (r.046)
- RMI Speed Compare Levels
  - RMI SPEED DET LEVEL 1 (r.050)
  - RMI SPEED DET LEVEL 2 (r.051)
  - RMI SPEED DET LEVEL 3 (r.052)
  - RMI LOW SPD DET LEVEL (r.050)
  - RMI SPEED DET HYSTER (r.053)
- RMI Current Compare Levels
  - RMI CURR DET LEVEL 1 (r.057)
  - RMI CURR DET LEVEL 2 (r.058)
  - RMI CURR DET LEVEL 3 (r.059)
  - RMI CURR DET HYSTER (r.060)
- RMI Torque Compare Levels
  - RMI TRQ DET LEVEL 1 (r.063)
  - RMI TRQ DET LEVEL 2 (r.064)
  - RMI TRQ DET LEVEL 3 (r.065)
  - RMI TRQ DET HYSTER (r.066)

B.1.10 Memory Functions

- PROGRAMMING DISABLE (P.051)
- DEFAULTS TYPE (P.049)
- RESTORE DEFAULTS (P.050)

B.1.11 Additional Parameters

If the OIM finds any parameters in the drive that do not correspond with those in the OIM (for example, if the OIM and drive contain different software versions), those parameters will be listed in this menu.

B.2 Main Menu - V/Hz Regulation

- Quick Start - see B.2.1
- Speed Control - see B.2.2
- Application Setup (V/Hz) - see B.2.3
- Performance Tuning (V/Hz) - see B.2.4
- Motor Data (V/Hz) - see B.2.5
- Drive Status - see B.2.6
- Regulator Terminal Strip - see B.2.7
- Option Port Configuration - see B.2.8 and B.2.9
- Memory Functions - see B.2.10
- Additional Parameters - see B.2.11

B.2.1 Quick Start

- REGULATION TYPE (P.048)
- MOTOR NAMEPL VOLTS (H.000)
- MOTOR NAMEPL BASE FRQ (H.001)
- MOTOR NAMEPL AMPS (H.002)
- ACCEL TIME (P.001)
- DECEL TIME (P.002)
- MINIMUM SPEED (P.003)
- MAXIMUM SPEED (P.004)
- CURRENT LIMIT (P.005)

B.2.2 Speed Control

- Define Speed Units
- Speed Limits
  - MINIMUM SPEED (P.003)
  - MAXIMUM SPEED (P.004)
- Accel & Decel Times
  - ACCEL TIME (P.001)
  - DECEL TIME (P.002)
  - ACCEL TIME - SECONDARY (P.017)
  - DECEL TIME - SECONDARY (P.018)
- FORWARD/REV CONFIGURE (P.027)

- Draw & Trim Configure
  - TRIM REF SOURCE (P.014)
  - DRAW GAIN PERCENT (P.016)
  - TRIM GAIN PERCENT (P.015)
- S-CURVE ENABLE (P.019)
- Jog Configure
  - JOG SPEED REFERENCE (P.020)
  - JOG RAMP ACCEL TIME (P.021)
  - JOG RAMP DECEL TIME (P.022)
- FRONT PNL SPD SCALING (P.028)

B.2.3 Application Setup (V/Hz)

- CURRENT LIMIT (P.005)
- LEVEL SENSE START ENABLE (P.054)
- STOP TYPE (P.025)
- TORQUE BOOST VOLTAGE (H.003)
- AC LINE VOLTAGE (H.021)
- DC Braking
  - DC BRAKING ENABLE (H.005)
  - DC BRAKING START FREQ (H.006)
  - DC BRAKING CURRENT (H.007)
  - DC BRAKING TIME (H.008)
- VHZ-CURVE TYPE (H.018)
- Avoidance Frequencies
  - AVOID FREQ ENABLE (H.009)
  - AVOID FREQ MIDPOINT 1 (H.010)
  - AVOID FREQ BAND 1 (H.011)
  - AVOID FREQ MIDPOINT 2 (H.012)
  - AVOID FREQ BAND 2 (H.013)
  - AVOID FREQ MIDPOINT 3 (H.014)
  - AVOID FREQ BAND 3 (H.015)
- LINE DIP RIDE THRU TM (P.042)
- INPUT PWR/SNUB CONFIG (H.017)
- CARRIER FREQ (KHZ) (P.047)
- OVERFREQUENCY LIMIT (H.022)
- Fault Functions
  - MOTOR OVERLOAD ENABLE (P.040)

