# Toshiba inverter G3-Series Remote I/O Manual

## HIGH PERFORMANCE TRANSISTOR ADJUSTABLE SPEED DRIVE
## TRUE TORQUE CONTROL SERIES

TOSHIBA

G3

TOSVERT-130

TRANSISTOR INVERTER

## REMOTE I/O COMMUNICATIONS OPTION MANUAL

August 6, 1998

# 1. Introduction

Thank you for purchasing the “Remote I/O Communications Interface” for the Toshiba TOSVERT-130 G3 High-Performance Transistor Adjustable Speed Drive (ASD). Before using the Remote I/O interface option, please be sure to thoroughly read the instructions and precautions contained in this manual. In addition, please make sure that this instruction manual is delivered to the end user of the ASD unit into which the Remote I/O option kit is installed, and keep this instruction manual in a safe place for future reference or ASD inspection.

This instruction manual describes the device specifications, wiring methods, maintenance procedures, protocol, functions and usage methods for the Remote I/O communications interface option.

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# 2. Usage Precautions

### *Operating Environment*

- Please use the option board only when the ambient temperature of the ASD unit into which the option board is installed is within the following specified temperature limits:
  Operation: -10 ~ +40°C (+14 ~ +104°F)
  Storage: -25 ~ +65°C (-13 ~ +149°F)
- Avoid installation locations that may be subjected to large shocks or vibrations.
- Avoid installation locations that may be subjected to rapid changes in temperature or humidity.

### *Installation • Wiring*

- Do not touch charged parts such as the terminal block while the ASD's CHARGE lamp is lit. A charge will still be present in the ASD unit's internal electrolytic capacitors, and therefore touching these areas may result in an electrical shock. Always turn all ASD input power supplies OFF, and wait at least 5 minutes after the CHARGE lamp has gone out before wiring the communication cables or motor wiring.
- When installing the option board into the ASD and making wiring connections, make certain that no clippings or wiring leads that could cause device failure fall into the ASD or onto electronic components.
- Proper ground connections are vital for both safety and signal reliability reasons. For proper grounding procedures, please refer to the G3 Operations Manual.
- Route the communication cables separate from the ASD input/output power wiring.
- To avoid the possibility of electric shock due to leakage currents, always ground the ASD unit's E/GND terminal and the motor.
- If I/O communications to the G3 are interrupted, the ASD will continue with the same settings as before communications were interrupted. If the drive was running at 60Hz, it will continue to do so. Therefore, hardwired precautions should be taken considering preferred operation during loss of communications.

### *Other Precautions*

- The ASD's EEPROM has a life span of 10,000 write cycles. Do not write to the same holding register (other than register 01 (frequency command) or 02 (input command)) more than 10,000 times.
- Do not touch or insert a rod or any other item into the ASD while power is applied, as this may lead to electrical shock or ASD damage.
- Commission the disposal of the option board to a specialist.
- Do not assign the same address to more than one ASD in the same network.
- When the ASD's control power supply is turned on, the ASD performs initialization functions for approximately 1 second, during which communications capabilities are disabled. Communications capabilities will also be disabled for approximately 1 second after momentary control power supply outages or ASD resets.

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# 3. Option Board Installation / Removal

The Remote I/O Communications Option ROM enclosed with the Remote I/O kit is compatible only with G3 ASDs with V120 or later main software. An error will occur if the option ROM is installed in an ASD with pre-V120 main software. The main software version number is printed on the CPU package (IC1) on the control board. Additionally, this version number can be read from ASD memory by displaying the parameter CPU VERSION in GROUP:UTILITY PARAMETERS. If you are unsure of the software version of your ASD, please contact Toshiba International Corporation for more information.

The Remote I/O option ROM version number is printed on the label attached to the ROM. The option ROM version number can also be read from the ASD's memory and displayed on the LCD panel after initialization by displaying the parameter ROM VERSION in GROUP:UTILITY PARAMETERS. The option ROM version number replaces the standard ROM version number after installation/initialization.

## 3.1 Before Installation

All parameters will be automatically reset to the factory default values after the option ROM is installed in the ASD. If it is desired to retain the current parameter settings, the user should access the user-changed parameter group to display and record all the parameters and setting values that have been changed from factory defaults. Even if the current settings are saved to non-volatile memory by setting the STANDARD SETTING MODE SELECTION parameter in GROUP:UTILITY PARAMETERS to 5*, they will be erased from memory during initialization of the option ROM.

- *Setting the standard mode selection parameter will be referred to in this manual as performing a **TYPE X RESET**, where X is the parameter setting value*

## 3.2 Installation Procedure

Installation of the TOSHIBA Remote I/O option ROM and option board into a TOSVERT-130 G3 ASD should only be performed by a qualified technician familiar with the maintenance and operation of the G3. To install the option ROM and option board, complete the following steps:

## 3.3 Option ROM

### 3.3.1 640x Option ROM:

Your Remote I/O card comes with an option ROM which has the number 6401 at the time of this printing. Sometime in the future, this will be updated to 6402. In the notes below, this is referred to as the "640x" Option ROM.

**CAUTION!**

When an Option ROM is installed into the G3, the G3's memory will be set back to factory defaults. The message "Inverter Typeform Error" will appear.

The 640x Option ROM should only be installed in the 230 or 460Vac G3. The 600 Vac G3 and the H3 come with an option ROM already installed. Do not remove it.

Do not install the 640x Option ROM into any E3.

At the time of this printing, G3s over 300HP are planned. These may come with an Option ROM. If so, do not remove it.

### 3.3.2 Which Drives Need the V640x Option ROM?

| DRIVE | Install 640x Option ROM? |
|---|---|
| 230 and 460Vac G3s 300HP and under | YES |
| H3 | NO |
| E3 | NO |
| 600Vac G3 | NO |
| Any drive which already has an Option ROM | NO |

1. **CAUTION!** Verify that all input power sources to the ASD have been turned OFF and are locked and tagged out.
2. **DANGER!** Wait at least 5 minutes for the ASD's electrolytic capacitors to discharge before proceeding to step 4. **Do not touch any internal parts with power applied to the ASD, or for at least 5 minutes after power to the ASD has been removed. A hazard exists temporarily for electrical shock even if the source power has been removed.**
3. Remove the ASD's cover (open the door on units with hinged doors). Verify that the CHARGE LED has gone out before continuing the installation process.
4. Loosen the 4 screws attaching the G3's operation panel support bracket to the control board support bracket, and then remove the operation panel and support bracket as a unit (refer to Figure 1).

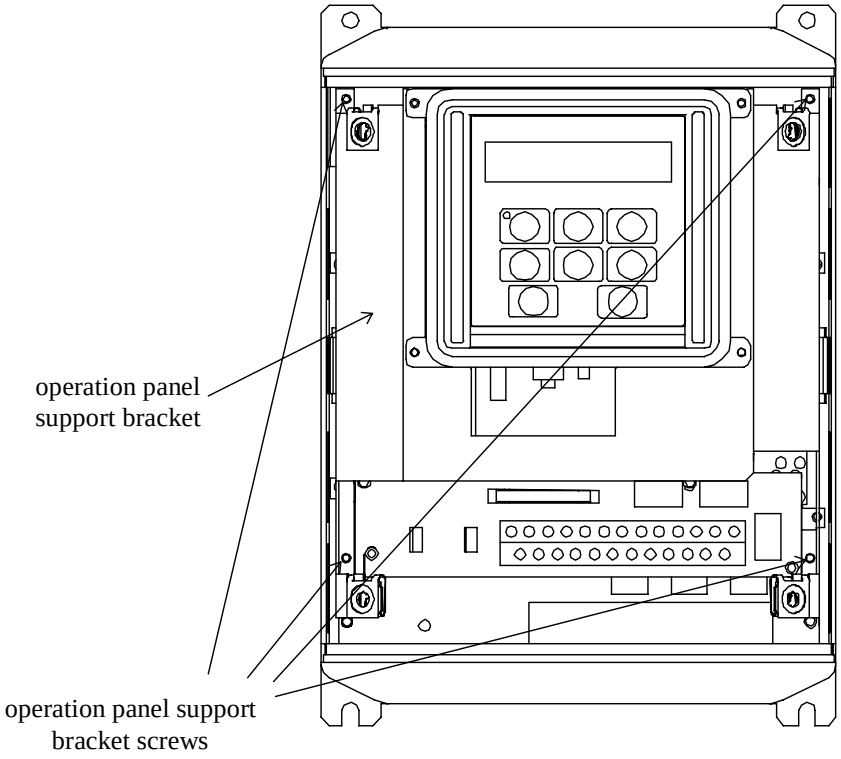



**Figure 1**: *G3 with front cover removed*

6. **CAUTION!** The option ROM PCB assembly and option board are static-sensitive devices. Standard electrostatic-sensitive component handling precautions should be observed. Locate the option ROM connector, labeled CN41, on the lower-left side of the control PCB. Line up the connector on the back of the option ROM PCB with CN41. Install the option ROM by pressing gently but firmly on the option ROM PCB until a slight “click” is felt. Verify that the option ROM PCB is seated properly and firmly in CN41. If the option ROM connector does not appear to be mating with CN41 properly, verify that the ROM is oriented properly and that there are no obstructions in either connector.
7. Set the Remote I/O option board's DIP switches for the desired communication parameters (refer to section 8).
8. Install the 4 plastic option board standoffs into the holes provided in the control board support bracket (refer to Figure 2).

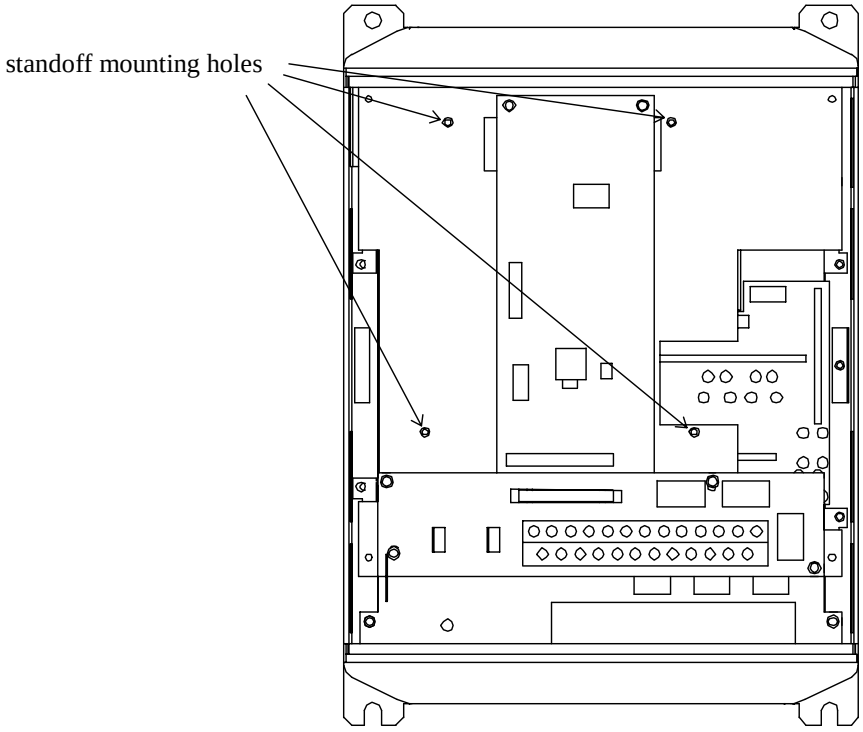



**Figure 2:** *G3 with front cover and operation panel support bracket removed*

9. Install the Remote I/O network cable through the access holes at the bottom of the ASD and route the cable in order to make connections to the option board connector (TB1). Take care to not route the cable near any sharp edges or in positions where it may be pinched.