- MOTOR OVERLOAD TYPE SEL (P.041)
- FLT AUTO RESET COUNTS (P.043)
- FLT AUTO RESET TIME (P.044)
- FUNCT LOSS RESPONSE (P.026)
- OUTPUT PHASE LOSS EN (P.045)

- STOP/RST KEY DISABLE (P.055)
- AUTO/MAN KEY DISABLE (P.052)
- MAN REF PRESET ENABLE (P.053)

B.2.4 Performance Tuning (V/Hz)

- SLIP COMPENSATION (H.004)
- SYNC DIRECTION (H.016)
- IDENTIFICATION RESULT (H.019)
- Identification

B.2.5 Motor Data (V/Hz)

- MOTOR NAMEPL BASE FRQ (H.001)
- MOTOR NAMEPL AMPS (H.002)
- MOTOR NAMEPL VOLTS (H.000)

B.2.6 Drive Status

- ELAPSED TIME METER (P.029)
- ELPSD TIME METER RST (P.030)
- DIAGNOSTICS SELECT (P.090)
- DIAGNOSTICS DISPLY (P.091)
- P/M OUTPUT AMPS (P.095)
- SOFTWARE VERSION NUM (P.098)

B.2.7 Regulator Terminal Strip

- TS ANALOG IN OFFSET (P.009)
- TS ANALOG IN GAIN (P.010)
- TS ANALOG IN CONFIG (P.011)
- TS ANALOG OUT SOURCE (P.012)
- OUTPUT RELAY CONFIG (P.013)
- TS DIG INP CONFIG (P.007)
- TS SPEED REF SEL (P.006)

- MOP Configuration
  - MOP ACCEL DECEL TIME (P.023)
  - MOP RESET CONFIG (P.024)
- Preset Speed Setup
  - PRESET SPEED 1 (P.031)
  - PRESET SPEED 2 (P.032)
  - PRESET SPEED 3 (P.033)
  - PRESET SPEED 4 (P.034)
  - PRESET SPEED 5 (P.035)
  - PRESET SPEED 6 (P.036)
  - PRESET SPEED 7 (P.037)
  - PRESET SPEED 8 (P.038)

B.2.8 Option Port Configuration Menu (If the Network Option Board Is Installed)

These menus and parameters are only shown if the Network Option board is installed.

- Network Configuration
  - NETW DROP NUMBER (P.060)
  - NETW CONNECT TYPE (P.061)
  - NETW COMM LOSS RESP (P.062)
  - NETW REF SOURCE (P.063)
  - NETW TRIP REF SOURCE (P.064)
  - NETW TYPE AND VERSION (P.065)
  - OUTPUT REG 1 SOURCE (P.066)
  - OUTPUT REG 2 SOURCE (P.067)
  - OUTPUT REG 3 SOURCE (P.068)
  - OUTPUT REG 4 SOURCE (P.069)

B.2.9 Option Port Configuration Menu (If the Optional RMI Board Is Installed)

These menus and parameters are only shown if the optional RMI board is installed.