10. Connect the Remote I/O cable to the option board connector (TB1). **CAUTION!** Extremely high voltages exist in the area near the Remote I/O option board and connector (TB1). Ensure that no stray wires (such as the shield on the Remote I/O communications wire) come into contact with any internal ASD components. Also ensure that the communications cable is not routed in such a manner that it may come into contact with high-voltage ASD components, or ASD components that may heat up during operation and melt the cable insulation.

11. Install the option board into the ASD by carefully aligning the 4 plastic supports with the 4 mounting holes provided in the option board. Ensure that connector CN5A on the back side of the option board is aligned with connector CN5 on the front side of the control board.

12. Press the option board firmly onto the standoffs and connector CN5 until the standoff retaining tabs lock. Ensure that CN5 and CN5A are thoroughly interlocked.

13. Carefully re-install the operation panel and support bracket and tighten the 4 screws that attach the operation panel support bracket to the control board support bracket.

14. Reinstall the ASD's cover (close and latch the door on units with hinged doors).

**DANGER!** **Do not operate the unit with the cover off / cabinet door open.**

15. Turn all power sources to the ASD unit ON, and verify that the ASD functions properly. If the ASD unit does not appear to power up, or does not function properly, immediately turn power OFF.

**Repeat steps 2 ~ 4 to remove all power from the ASD.** Then, verify all connections. Contact Toshiba International Corporation for assistance if the problem persists.

16. To perform final verification that the option ROM is installed properly, display the value of the `ROM VERSION` parameter in `GROUP:UTILITY PARAMETERS`. This number should match the option ROM version number that was recorded in step 1. If this parameter value does not match the option ROM version number recorded in step 1, **repeat steps 2 ~ 4 to remove all power from the ASD,** then re-verify that the option ROM is installed properly. If the option ROM appears to be installed properly, but the version numbers still do not match, contact Toshiba International Corporation for further assistance.

## 3.4 Before Removal

Removal of the Remote I/O option board from a TOSVERT-130 G3 ASD should only be performed by a qualified technician familiar with the maintenance and operation of the G3. In order to protect the option board connector's reliability, do not repeatedly connect and disconnect the option board. Use the following procedure if it becomes necessary to remove the Remote I/O option board from the ASD.

**CAUTION!** Do not remove the option board while power is applied to the ASD. Removing the option board with power applied may damage the ASD.

The ASD will display an error message if the option ROM becomes dislodged or is removed from its socket. The ASD must be reset to clear this error. Therefore, all parameters will be automatically reset to the factory default values after an option ROM has been removed from the ASD. If it is desired to retain the current parameter settings, the user should access the user-changed parameter group to display and record all the parameters and setting values that have been changed from factory defaults. Even if the current settings are saved using the TYPE 5 RESET function, they will be erased from memory during the re-initialization of the ASD after the option ROM has been removed.

## 3.5 Removal Procedure

1. **CAUTION!** Verify that all input power sources to the ASD have been turned OFF and are locked and tagged out.
2. **DANGER!** Wait at least 5 minutes for the ASD's electrolytic capacitors to discharge before proceeding to step 3. **Do not touch any internal parts with power applied to the ASD, or for at least 5 minutes after power to the ASD has been removed. A hazard exists temporarily for electrical shock even if the source power has been removed.**
3. Remove the ASD's cover (open the door on units with hinged doors). Verify that the CHARGE LED has gone out before continuing the removal process.
4. Loosen the 4 screws attaching the operation panel support bracket to the control board support bracket and remove the operation panel and support bracket as a unit (refer to Figure 3).
5. **CAUTION!** The option ROM PCB and Remote I/O option board are static-sensitive devices. Standard electrostatic-sensitive component handling precautions should be observed.

Release the 4 corners of the option board from the standoffs by pressing down on the standoff locking tabs with a small flat-headed screwdriver. Be careful to not apply any abnormal stress to the option board while performing this, as this may damage the option board or control board connectors.

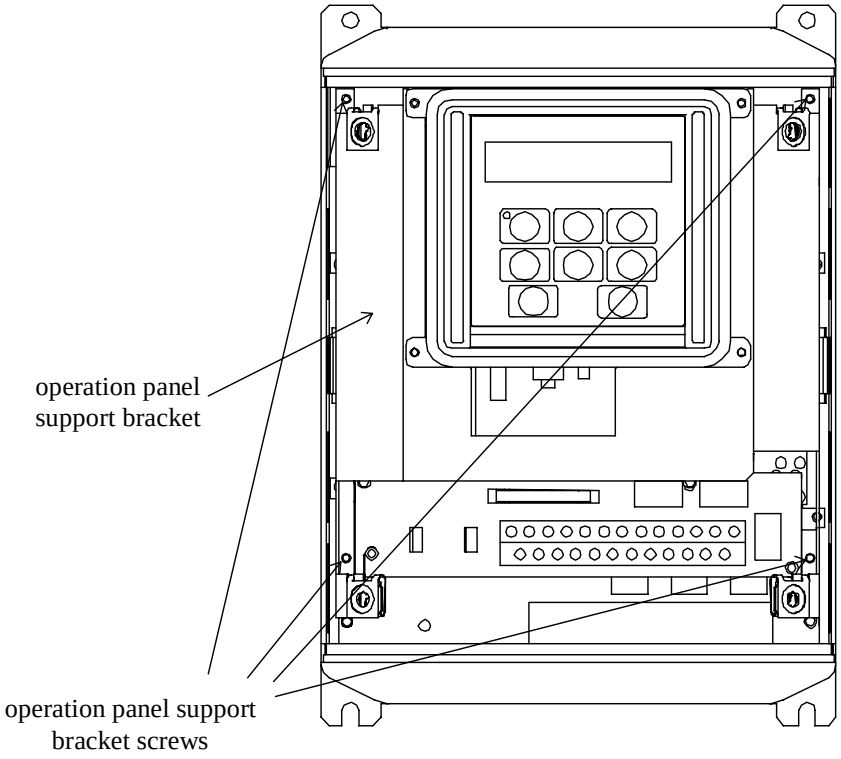



**Figure 3:** *G3 with front cover removed*

6. Remove the option board from the ASD.
7. Disconnect the communications cable from the option board connector (TB1), and pull the cable out through the access holes at the bottom of the ASD.
8. Locate the option ROM in the option ROM connector, labeled CN41, on the lower-left side of the control PCB. Gently work the option ROM PCB up and down while pulling on it until the ROM releases from the control PCB option ROM connector.
9. Carefully re-install the operation panel and support bracket and tighten the 4 screws that attach the operation panel support bracket to the control board support bracket.
10. Reinstall the ASD's cover (close and latch the door on units with hinged doors).

**DANGER! Do not operate unit with the cover off / cabinet door open.**

11. Turn all power sources to the ASD unit ON, and verify that the ASD functions properly. If the ASD unit does not appear to power up, or does not function properly, immediately turn power OFF. **Repeat steps 1 ~ 3 to remove all power from the ASD.** Then, verify all connections. Contact Toshiba International Corporation for assistance if the problem persists.

12. To re-initialize the ASD after the ROM has been removed, perform a TYPE 3 reset. After the initialization sequence, display the value of the ROM VERSION parameter in GROUP:UTILITY PARAMETERS. This number should match the standard ROM version number that was recorded prior to option ROM installation. If this parameter value does not match the value recorded earlier, contact Toshiba International Corporation for further assistance.

# 4. Grounding

Grounding is of particular importance for reliable, stable operation. Communication system characteristics may vary from system to system, depending on the system environment and grounding method used. A ground connection with an impedance of less than 100Ω should be used. Please be sure to consider the following points for making proper ground connections:

**Grounding method checkpoints**

1. Make all ground connections such that no ground current flows through the ASD case.
2. Ensure that all grounds are connected to points that are at the same potential as ASD grounds.
3. Do not connect the Remote I/O option board's SHIELD terminal to a power ground or any other potential noise-producing ground connection (such as the ASD's E/GND terminal).
4. Do not make connections to unstable grounds (paint-coated screw heads, grounds that are subjected to inductive noise, etc.)
5. Use copper wire with a cross-sectional area of 2mm$^2$ or larger, or aluminum wire with a cross-sectional area of 2.6mm$^2$ or larger for grounding.

# 5. Equipment Specifications

| Item | Specification |
|---|---|
| Operating Environment | Indoors, less than 1000m above sea level, do not expose to direct sunlight or corrosive / explosive gasses. |
| Operating Temperature | -10 ~ +40°C (+14 ~ +104°F) |
| Storage Temperature | -25°C ~ +65°C (-13 ~ +149°F) |
| Relative Humidity | 20% ~ 90% (without condensation) |
| Vibration | 5.9m/s$^2$ {0.6G} or less (10 ~ 55Hz) |
| Grounding | Use a ground connection with an impedance of less than 100Ω. |
| Cooling Method | Self-cooled |

# 6. Maintenance And Inspection

Preventive maintenance and inspection is required to maintain the Remote I/O communication option in its optimal condition, and to ensure a long operational lifetime. Depending on usage and operating conditions, perform a periodic inspection once every three to six months. Before starting inspections, always turn off all power supplies to the ASD unit, and wait at least five minutes after the ASD's "CHARGE" lamp has gone out.

**DANGER! Do not touch any internal parts with power applied to the ASD, or for at least 5 minutes after power to the ASD has been removed. A hazard exists temporarily for electrical shock even if the source power has been removed.**

**Inspection Points**

- Check that the wiring terminal screws are not loose. Tighten if necessary.
- Check that there are no defects in any wire terminal crimp points. Visually check that the crimp points are not scarred by overheating.
- Visually check the wiring and cables for damage.
- Clean off any accumulated dust and dirt. Place special emphasis on cleaning the ventilation ports of the ASD and all installed PCBs. Always keep these areas clean, as adherence of dust and dirt can cause premature component failure.
- If use of the ASD unit is discontinued for extended periods of time, turn the power on at least once every two years and confirm that the unit still functions properly.
- Do not perform hi-pot tests on the ASD or Remote I/O option card, as they may damage the unit's internal components.

Please pay close attention to all periodic inspection points and maintain a good operating environment.

# 7. Storage And Warranty

## 7.1 Storage

Observe the following points when the Remote I/O option board is not used immediately after purchase or when it is not used for an extended period of time.

- Avoid storing the option board in places that are hot or humid, or that contain large quantities of dust or metallic dust. Store the option board in a well-ventilated location.
- When not using the Remote I/O option board for an extended period of time, turn the power on at least once every two years and confirm that it still functions properly.

## 7.2 Warranty

The Remote I/O communication option kit is covered under warranty for a period of 12 months from the date of installation, but not to exceed 18 months from the date of shipment from the factory. For further warranty or service information, please contact Toshiba International Corporation.

# 8. Remote I/O Card Setup Information

This card operates by taking data from the Allen-Bradley Remote I/O network, and then sending this data to the G3 CPU. There are two basic methods the G3 uses to communicate: Scan and Block Transfer. Scan data is read and written directly from AB Input/Output registers. Block Transfer data access uses the Block Transfer Read and Block Transfer Write instructions in the Allen-Bradley PLC to read or write data into the G3's memory. To facilitate this, the G3's memory map is included in this document.

## 8.1 Baud Rate

The G3's **RS232 Baud Rate** is used for the RIO baud rate settings. Note that this will also change the baud rate of the G3's built-in RS232 port.

| Parameter Description | Item No. | Setting | RIO Baud Rate |
|---|---|---|---|
| RS232 Baud Rate | 260 | 0 | 57.6 KBaud |
| | | 1 | 115.2 KBaud |
| | | 2 | 230.4 KBaud |

## 8.2 RIO Rack Address

The **ASD ID NUMBER** (Item 263) is used for the RIO Rack Address. It has a range of 1 to 255.

## 8.3 Communication Selection

The **COMMUNICATION SELECTION** (Item No. 264) must be set to **TOSLINE-F10 "2"** to select the G3 RIO option Board.

## 8.4 Rack Size and Placement

The Tosline-F10/S20 Monitor Output is used to define the Rack Size and Placement.

| Parameter Description | Item No. | Setting | RIO Rack Size | Starting Group |
|---|---|---|---|---|
| TOSLINE-F10 Monitor Output | 268 | 0 | 1/4 | 0 |
| | | 1 | 1/4 | 2 |
| | | 2 | 1/4 | 4 |
| | | 3 | 1/4 | 6 |
| | | 4 | 1/2 | 0 |
| | | 5 | 1/2 | 4 |
| | | 6 | FULL | 0 |

## 8.5 Tosline F10 Command Input

This table shows how to configure the G3 Remote I/O Card to send and receive data over the RIO scan. The Scan Data to PLC column corresponds to data in the INPUT IMAGE table, while the Scan Data to Option Board column corresponds to data in the OUTPUT IMAGE table.

| Parameter Description | Item No. | Setting | Rack Size | Scan Data to PLC | Scan Data to Option Card |
|---|---|---|---|---|---|
| TOSLINE-F10 Command Input | 267 | 0 | 1/4 | RIO Status | Input Status |
| | | | | Frequency | Frequency |
| | | 0 | 1/2 | RIO Status | Input Status |
| | | | | Frequency | Frequency |
| | | | | Drive Status | Scan In 1 |
| | | | | Current | Scan In 2 |
| | | 0 | FULL | RIO Status | Input Status |
| | | | | Frequency | Frequency |
| | | | | Drive Status | Scan In 1 |
| | | | | Current | Scan In 2 |
| | | | | Voltage | Scan In 3 |
| | | | | Scan Out 1 | Scan In 4 |
| | | | | Scan Out 2 | Scan In 5 |
| | | | | Scan Out 3 | Scan In 6 |
| | | | | | |
| | | 1 | 1/4 | Drive Status | Input Status |
| | | | | Frequency | Frequency |
| | | 1 | 1/2 | Drive Status | Input Status |
| | | | | Frequency | Frequency |
| | | | | Current | Scan In 1 |
| | | | | Voltage | Scan In 2 |
| | | 1 | FULL | Drive Status | Input Status |
| | | | | Frequency | Frequency |
| | | | | Current | Scan In 1 |
| | | | | Voltage | Scan In 2 |
| | | | | Scan Out 1 | Scan In 3 |
| | | | | Scan Out 2 | Scan In 4 |
| | | | | Scan Out 3 | Scan In 5 |
| | | | | Scan Out 4 | Scan In 6 |

…table continues on next page…

## Tosline F10 Command Input continued

| Parameter Description | Item No. | Setting | Rack Size | Scan Data to PLC | Scan Data to Option |
|---|---|---|---|---|---|
| TOSLINE-F10 Command Input | 267 | 2 | 1/4 | RIO Status | Input Status |
| | | | | Scan Out 1 | Scan In 1 |
| | | 2 | 1/2 | RIO Status | Input Status |
| | | | | Scan Out 1 | Scan In 1 |
| | | | | Scan Out 2 | Scan In 2 |
| | | | | Scan Out 3 | Scan In 3 |
| | | 2 | FULL | RIO Status | Input Status |
| | | | | Frequency | Frequency |
| | | | | Current | Scan In 1 |
| | | | | Voltage | Scan In 2 |
| | | | | Scan Out 1 | Scan In 3 |
| | | | | Scan Out 2 | Scan In 4 |
| | | | | Scan Out 3 | Scan In 5 |
| | | | | Scan Out 4 | Scan In 6 |
| | | | | | |
| | | 3 | 1/4 | Scan Out 1 | Scan In 1 |
| | | | | Scan Out 2 | Scan In 2 |
| | | 3 | 1/2 | Scan Out 1 | Scan In 1 |
| | | | | Scan Out 2 | Scan In 2 |
| | | | | Scan Out 3 | Scan In 3 |
| | | | | Scan Out 4 | Scan In 4 |
| | | 3 | FULL | Drive Status | Input Status |
| | | | | Frequency | Frequency |
| | | | | Current | Scan In 1 |
| | | | | Voltage | Scan In 2 |
| | | | | Scan Out 1 | Scan In 3 |
| | | | | Scan Out 2 | Scan In 4 |
| | | | | Scan Out 3 | Scan In 5 |
| | | | | Scan Out 4 | Scan In 6 |

Current is scaled 0 to 100% of full load amps, and voltage is scaled 10 X % of 400V for a 460Vac drive, or 10 X % of 200V for a 230Vac drive.

Rack Size is set by Tosline F10 Monitor Output.

## 8.6 Input Status Register (Scan Data)

The following is the Bit definition for the Input Status (PLC to Option Board).

| Bit | Function | State "0" | State "1" |
|---|---|---|---|
| 0 | Run Command | Stop | Run |
| 1 | Run Enable | Run Enable | Run Disable |
| 2 | Forward / Reverse | Reverse | Forward |
| 3 | Accel/Decel #1/#2 Switching | #1 | #2 |
| 4 | Reserved: Set at 0 | - | - |
| 5 | Reserved: Set at 0 | - | - |
| 6 | Reserved: Set at 0 | - | - |
| 7 | JOG Mode Selection | Normal Mode | JOG Mode |
| 8 | Feedback Enable | Feedback Valid | Feedback Invalid |
| 9 | DC Injection Braking | Off | Available |
| A | Fundamental Parameter Switching | V/F #1 | V/F #2 |
| B | Gate Block Command (Coast Stop) | Normal Operation | Gate Block |
| C | Emergency Off Command | Normal Operation | Emergency Off |
| D | Reset Command (Trip Clear) | Normal Operation | Reset |
| E | Reserved: Set at 0 | - | - |
| F | Reserved: Set at 0 | - | - |

## 8.7 Output Status Register

The following is the Bit definition for the Drive Status (Option Board to PLC).

| Bit | Function | State "0" | State "1" |
|---|---|---|---|
| 0 | Run Status | Stopped | Running |
| 1 | Run Enabled | Run Enabled | Run Disabled |
| 2 | Forward / Reverse | Reverse | Forward |
| 3 | Accel/Decel #1/#2 Mode | #1 | #2 |
| 4 | Reserved | - | - |
| 5 | Gate Block (Fault) | Active | Not Active |
| 6 | Reserved | - | - |
| 7 | JOG Mode Selection | Normal Mode | JOG Mode |
| 8 | Feedback Enable | Feedback Valid | Feedback Invalid |
| 9 | DC Injection Braking | Off | Available |
| A | Fundamental Parameter Group Active | V/F #1 | V/F #2 |
| B | Gate Block Command (Coast Stop) | Normal Operation | Gate Block |
| C | Emergency Off Command | Normal Operation | Emergency Off |
| D | Reserved | - | - |
| E | Main Circuit Bus UnderVoltage (BUV) | Normal | BUV |
| F | Reserved | - | - |

## 8.8 Remote I/O Status Word

This register is available in the Allen-Bradley PLC, and indicates the status of Remote I/O communications.

| Bit | Function | State “0” | State “1” |
|---|---|---|---|
| 0 | Reserved | - | - |
| 1 | Reserved | - | - |
| 2 | Reserved | - | - |
| 3 | Reserved | - | - |
| 4 | Reserved | - | - |
| 5 | Reserved | - | - |
| 6 | Reserved | - | - |
| 7 | Reserved | - | - |
| 8 | Block Transfer Ready (Communications Are Working) | Not Ready | Ready |
| 9 | Block Transfer Write In Progress | Not In Progress | In Progress |
| A | Block Transfer Read Available (Indicates that the Remote I/O Option Board has data available for the PLC) | BTR Not Available | BTR Available |
| B | Block Transfer Wait (Indicates that the option board is communicating. This bit is cleared when the data transfer is complete.) | Not Communicating | Communicating |
| C | Block Transfer Error (Indicates that a communication error occurred, or that a BTW contained invalid data.) | Normal Operation | Block Transfer Error |
| D | Block Transfer Write Available (Indicates that the option board is ready to receive a BTW.) | BTW Not Ready | BTW Ready |
| E | Reserved | - | - |
| F | Reserved | - | - |

## 8.9 Setting Additional Scan In/Out Parameters

This table provides information necessary to set the data provided in the Allen-Bradley I/O registers (Input and Output Image Tables). Refer to section 8.5 to see how to set the PLC for different rack sizes.