- **RMI Inputs**
  - RMI Analog Inputs
    - RMI ANLG INPUT OFFS (r.010)
    - RMI ANLG INPUT GAIN (r.011)
  - RMI Digital Inputs
    - RMI DIG INPUT CONFIG (r.030)
  - RMI Frequency Inputs
    - RMI FREQ SAMP PERIOD (r.014)
    - RMI FREQ INPUT OFFS (r.015)
    - RMI FREQ INPUT GAIN (r.016)
  - RMI PropInt Configuration
    - RMI PI RLG OFFSET (r.020)
    - RMI PI RLG PROP GAIN (r.021)
    - RMI PI RLG INT GAIN (r.022)
  - RMI TRQ/CURR LIM SRC (r.025)
- **RMI Outputs**
  - RMI Analog Outputs
    - RMI ANLG OUTPUT 1 (r.001)
    - RMI ANLG OUT 1 OFFS (r.002)
    - RMI ANLG OUT 1 GAIN (r.003)
    - RMI ANLG OUTPUT 2 (r.004)
    - RMI ANLG OUT 2 OFFS (r.005)
    - RMI ANLG OUT 2 GAIN (r.006)
    - RMI ANLG OUTPUT 3 (r.007)
    - RMI ANLG OUT 3 OFFS (r.008)
    - RMI ANLG OUT 3 GAIN (r.009)
  - RMI Digital Outputs
    - RMI DIG OUTPUT 1 CNF (r.031)
    - RMI DIG OUTPUT 2 CNF (r.032)
    - RMI DIG OUTPUT 3 CNF (r.033)
    - RMI DIG OUTPUT 4 CNF (r.034)
    - RMI DIG OUT1 DLY TIME (r.040)
    - RMI DIG OUT2 DLY TIME (r.041)

- RMI DIG OUT3 DLY TIME (r.042)
- RMI DIG OUT4 DLY TIME (r.043)

- RMI Relay Outputs
  - RMI RELAY OUTP 1 CNF (r.035)
  - RMI RELAY OUTP 2 CNF (r.036)
  - RMI RELAY OUTP 3 CNF (r.037)
  - RMI RLY OUT1 DLY TIME (r.044)
  - RMI RLY OUT2 DLY TIME (r.045)
  - RMI RLY OUT3 DLY TIME (r.046)
- RMI Speed Compare Levels
  - RMI SPEED DET LEVEL 1 (r.050)
  - RMI SPEED DET LEVEL 2 (r.051)
  - RMI SPEED DET LEVEL 3 (r.052)
  - RMI LOW SPD DET LEVEL (r.050)
  - RMI SPEED DET HYSTER (r.053)
- RMI Current Compare Levels
  - RMI CURR DET LEVEL 1 (r.057)
  - RMI CURR DET LEVEL 2 (r.058)
  - RMI CURR DET LEVEL 3 (r.059)
  - RMI CURR DET HYSTER (r.060)
- RMI Torque Compare Levels
  - RMI TRQ DET LEVEL 1 (r.063)
  - RMI TRQ DET LEVEL 2 (r.064)
  - RMI TRQ DET LEVEL 3 (r.065)
  - RMI TRQ DET HYSTER (r.066)

B.2.10 Memory Functions

- PROGRAMMING DISABLE (P.051)
- DEFAULTS TYPE (P.049)
- RESTORE DEFAULTS (P.050)

B.2.11 Additional Parameters

If the OIM finds any parameters in the drive that do not correspond with those in the OIM (for example, if the OIM and drive contain different software versions), those parameters will be listed in this menu.

APPENDIX C

Record of User Parameter Settings

Parameter No.	Parameter Name	Setting	Date
P.000	CONTROL SOURCE SEL		
P.001	ACCEL TIME		
P.002	DECEL TIME		
P.003	MINIMUM SPEED		
P.004	MAXIMUM SPEED		
P.005	CURRENT LIMIT		
P.007	TS DIG INPUT CONFIG		
P.008	TS SPEED REF SEL		
P.009	TS ANALOG IN OFFSET		
P.010	TS ANALOG IN GAIN		
P.011	TS ANALOG IN CONFIG		
P.012	TS ANALOG OUT SOURCE		
P.013	OUTPUT RELAY CONFIG		
P.014	TRIM REF SOURCE		
P.015	TRIM GAIN PERCENT		
P.016	DRAW GAIN PERCENT		
P.017	ACCEL TIME - SECONDARY		
P.018	DECEL TIME - SECONDARY		
P.019	S-CURVE ENABLE		
P.020	JOG SPEED REFERENCE		
P.021	JOG RAMP ACCEL TIME		
P.022	JOG RAMP DECEL TIME		
P.023	MOP ACCEL DECEL TIME		
P.024	MOP RESET CONFIG		
P.025	STOP TYPE		
P.026	FUNCT LOSS RESPONSE		
P.027	FORWARD/REV CONFIGURE		
P.028	FRONT PNL SPD SCALING		

Parameter No.	Parameter Name	Setting	Date
P.029	ELAPSED TIME METER		
P.030	ELPSD TIME METER RST		
P.031	PRESET SPEED 1		
P.032	PRESET SPEED 2		
P.033	PRESET SPEED 3		
P.034	PRESET SPEED 4		
P.035	PRESET SPEED 5		
P.036	PRESET SPEED 6		
P.037	PRESET SPEED 7		
P.038	PRESET SPEED 8		
P.039	ENCODER LOSS ENABLE		
P.040	MOTOR OVERLOAD ENABLE		
P.041	MOTOR OVERLOAD TYPE SEL		
P.042	LINE DIP RIDE THRU TM		
P.043	FAULT AUTO RESET COUNTS		
P.044	FLT AUTO RESET TIME		
P.045	OUTPUT PHASE LOSS EN		
P.047	CARRIER FREQUENCY (KHZ)		
P.048	REGULATION TYPE		
P.049	DECEL/S TYPE		
P.050	RESTORE DFLTS		
P.051	PROGRAMMING DISABLE		
P.052	AUTO/MAN KEY DISABLE		
P.053	MAN REF PRESET ENABLE		
P.054	LEVEL SENSE START EN		
P.055	STOP/RST KEY DISABLE		
P.060	NETW DROP NUMBER		
P.061	NETW CONNECT TYPE		
P.062	NETW COM LOSS RESP		
P.063	NETW REF SOURCE		
P.064	NETW TRIM REF SOURCE		
P.065	OPTION: TYPE AND VERS		
P.066	OUTPUT REG 1 SOURCE		
P.067	OUTPUT REG 2 SOURCE		

Parameter No.	Parameter Name	Setting	Date
P.068	OUTPUT REG 3 SOURCE		
P.069	OUTPUT REG 4 SOURCE		
P.090	DIAGNOSTICS SELECT		
P.091	DIAGNOSTICS DISPLY		
P.095	P/M OUTPUT AMPS		
P.098	SOFTWARE VERSION NUM		
P.099	SELECTED P/M TYPE		
H.000	MOTOR NAMEPL VOLTS		
H.001	MOTOR NAMEPL BASE FRQ		
H.002	MOTOR NAMEPL AMPS		
H.003	TORQUE BOOST VOLTAGE		
H.004	SLIP COMPENSATION		
H.005	DC BRAKING ENABLE		
H.006	DC BRAKING START FREQ		
H.007	DC BRAKING CURRENT		
H.008	DC BRAKING TIME		
H.009	AVOID FREQ ENABLE		
H.010	AVOID FREQ MIDPOINT 1		
H.011	AVOID FREQ BAND 1		
H.012	AVOID FREQ MIDPOINT 2		
H.013	AVOID FREQ BAND 2		
H.014	AVOID FREQ MIDPOINT 3		
H.015	AVOID FREQ BAND 3		
H.016	SYNC DIRECTION		
H.017	INPUT PWR/SNUB CONFIG		
H.018	VHZ-CURVE TYPE		
H.019	IDENTIFICATION RESULT		
H.020	IDENTIFICATION RQST		
H.021	AC LINE VOLTAGE		
H.022	OVERFREQUENCY LIMIT		
U.000	TORQUE REF SOURCE		
U.001	ENCODER PPR		
U.002	MOTOR POLES		
U.003	MOTOR NAMEPL BASE FRQ		