 Extreme caution must be used when setting the scan-in addresses and masks, as unpredictable ASD operation or ASD damage may occur if they are incorrectly set.

| *EEPROM Address* | *Factory Preset Value* | *Comment* |
|---|---|---|
| 0x05A0 | 0x0000 | Scan-in address #1 |
| 0x05A2 | 0xFFFF | Scan-in mask #1 |
| 0x05A4 | 0x0000 | Scan-in address #2 |
| 0x05A6 | 0xFFFF | Scan-in mask #2 |
| 0x05A8 | 0x0000 | Scan-in address #3 |
| 0x05AA | 0xFFFF | Scan-in mask #3 |
| 0x05AC | 0x0000 | Scan-in address #4 |
| 0x05AE | 0xFFFF | Scan-in mask #4 |
| 0x05B0 | 0x0000 | Scan-in address #5 |
| 0x05B2 | 0xFFFF | Scan-in mask #5 |
| 0x05B4 | 0x0000 | Scan-in address #6 |
| 0x05B6 | 0xFFFF | Scan-in mask #6 |
| 0x05B8 | 0x0000 | Scan-out address #1 |
| 0x05BA | 0xFFFF | Scan-out mask #1 |
| 0x05BC | 0x0000 | Scan-out address #2 |
| 0x05BE | 0xFFFF | Scan-out mask #2 |
| 0x05C0 | 0x0000 | Scan-out address #3 |
| 0x05C2 | 0xFFFF | Scan-out mask #3 |
| 0x05C4 | 0x0000 | Scan-out address #4 |
| 0x05C6 | 0xFFFF | Scan-out mask #4 |

Scan In refers to data sent from the PLC to the G3 Remote I/O Option Card.
Note that these are byte addresses, which is why they skip every other address.
Only bank 0 (RAM) can be read or written to with this method.

Example: To set Scan Out #1 for overload pre-alarm status monitor (see 9.2.6.1)
This item is address 05D4, bit 4.

| | | | |
|---|---|---|---|
| 05B8: enter D4 | 05B9: enter 05 | 05BA: enter 00 | 05BB: enter 01 |

A mask of 0x0100 corresponds to binary 0000000000010000. Bit 4 is left unmasked here.
Setting these values can be done with the BTW command or by G3 Super User Mode EEP Group.
The drive must be reset for the Scan list to be updated.

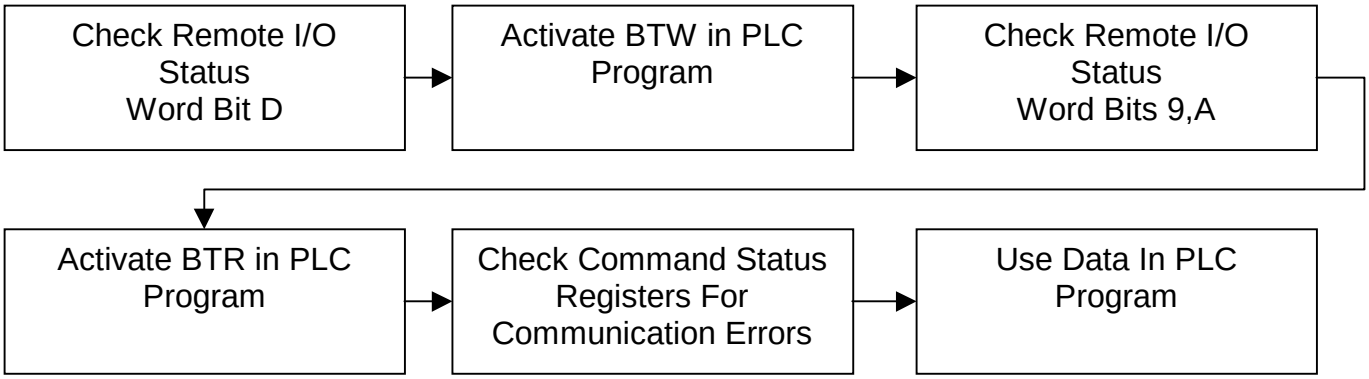
**Scan In Problem**
When using the G3's 6400 option ROM, only a mask of FFFF can be specified for Scan In parameters. This will be fixed in a future revision of the G3's option ROM. At the time of this writing, the version number of the G3's option ROM is 6400.

## 8.10 Block Transfer Reads and Writes

Data can be read from or written to the G3 Remote I/O card using the Allen-Bradley's Block Transfer commands. Using these commands enables complete access the G3's memory. Use the memory map in the next chapter to determine the addresses of the G3 parameters you need to access.

There are two steps to using the Block Transfer commands with the G3: First do a Block Transfer Write (BTW), then do a Block Transfer Read (BTR). Below is a sketch which shows the steps involved in this process.

All BTs are done to Module 1 of the Starting Group and only Tosline F10 Command Input Settings of 0 or 2 allow BT's.




### 8.10.1 Status Words

Some of the commands in this chapter have a status register associated with them. Below is a description of these status registers.

#### *8.10.1.1 Command Status Word Description*

Bit 15, when on, indicates an error has occurred with communications between the option card and the G3 ASD. The low byte of this register contains a count of the number of errors which occurred.

#### *8.10.1.2 Individual Status Words Description*

Bit 15, when on, indicates an error occurred, and bit 14, when on, indicates that a successful write command was issued.

## 8.10.2 Single Register Read (Command #1)

The single register read is Command #1. Data is acquired by using two commands: A block transfer write (BTW) followed by a block transfer read (BTR). The BTW has Command, Bank, Address, and Mask.

**Command #1 – Single Read** reads the Operating Frequency Monitor in this example BTW.

| WORD NUMBER | DEFINITION | EXAMPLE VALUE |
|---|---|---|
| 1 | COMMAND | 0001 |
| 2 | BANK | 0000 |
| 3 | ADDRESS | 0524 |
| 4 | MASK | FFFF |

**Data from Command #1 - Single Read**

The Block Transfer Read Available bit in the Remote I/O status word must be set to get this data. The Value from the Operating Frequency Monitor is 1500 in this example. By checking in the Inverter Status Monitor section of the G3 Memory Configuration chapter, it can be seen that this register has the operating frequency X 100. Therefore, the drive is running at 15 Hz here.

| WORD | DEFINITION | EXAMPLE VALUE |
|---|---|---|
| 1 | HEADER WORD/LENGTH | 0006 |
| 2 | COMMAND STATUS | ---- |
| 3 | BANK | 0000 |
| 4 | ADDRESS | 0524 |
| 5 | MASK | FFFF |
| 6 | VALUE/STATUS | 1500 |

### 8.10.3 Single Register Write (Command #2)

The single register write is Command #2. Data is written by using two commands: A block transfer write (BTW) followed by a block transfer read (BTR). The BTW has Command, Bank, Address, Mask, and Value.

**Command #2 – Single Register Write** writes the drive's Frequency Command to a value of 2000 (20Hz) in this example. This register can be found in section 9.2.2.

| WORD NUMBER | DEFINITION | EXAMPLE VALUE |
|---|---|---|
| 1 | COMMAND | 0002 |
| 2 | BANK | 0000 |
| 3 | ADDRESS | 0510 |
| 4 | MASK | FFFF |
| 5 | VALUE | 2000 |

**Data from Command #2 - Single Write**

The Block Transfer Read Available bit in the Remote I/O status word must be set to get this data. This command shows the status of writing a value of 2000 (20Hz) to the Frequency Command.

| WORD | DEFINITION | EXAMPLE |
|---|---|---|
| 1 | HEADER WORD/LENGTH | 0006 |
| 2 | COMMAND STATUS | ---- |
| 3 | BANK | 0000 |
| 4 | ADDRESS | 0510 |
| 5 | MASK | 003C |
| 6 | STATUS | ---- |

## 8.10.4 Multiple Scattered Read (Command #5)

**Command #5 – Multiple Scattered Read** reads the following three parameters in this example:
1. RS232 Baud Rate (Bank 1, Address 04AE, mask 0018).
2. ASD ID Number (Bank 1, Address 04B1, mask 00FF).
3. Tosline-F10/S20 monitor output (Bank 1, Address 04B0, mask 003C).
This data can be found in section 9.2.19.

| WORD NUMBER | DEFINITION | EXAMPLE VALUE |
|---|---|---|
| 1 | COMMAND | 0005 |
| 2 | NUMBER OF PARAMETERS | 0003 |
| 3 | BANK PARAMETER 1 | 0001 |
| 4 | ADDRESS PARAMETER 1 | 04AE |
| 5 | MASK PARAMETER 1 | 0018 |
| 6 | BANK PARAMETER 2 | 0001 |
| 7 | ADDRESS PARAMETER 2 | 04B1 |
| 8 | MASK PARAMETER 2 | 00FF |
| 9 | BANK PARAMETER 3 | 0001 |
| 10 | ADDRESS PARAMETER 3 | 04B0 |
| 11 | MASK PARAMETER 3 | 003C |

**Data From Command #5 - Multiple Scattered Read**
The Block Transfer Read Available bit in the Remote I/O status word must be set to get this data.
This example contains the values from a read of the following three parameters:
1. RS232 Baud Rate (Bank 1, Address 04AE, mask 0018).
2. ASD ID Number (Bank 1, Address 04B1, mask 00FF).
3. Tosline-F10/S20 monitor output (Bank 1, Address 04B0, mask 003C).
This data can be found in section 9.2.19.

| WORD NUMBER | DEFINITION | EXAMPLE VALUE |
|---|---|---|
| 1 | HEADER WORD/LENGTH | 0015 |
| 2 | COMMAND STATUS | - |
| 3 | NUMBER OF PARAMETERS | 0003 |
| 4 | STATUS & BANK #1 | 0001 |
| 5 | ADDRESS #1 | 04AE |
| 6 | MASK #1 | 0018 |
| 7 | VALUE #1/STATUS #1 | 0000 |
| 8 | STATUS & BANK #2 | 0001 |
| 9 | ADDRESS #2 | 04B1 |
| 10 | MASK #2 | 00FF |
| 11 | VALUE #1/STATUS | 0001 |
| 12 | STATUS & BANK #3 | 0001 |
| 13 | ADDRESS #3 | 04B0 |
| 14 | MASK #3 | 003C |
| 15 | VALUE #3/STATUS #3 | 0018 |

## 8.10.5 Multiple Scattered Write (Command #6)

**Command #6 – Multiple Scattered Write** writes to three parameters in this example.
1. RS232 Baud Rate (Bank 1, Address 04AE, mask 0018) - Value 0 (57.6K).
2. ASD ID Number (Bank 1, Address 04B1, mask 00FF) - Value 3 (Rack 3)
3. Tosline-F10/S20 monitor output (Bank 1, Address 04B0, mask 003C) - Value 6 (Full).
This data can be found in section 9.2.19.

| WORD NUMBER | DEFINITION | EXAMPLE VALUE |
|---|---|---|
| 1 | COMMAND | 0006 |
| 2 | NUMBER OF PARAMETERS | 0003 |
| 3 | BANK PARAMETER 1 | 0001 |
| 4 | ADDRESS PARAMETER 1 | 04AE |
| 5 | MASK PARAMETER 1 | 0018 |
| 6 | VALUE PARAMETER 1 | 0000 |
| 7 | BANK PARAMETER 2 | 0001 |
| 8 | ADDRESS PARAMETER 2 | 04B1 |
| 9 | MASK PARAMETER 2 | 00FF |
| 10 | VALUE PARAMETER 2 | 0003 |
| 11 | BANK PARAMETER 3 | 0001 |
| 12 | ADDRESS PARAMETER 3 | 04B0 |
| 13 | MASK PARAMETER 3 | 003C |
| 14 | VALUE PARAMETER 3 | 0018 |