Parameter No.	Parameter Name	Setting	Date
U.004	MOTOR NAMEPL AMPS		
U.005	MOTOR NAMEPL RPM		
U.006	MAGNET CURRENT PRCNT		
U.007	MOTOR NAMEPL VOLTS		
U.008	TORQUE SELF TUNE EN		
U.009	TORQUE SELF TUNE RSLT		
U.012	SPEED REG PROP GAIN		
U.013	SPEED REG INT GAIN		
U.014	TORQUE REG PROP GAIN		
U.015	TORQUE REG INT GAIN		
U.016	FLD-WEAKEN START RPM		
U.017	MOTOR TOP SPEED		
U.018	AC LINE VOLTAGE		
U.019	FLX CUR REG PROP GAIN		
U.020	FLX CUR REG INT GAIN		
U.021	ROTOR TIME CONSTANT		
U.022	MOTOR NAMEPL HP		
U.023	LOW BUS FLT AVOID EN		
U.024	HIGH BUS FLT AVOID EN		
U.025	ZERO SPEED HOLD TIME		
U.026	CURRENT COMPOUND GAIN		
U.027	INERTIA COMP GAIN		
U.028	LOSSES COMP GAIN		
U.030	SVC SLIP ADJUST		
U.031	SVC SYNC DIRECTION		
U.032	SVC FLUX REG GAIN		
U.040	OCL FEEDBACK SOURCE		
U.041	OCL LEAD/LAG SELECT		
U.042	OCL LEAD/LAG LOW FREQ		
U.043	OCL LEAD/LAG RATIO		
U.044	OCL REFERENCE GAIN		
U.045	OCL PROPORTIONAL GAIN		
U.046	OCL INTEGRAL GAIN		
U.047	OCL TRIM RANGE PERCNT		

Parameter No.	Parameter Name	Setting	Date
U.048	OCL PROP TRIM ENABLE		
r.001	RMI ANLG OUTPUT 1		
r.002	RMI ANLG OUT 1 OFFS		
r.003	RMI ANLG OUT 1 GAIN		
r.004	RMI ANLG OUTPUT 2		
r.005	RMI ANLG OUT 2 OFFS		
r.006	RMI ANLG OUT 2 GAIN		
r.007	RMI ANLG OUTPUT 3		
r.008	RMI ANLG OUT 3 OFFS		
r.009	RMI ANLG OUT 3 GAIN		
r.010	RMI ANLG INPUT OFFS		
r.011	RMI ANLG INPUT GAIN		
r.014	RMI FREQ SAMP PERIOD		
r.015	RMI FREQ INPUT OFFS		
r.016	RMI FREQ INPUT GAIN		
r.020	RMI PI REG OFFSET		
r.021	RMI PI REG PROP GAIN		
r.022	RMI PI REG INT GAIN		
r.025	RMI TRQ/CURR LIM SRC		
r.030	RMI DIG INPUT CONFIG		
r.031	RMI DIG OUTPUT 1 CNF		
r.032	RMI DIG OUTPUT 2 CNF		
r.033	RMI DIG OUTPUT 3 CNF		
r.034	RMI DIG OUTPUT 4 CNF		
r.035	RMI RELAY OUTP 1 CNF		
r.036	RMI RELAY OUTP 2 CNF		
r.037	RMI RELAY OUTP 3 CNF		
r.040	RMI DIG OUT1 DLY TIME		
r.041	RMI DIG OUT2 DLY TIME		
r.042	RMI DIG OUT3 DLY TIME		
r.043	RMI DIG OUT4 DLY TIME		
r.044	RMI RLY OUT1 DLY TIME		
r.045	RMI RLY OUT2 DLY TIME		
r.046	RMI RLY OUT3 DLY TIME		

Parameter No.	Parameter Name	Setting	Date
r.050	RMI SPEED DET LEVEL 1		
r.051	RMI SPEED DET LEVEL 2		
r.052	RMI SPEED DET LEVEL 3		
r.053	RMI SPEED DET HYSTER		
r.056	RMI LOW SPD DLT LEVEL		
r.057	RMI CURR DLT LEVEL 1		
r.058	RMI CURR DLT LEVEL 2		
r.059	RMI CURR DLT LEVEL 3		
r.060	RMI CURR DET HYSTER		
r.063	RMI TRQ DET LEVEL 1		
r.064	RMI TRQ DET LEVEL 2		
r.065	RMI TRQ DET LEVEL 3		
r.066	RMI TRQ DET HYSTER		

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Asia Pacific Headquarters, 27/F Kodak House II, 39 Healthy Street East, Causeway Bay, Hong Kong. Tel (852) 2887 4788, Fax (852) 2508 1846

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