**Data from Command #6 - Multiple Scattered Write**
This example shows writing these following three parameters:
1. RS232 Baud Rate (Bank 1, Address 04AE, mask 0018) - Value 0 (57.6K).
2. ASD ID Number (Bank 1, Address 04B1, mask 00FF) - Value 3 (Rack 3)
3. Tosline-F10/S20 monitor output (Bank 1, Address 04B0, mask 003C) - Value 6 (Full)
This data can be found in section 9.2.19.

| WORD | DEFINITION | EXAMPLE VALUE |
|---|---|---|
| 1 | HEADER WORD/LENGTH | 0015 |
| 2 | COMMAND STATUS | - |
| 3 | NUMBER OF PARAMETERS | 0003 |
| 4 | BANK #1 | 0001 |
| 5 | ADDRESS #1 | 04AE |
| 6 | MASK #1 | 0018 |
| 7 | STATUS #1 | - |
| 8 | BANK #2 | 0001 |
| 9 | ADDRESS #2 | 04B1 |
| 10 | MASK #2 | 00FF |
| 11 | STATUS #2 | - |
| 12 | BANK #3 | 0001 |
| 13 | ADDRESS #3 | 04B0 |
| 14 | MASK #3 | 003C |
| 15 | STATUS #3 | - |

## 8.11 Allen-Bradley PLC Ladder Logic Examples

These programs were run on an Allen-Bradley programmable logic controller. They are included here to show detail on what is needed in the ladder logic. Note that the ladder logic is set up to initiate BTWs, wait until that command is completed and processed by the ASD, then initiate the BTR.

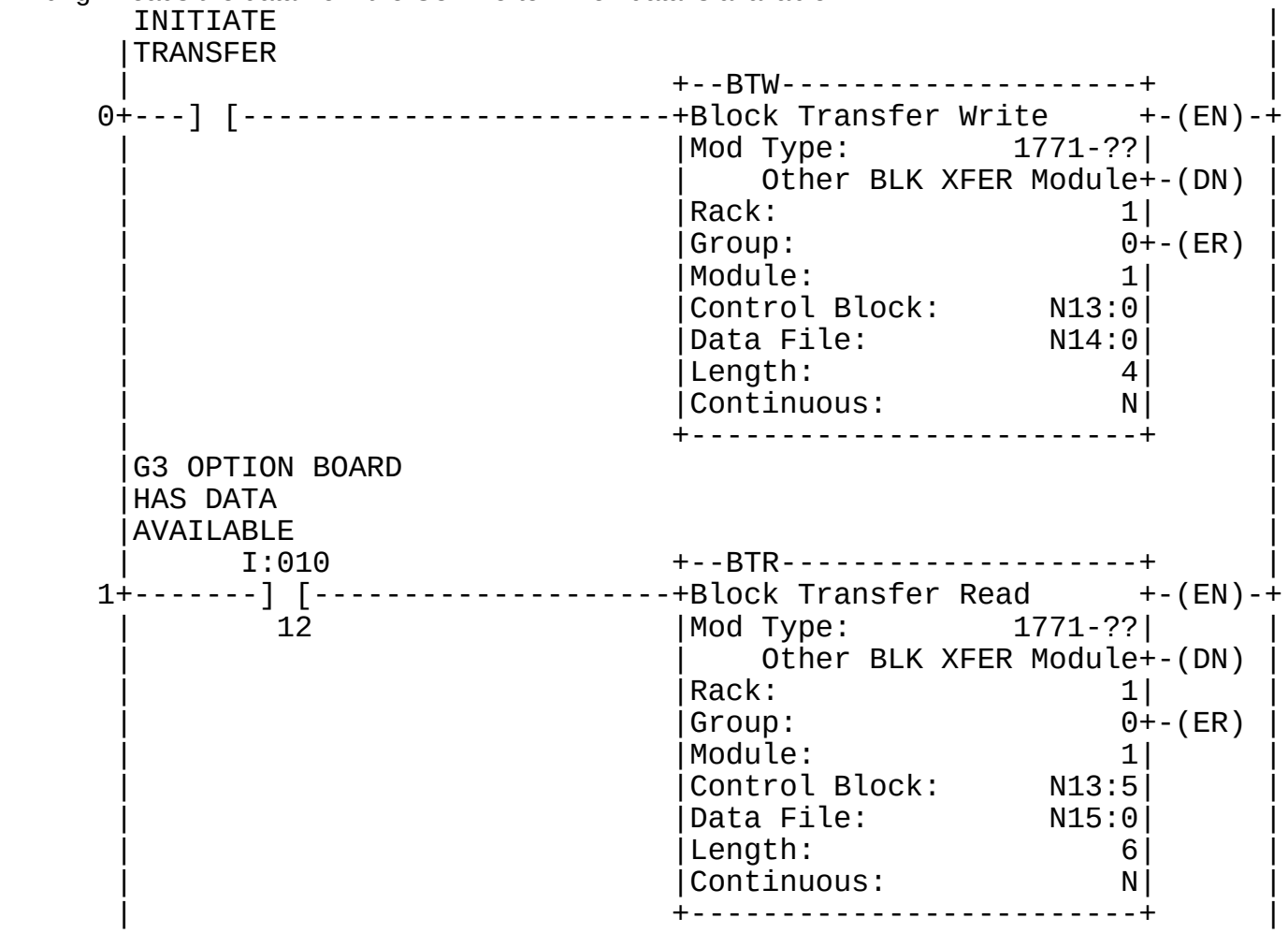
### 8.11.1 Command #1 - Single Read

The following example will read the ACCELERATION RATE #1 from the RAM (bank 0) of the G3. See section 9.2.8 for information on this parameter.

G3 Inverter Settings

| | |
|---|---|
| INVERTER ID NUMBER | 1 (Sets the rack number for the G3 to the PLC) |
| TOSLINE-F10 MONITOR OUTPUT | 6 (Sets Remote IO rack size to FULL) |
| TOSLINE-F10 COMMAND INPUT | 0 (Selects the data for the discrete IO) |

The following ladder logic reads data from the G3 Inverter. Rung 0 writes the request to the G3 Inverter. Rung 1 reads the data from the G3 Inverter when data is available.




This data is formatted as Command (1), Bank (0), Address (03C6), and Mask (FFFF).

| Addr | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| N14:0 | 1<br>Integer | 0<br>Integer | 03C6<br>HEX | FFFF<br>HEX | 0 | 0 | 0 | 0 | 0 | 0 |
| N14:10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Addr | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| N15:0 | 6<br>Integer | 0<br>Integer | 0<br>Integer | 03C6<br>HEX | FFFF<br>HEX | 10<br>Integer | 0 | 0 | 0 | 0 |
| N14:10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

The proper Header Word (N15:0), Bank (N15:2), Address (N15:3) and Mask (N15:4) should be verified before the data is accepted.

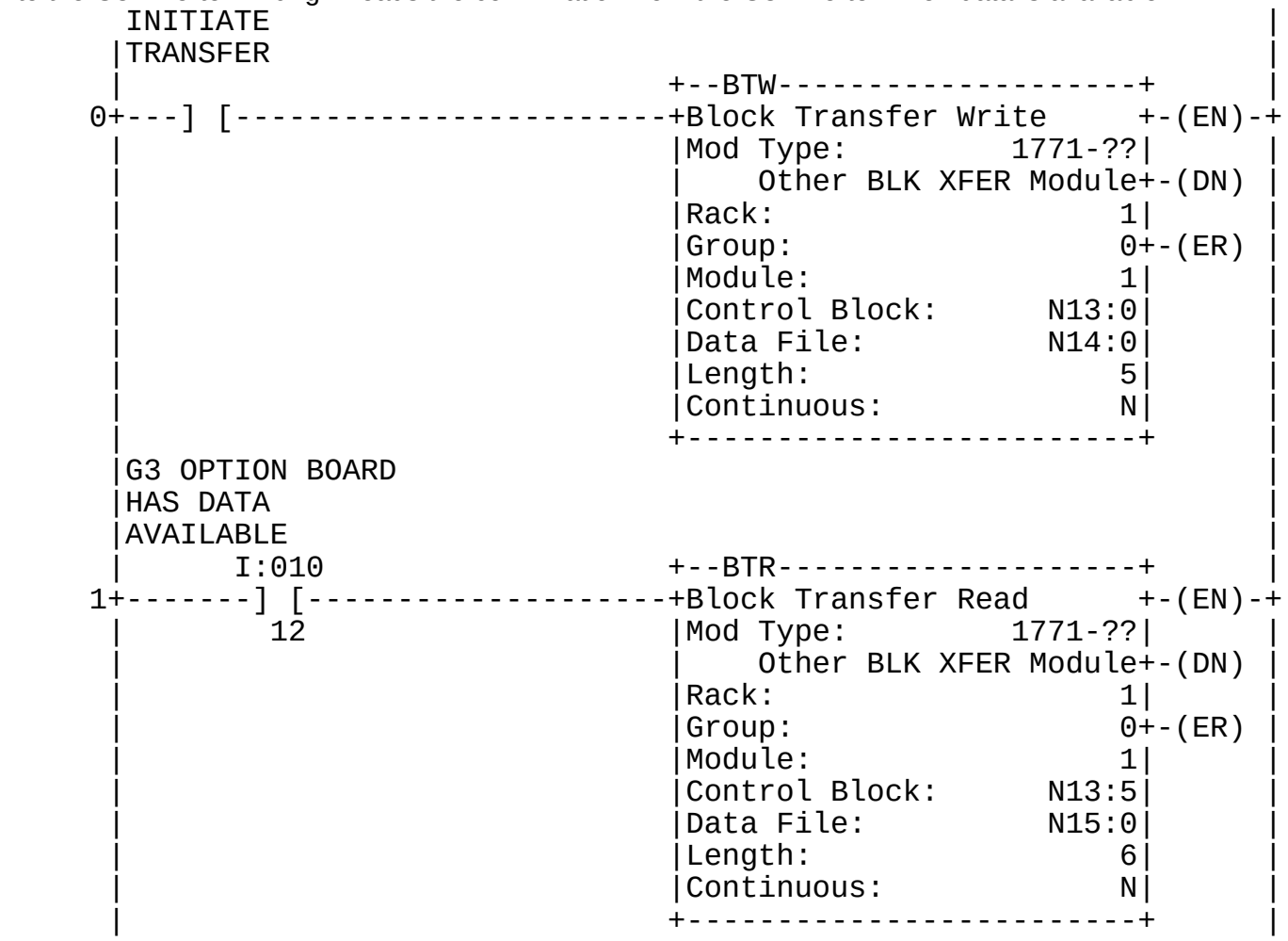
## 8.11.2 Command #2 - Single Write

The following example will set the ACCELERATION RATE #1 to 10 seconds in the RAM (bank 0) of the G3. See section 9.2.8 for information on this parameter.

G3 Inverter Settings

| | |
|---|---|
| INVERTER ID NUMBER | 1 (Sets the rack number for the G3 to the PLC) |
| TOSLINE-F10 MONITOR OUTPUT | 6 (Sets Remote IO rack size to FULL) |
| TOSLINE-F10 COMMAND INPUT | 0 (Selects the data for the discrete IO) |

The following ladder logic would be necessary to write data to the G3 Inverter. Rung 0 writes the data to the G3 Inverter. Rung 1 reads the confirmation from the G3 Inverter when data is available.




| Addr | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| N14:0 | 2<br>Integer | 0<br>Integer | 03C6<br>HEX | FFFF<br>HEX | 100<br>Integer | 0 | 0 | 0 | 0 | 0 |
| N14:10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Addr | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| N15:0 | 6<br>Integer | 0<br>Integer | 0<br>Integer | 03C6<br>HEX | FFFF<br>HEX | 0 | 0 | 0 | 0 | 0 |
| N14:10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

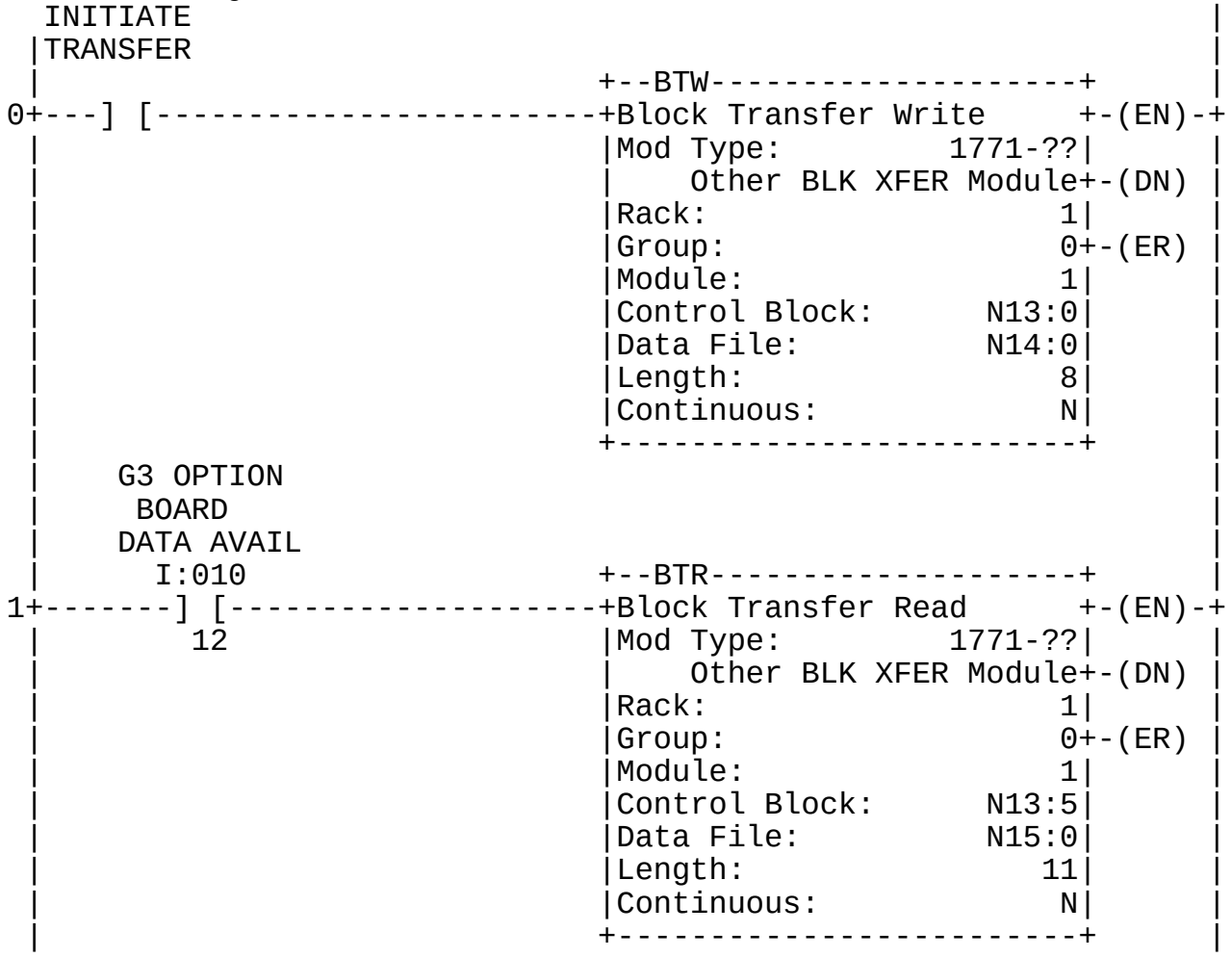
### 8.11.3 Command #5 - Multiple Scattered Read

The following example will read the OUTPUT CURRENT MONITOR and the OUTPUT VOLTAGE MONITOR from the RAM (bank 0) of the G3.

G3 Inverter Settings.

| | |
|---|---|
| INVERTER ID NUMBER | 1 (Sets the rack number for the G3 to the PLC) |
| TOSLINE-F10 MONITOR OUTPUT | 6 (Sets Remote IO rack size to FULL) |
| TOSLINE-F10 COMMAND INPUT | 0 (Selects the data for the discrete IO) |

The following ladder logic would be necessary to write data to the G3 Inverter. Rung 0 writes the data to the G3 Inverter. Rung 1 reads the confirmation from the G3 Inverter when data is available.



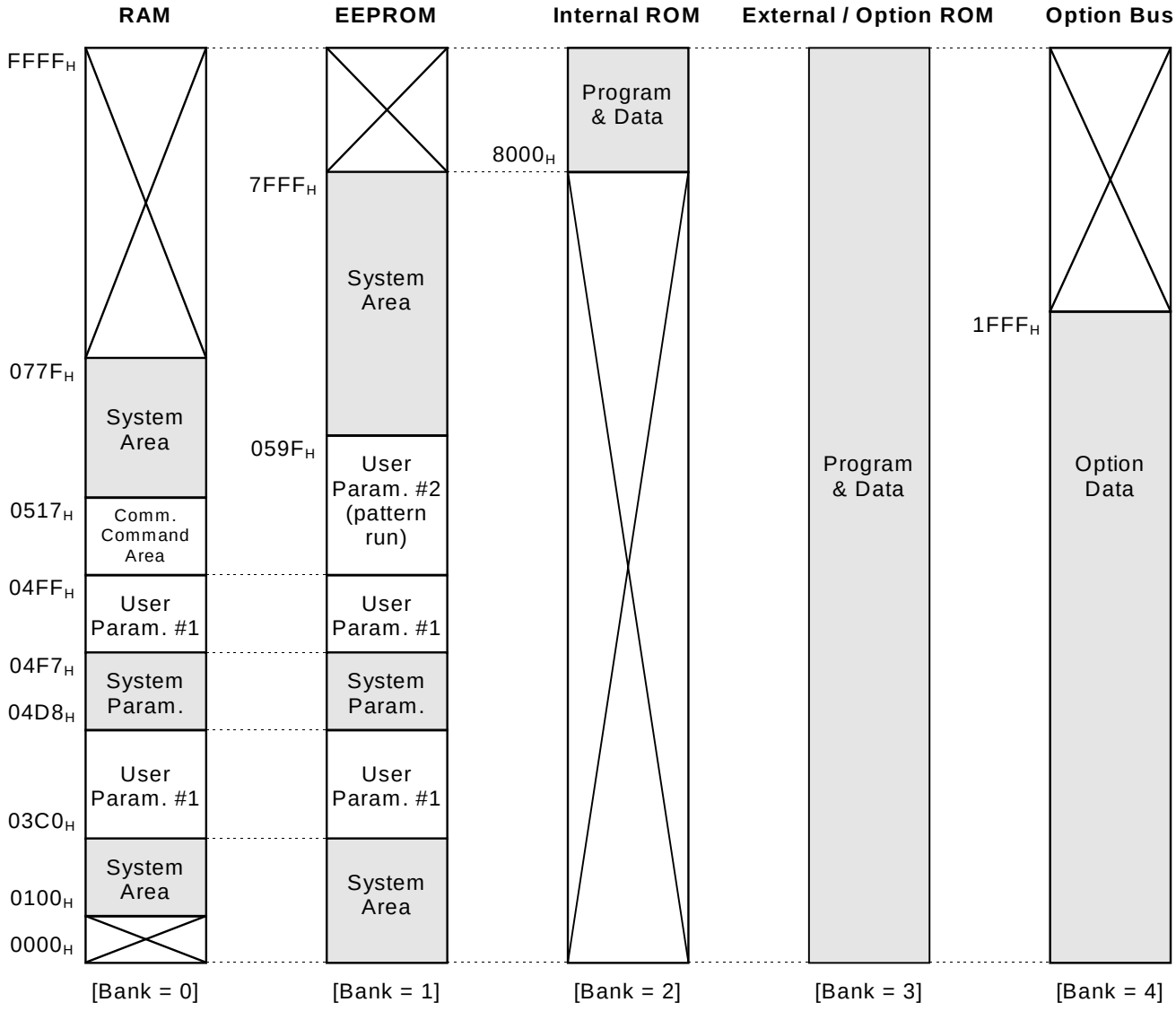

| Addr | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| N14:0 | 5<br>Integer | 2<br>Integer | 0<br>Integer | 0576<br>HEX | FFFF<br>HEX | 0<br>Integer | 05B0<br>HEX | FFFF<br>HEX | 0 | 0 |
| N14:10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Addr | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| N15:0 | 11<br>Integer | 0<br>Integer | 2<br>Integer | 0<br>Integer | 0576<br>HEX | FFFF<br>HEX | 10<br>Integer | 0<br>Integer | 05B0<br>HEX | FFFF<br>HEX |
| N14:10 | 500<br>Integer | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

OUTPUT CURRENT MONITOR (N15:6) indicates 10% of the inverter output.
OUTPUT VOLTAGE MONITOR (N15:10) indicates 50% of 400 volts.

# 9. G3 Memory Configuration

## 9.1 Memory Map




RAM: Contains parameter settings and other data that the ASD uses for system control (parameters, commands, status, etc.) When the ASD is powered-off, this data is erased. When the ASD is powered-on, parameter data is copied from EEPROM to RAM (directly in the case of User Param. #1). Other data is initialized.

EEPROM: Contains user-set parameters and other data. This data is retained with power loss.

Internal ROM: Contains control programming and internal ROM version information.

External ROM: Contains control programming and external ROM version information.

Option Bus: Allows access to data contained in installed options.

**<< Note >>** Shaded areas cannot be written to (read-only). Also, do not attempt to access those areas crossed out with an “X”.

## 9.2 Communications Memory Addresses

- **Symbol Definitions**
  (#): Depends on ASD rating.
  (✳): Cannot be set while ASD is running (attempting to write data while the ASD is running will result in an error (N0000)).
  (**Note**): Use caution! Because there is no data checking performed on these settings, caution must be used to not write incorrect data (the "Mask" and "Adjustment Range" sections will be shaded).

- **Usage Precautions**
  1: Refer to the ASD instruction manual in conjunction with this manual.
  2: If the mask data is not correctly set when data is written, the data check function cannot correctly check the data setting.
  3: All data is written in hexadecimal (base 16) format (except for "Multiplier" and "Adjustment Range" data, which is written in decimal (base 10) format).

**Parameter Table Usage Method Example**

### GROUP: FUNDAMENTAL PARAMETERS #1

| Function / Title | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|
| MAXIMUM OUTPUT FREQUENCY (✳) | 0 / 1 | 03C0 | FFFF | 0BB8 ~ 9C40 (30.00 ~ 400.00) | 0.01 |
| BASE FREQUENCY #1 | 0 / 1 | 0428 | FFFF | 09C4 ~ 9C40 (25.00 ~ 400.00) | 0.01 |

◊ In this example, the MAXIMUM OUTPUT FREQUENCY setting of the ASD numbered "00" will be changed from 80Hz to 60Hz.

HOST COMPUTER → INV. INV. → HOST COMPUTER

| | |
|---|---|
| (00B0) | (00B0000) ..... Bank |
| (00A3C0) | (00A03C0) ..... Address |
| (00MFFFF) | (00MFFFF) ..... Mask |
| (00W1770) | (00W1770) ..... Data (within adjustment range) |

(Since the mask is automatically set to $FFFF_H$ whenever the address is set, setting it as shown here is optional).

Bank 0 is RAM memory, Bank 1 is EEPROM memory. Changes to Bank 1 do not affect operation of the G3 until the drive is reset, or power is cycled. On power-up, data from EEPROM is written to RAM.

- **Panel display range (base 10)**
  The actual value displayed on the LCD panel will depend on the setting of FREQUENCY DISPLAY RESOLUTION in GROUP:UTILITY PARAMETERS. When 0.01Hz resolution is selected and the above example is performed, 60.00Hz will be displayed on the panel. When 0.1Hz resolution is selected, 60.0Hz will be displayed. The "Adjustment Range" column shows a maximum of 5 digits, but because the panel can only display 4 digits, the displayed value will be a rounded representation of the actual data setting value.
  (Ex: If 399.95 ($9C3B_H$) is written to MAXIMUM OUTPUT FREQUENCY (upper limit=400.00), 400.0Hz will be displayed).

- **Display Data / Internal Data Conversion Method**
  Internal data = [display data ÷ Multiplier], converted to hexadecimal.
  (Ex: To convert a MAXIMUM OUTPUT FREQUENCY setting of 60Hz to internal data: 60 ÷ 0.01 = 6000, converted to hexadecimal → h1770).

- **Shaded Parameters**
  Data checks are not performed on parameters that appear in the following data tables with shaded "Mask" and "Adjustment Range" sections. Therefore use extreme caution when setting these parameters, as incorrect mask or data settings may cause unpredictable operation.

## 9.2.1 Option Command / Frequency

<< The following function is valid only when FREQUENCY MODE SELECTION in GROUP:UTILITY PARAMETERS is set to 3 (communication/12-bit binary option input valid). >>

| Group | Function | Bank | Address | Mask | Adjustment Range | Multiplier | Initialized Value |
|---|---|---|---|---|---|---|---|
| Option | Frequency command | 0 | 0508 | FFFF | LL ~ UL (**Note 1**) | 0.01 | 0000 |

<< The following functions are valid only when COMMAND MODE SELECTION in GROUP:UTILITY PARAMETERS is set to 3 (communication option input valid). >>

| Group | Function | Bank | Address | Mask | Adjustment Range | Multiplier | Initialized Value |
|---|---|---|---|---|---|---|---|
| Option Command | Run • stop command selection | 0 | 050A | 0001 | 0000: Stop command<br>0001: Run command | — | 0000 |
| | Forward • reverse run selection | 0 | 050A | 0004 | 0000: Reverse<br>0004: Forward | — | 0004 (**Note 2**) |
| | Acc/dec #1 / #2 selection | 0 | 050A | 0008 | 0000: Acc / dec #1<br>0008: Acc / dec #2 | — | 0000 |
| | Jog mode selection | 0 | 050A | 0080 | 0000: Normal (acc/dec mode)<br>0080: Jog mode | — | 0000 |
| | Feedback control (**Note 3**) | 0 | 050B | 0001 | 0000: Feedback valid<br>0001: Feedback invalid | — | 0000 |
| | Compulsory DC injection braking mode | 0 | 050B | 0002 | 0000: No compulsory DC injection braking<br>0002: Compulsory DC injection below DC INJECTION START FREQUENCY | — | 0000 |
| | Fundamental parameter switching | 0 | 050B | 0004 | 0000: V/F #1<br>0004: V/F #2 | — | 0000 |
| | Gate block command (coast stop command) | 0 | 050B | 0008 | 0000: Normal<br>0008: Gate block | — | 0000 |
| | Emergency off command | 0 | 050B | 0010 | 0000: Does nothing<br>0010: Emergency off | — | 0000 |
| | Reset command (trip clear) | 0 | 050B | 0020 | 0000: Does nothing<br>0020: Reset | — | 0000 |
| | Preset speed run command | 0 | 050C | 000F | 0000: Output frequency selected by FREQUENCY MODE SELECTION<br>0001 ~ 000F: speeds 1 ~ 15 | 1 | 0000 |

| Group | Function | Bank | Address | Mask | Adjustment Range | Multiplier | Initialized Value |
|---|---|---|---|---|---|---|---|
| RS485 | RS485 communications timer | 0 / 1 | 04CC | 00FF | 0000: Timer OFF<br>0001 ~ 0064: 1s ~ 100s | 1 | EEPROM contents |

(**Note 1**) Throughout the remainder of this document, the abbreviations “LL”, “UL”, and “Fmax” will stand for LOWER LIMIT FREQUENCY, UPPER LIMIT FREQUENCY, and MAXIMUM OUTPUT FREQUENCY, respectively.

(**Note 2**) The initialized value is 0004 only when an option ROM is installed and a communications option (RS485, TOSLINE-F10, TOSLINE-S20, DeviceNet or RIO) is selected (COMMUNICATION SELECTION in GROUP:COMMUNICATION SETTING PARAMETERS = 1 ~ 3). Otherwise, it is initialized to 0000.

(**Note 3**) This parameter only selects whether or not feedback control is valid when feedback control is selected. In order to use feedback control, parameter FEEDBACK CONTROL SELECTION in GROUP:FEEDBACK CONTROL PARAMETERS must still be set.

## 9.2.2 RS232C Command / Frequency

<< RS232C commands/frequency command will only be valid when the following parameter is respectively configured for RS232C command, frequency, or both. >>

| Group | Function | Bank | Address | Mask | Adjustment Range | Multiplier | Initialized Value |
|---|---|---|---|---|---|---|---|
| RS232C | Command • frequency mode selection | 0 | 0515 | 0003 | 0000: FREQUENCY MODE SELECTION, COMMAND MODE SELECTION settings<br>0001: RS232C commands valid<br>0002: RS232C frequency valid<br>0003: RS232C commands and frequency valid | — | 0000 |

| Group | Function | Bank | Address | Mask | Adjustment Range | Multiplier | Initialized Value |
|---|---|---|---|---|---|---|---|
| RS232C | Frequency command | 0 | 0510 | FFFF | LL ~ UL | 0.01 | 0000 |

| Group | Function | Bank | Address | Mask | Adjustment Range | Multiplier | Initialized Value |
|---|---|---|---|---|---|---|---|
| RS232C Command | Run • stop command selection | 0 | 0512 | 0001 | 0000: Stop command<br>0001: Run command | — | 0000 |
| | Forward • reverse run selection | 0 | 0512 | 0004 | 0000: Reverse<br>0004: Forward | — | 0004 |
| | Acc/dec #1 / #2 selection | 0 | 0512 | 0008 | 0000: Acc / dec #1<br>0008: Acc / dec #2 | — | 0000 |
| | Jog mode selection | 0 | 0512 | 0080 | 0000: Normal (acc/dec mode)<br>0080: Jog mode | — | 0000 |
| | Feedback control (**Note 1**) | 0 | 0513 | 0001 | 0000: Feedback valid<br>0001: Feedback invalid | — | 0000 |
| | Compulsory DC injection braking mode | 0 | 0513 | 0002 | 0000: No compulsory DC injection braking<br>0002: Compulsory DC injection below DC INJECTION START FREQUENCY | — | 0000 |
| | Fundamental parameter switching | 0 | 0513 | 0004 | 0000: V/F #1<br>0004: V/F #2 | — | 0000 |
| | Gate block command (coast stop command) | 0 | 0513 | 0008 | 0000: Normal<br>0008: Gate block | — | 0000 |
| | Emergency off command | 0 | 0513 | 0010 | 0000: Does nothing<br>0010: Emergency off | — | 0000 |
| | Reset command (trip clear) | 0 | 0513 | 0020 | 0000: Does nothing<br>0020: Reset | — | 0000 |
| | Preset speed run command | 0 | 0514 | 000F | 0000: Output frequency selected by FREQUENCY MODE SELECTION<br>0001 ~ 000F: speeds 1 ~ 15 | 1 | 0000 |

| Group | Function | Bank | Address | Mask | Adjustment Range | Multiplier | Initialized Value |
|---|---|---|---|---|---|---|---|
| RS232C | RS232C communications timer | 0 / 1 | 0445 | 00FF | 0000: Timer OFF<br>0001 ~ 0064: 1s ~ 100s | 1 | EEPROM contents |

(**Note 1**) This parameter only selects whether or not feedback control is valid when feedback control is selected. In order to use feedback control, parameter FEEDBACK CONTROL SELECTION in GROUP:FEEDBACK CONTROL PARAMETERS must still be set.

## 9.2.3 Panel Command / Frequency

<< The following function is valid only when FREQUENCY MODE SELECTION in GROUP:UTILITY PARAMETERS is set to 2 (panel input valid) or 4 (local/remote changeover possible). >>

| Group | Function / Title | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|---|
| Panel | FREQUENCY COMMAND | 0 | 04F8 | FFFF | LL ~ UL | 0.01 |

<< The following functions are valid only when COMMAND MODE SELECTION in GROUP:UTILITY PARAMETERS is set to 2 (panel input valid) or 4 (local/remote changeover possible). >>

| Group | Function / Title | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|---|
| Panel Command | Run • stop command selection | 0 (**Note 1**) | 04FA | 0001 | 0000: Stop command<br>0001: Run command | — |
| | DIRECTION SELECTION (FORWARD/REV) | 0 / 1 | 04FA | 0004 | 0000: Reverse<br>0004: Forward | — |
| | ACCEL/DECEL #1/#2 SELECTION | 0 / 1 | 04FA | 0008 | 0000: Acc / dec #1<br>0008: Acc / dec #2 | — |
| | Jog mode selection | 0 (**Note 1**) | 04FA | 0080 | 0000: Normal (acc/dec mode)<br>0080: Jog mode | — |
| | PANEL FEEDBACK CONTROL (**Note 2**) | 0 / 1 | 04FB | 0001 | 0000: Feedback valid<br>0001: Feedback invalid | — |
| | Compulsory DC injection braking mode | 0 (**Note 1**) | 04FB | 0002 | 0000: No compulsory DC injection braking<br>0002: Compulsory DC injection below DC INJECTION START FREQUENCY | — |
| | FUNDAMENTAL PARAM SWITCHING | 0 / 1 | 04FB | 0004 | 0000: V/F #1<br>0004: V/F #2 | — |
| | Gate block command | 0 (**Note 1**) | 04FB | 0008 | 0000: Normal<br>0008: Gate block | — |
| | Emergency off command | 0 (**Note 1**) | 04FB | 0010 | 0000: Does nothing<br>0010: Emergency off | — |
| | Reset command | 0 (**Note 1**) | 04FB | 0020 | After writing 0020 ("TRIP CLEAR COMMAND (PRESS CLEAR)") will be displayed), write 0000 and the ASD will reset | — |
| | Preset speed run command | 0 (**Note 1**) | 04FC | 000F | 0000: Output frequency selected by FREQUENCY MODE SELECTION<br>0001 ~ 000F: speeds 1 ~ 15 | 1 |

(**Note 1**) It is also possible to write to bank 1 (EEPROM), but this is not for normal command use. To avoid the possibility of unpredictable operation, do not write these commands to bank 1.

(**Note 2**) This parameter only selects whether or not feedback control is valid when feedback control is selected. In order to use feedback control, parameter FEEDBACK CONTROL SELECTION in GROUP:FEEDBACK CONTROL PARAMETERS must still be set.

## 9.2.4 ASD Status Monitor (Read Only)

| Function | Bank | Address | Mask | Data Length | Contents (Units) | Multiplier |
|---|---|---|---|---|---|---|
| Operating frequency monitor | 0 | 0524 | FFFF | word | Hz | 0.01 |
| Rotation direction monitor | 0 | 05B6 | 0004 | bit | → *ASD status monitor 1* | — |
| Frequency command monitor | 0 | 0500 | FFFF | word | Hz | 0.01 |
| Output current monitor | 0 | 0576 | 00FF | byte | % | 1 |
| Input voltage monitor (**Note 1**) | 0 | 05B2 | FFFF | word | % | 0.1 |
| Output voltage monitor (**Note 1**) | 0 | 05B0 | FFFF | word | % | 0.1 |
| Input terminal status monitor | 0 | 057A | FFFF | word | → *bit monitor 1* | — |
| Output terminal status monitor | 0 | 0579 | 00FF | byte | → *bit monitor 2* | — |
| Cumulative run time (**Note 2**) | 0 | 05A6 | FFFF | word | — | 1 |
| | | 05D2 | 0008 | bit | — | 1 |
| Past trips (**Note 3**) (4 most recent trips) | 0 / 1 | 04F3 ~ 04F7 | 007F | 5 bytes | → *Table 1, Table 2* | — |
| Pre-compensation frequency | 0 | 0524 | FFFF | word | Hz | 0.01 |
| Post-compensation frequency | 0 | 0260 | FFFF | word | Hz | 0.01 |
| Torque current monitor | 0 | 0684 | FFFF | word | % (**Note 4**) | 0.01 |
| Excitation current monitor | 0 | 0688 | 00FF | byte | % | 1 |
| PID feedback value | 0 | 0506 | FFFF | word | Hz (**Note 4**) | 0.02 |
| Motor overload ratio | 0 | 0584 | FFFF | word | % | (**Note 5**) |
| ASD overload ratio | 0 | 0586 | FFFF | word | % | (**Note 5**) |
| DBR overload ratio | 0 | 0588 | FFFF | word | % | (**Note 5**) |
| Input / output power units | 0 | 03AE | 0008 | bit | 0000: 0.01kW<br>0008: 0.1kW | (**Note 6**) |
| Input power (%) (**Note 7**) | 0 | 035C | FFFF | word | % | 0.1 |
| Input power (kW) | 0 | 0350 | FFFF | word | kW | (**Note 6**) |
| Output power (%) (**Note 7**) | 0 | 035E | FFFF | word | % (**Note 4**) | 0.1 |
| Output power (kW) | 0 | 0352 | FFFF | word | kW (**Note 4**) | (**Note 6**) |
| RR input | 0 | 0550 | FFFF | word | % | (**Note 5**) |
| Present trip | 0 | 0591 | 007F | byte | → *Table 1* | — |
| Command mode status | 0 | 05B8 | 0003 | 2 bits | 00: terminal<br>01: panel<br>02: option<br>03: RS232C | — |
| Frequency mode selection status | 0 | 05B8 | 000C | 2 bits | 00: terminal<br>04: panel<br>08: option<br>0C: RS232C | — |
| CPU version number | 2 | 8000 | FFFF | word | — | 1 |
| External ROM version number | 3 | 0000 | FFFF | word | — | 1 |
| EEPROM version number | 1 | 0380 | FFFF | word | — | 1 |
| ASD typeform monitor | 0 | 05CA | 00FF | byte | → *Table 5* | 1 |

(**Note 1**) These monitor voltage units are not affected by the setting of `VOLTAGE UNITS SELECTION` in `GROUP:UTILITY PARAMETERS` - they are always in %.

(**Note 2**) The time range for the cumulative run timer is 0000H ~ FFFFH (0 ~ 65535 hours), counted at address 05A6 in bank 0. When the timer reaches a count of 65536, bit 3 of address 05D2 in bank 0 is set, and the count at address 05A6 is cleared. At a count of 65537, therefore, address 05A6 will contain 0001H and bit 3 of address 05D2 will be set.

(**Note 3**) Past trips are stored in a ring-buffer format, with the most recent trip located at the address following the 00H starting point.

(**Note 4**) Uses signed data (data values larger than 7FFFH are negative). If internal data is 8000H or larger, the actual value can be obtained by: **actual value = - [FFFFH - (internal data) + 1]**.

(**Note 5**) Multiplier is 100/65535.

(**Note 6**) If the input / output power units data is 0000, the monitored data is in 0.01kW units, and the multiplier is 0.01. If the input / output power units data is 0008, the monitored data is in 0.1kW units, and the multiplier is 0.1. These values are automatically set according to the ASD typeform.

(**Note 7**) 100% = $\sqrt{3} \times$ rated voltage $\times$ rated current (with some variation for losses).

### *9.2.4.1 Input Terminal Status Monitor*

| Bit Monitor 1 Lower Byte | 057AH | Input Terminal | 0 | 1 | Single-Bit Read Mask |
|---|---|---|---|---|---|
| | bit 0 | F | terminal - CC open | terminal - CC shorted | 0001 |
| | bit 1 | R | terminal - CC open | terminal - CC shorted | 0002 |
| | bit 2 | S1 | terminal - CC open | terminal - CC shorted | 0004 |
| | bit 3 | S2 | terminal - CC open | terminal - CC shorted | 0008 |
| | bit 4 | S3 | terminal - CC open | terminal - CC shorted | 0010 |
| | bit 5 | S4 | terminal - CC open | terminal - CC shorted | 0020 |
| | bit 6 | S5 (option) | terminal - CC open | terminal - CC shorted | 0040 |
| | bit 7 | S6 (option) | terminal - CC open | terminal - CC shorted | 0080 |

| Bit Monitor 1 Upper Byte | 057BH | Input Terminal | 0 | 1 | Single-Bit Read Mask |
|---|---|---|---|---|---|
| | bit 0 | unused (always 0) | — | — | — |
| | bit 1 | unused (always 0) | — | — | — |
| | bit 2 | unused (always 0) | — | — | — |
| | bit 3 | unused (always 0) | — | — | — |
| | bit 4 | unused (always 0) | — | — | — |
| | bit 5 | S7 (option) | terminal - CC open | terminal - CC shorted | 0020 |
| | bit 6 | RES | terminal - CC open | terminal - CC shorted | 0040 |
| | bit 7 | ST | terminal - CC open | terminal - CC shorted | 0080 |

### *9.2.4.2 Output Terminal Status Monitor*

| Bit Monitor 2 | 0579H | Output Terminal | 0 | 1 | Single-Bit Read Mask |
|---|---|---|---|---|---|
| | bit 0 | unused (always 0) | — | — | — |
| | bit 1 | unused (always 0) | — | — | — |
| | bit 2 | FAN | OFF | ON | 0004 |
| | bit 3 | FL | FLB-FLC shorted | FLA-FLC shorted | 0008 |
| | bit 4 | MS relay | OFF | ON | 0010 |
| | bit 5 | OUT (option) | OUTB-OUTC shorted | OUTA-OUTC shorted | 0020 |
| | bit 6 | RCH | RCHA-RCHC open | RCHA-RCHC shorted | 0040 |
| | bit 7 | LOW | LOWA-LOWC open | LOWA-LOWC shorted | 0080 |

### 9.2.4.3 ASD Status Monitor

| ASD Status 1 Lower Byte | 05B6H | ASD Status | 0 | 1 | Single-Bit Read Mask |
|---|---|---|---|---|---|
| | bit 0 | running (acc/dec) | — | running | 0001 |
| | bit 1 | unused (always 0) | — | — | — |
| | bit 2 | forward / reverse | reverse | forward | 0004 |
| | bit 3 | acc/dec #1/#2 | acc/dec #1 | acc/dec #2 | 0008 |
| | bit 4 | for ASD use | — | — | — |
| | bit 5 | for ASD use | — | — | — |
| | bit 6 | for ASD use | — | — | — |
| | bit 7 | jog/normal mode | normal (acc/dec) | jog mode | 0080 |

| ASD Status 1 Upper Byte | 05B7H | ASD Status | 0 | 1 | Single-Bit Read Mask |
|---|---|---|---|---|---|
| | bit 0 | feedback ON/OFF | OFF | feedback active | 0001 |
| | bit 1 | DC inject. braking | OFF | DC inject. braking active | 0002 |
| | bit 2 | V/F #1/#2 | V/F #1 | V/F #2 | 0004 |
| | bit 3 | coasting | not coasting | coasting | 0008 |
| | bit 4 | emergency off | not in emergency off | in emergency off | 0010 |
| | bit 5 | for ASD use | — | — | — |
| | bit 6 | for ASD use | — | — | — |
| | bit 7 | for ASD use | — | — | — |

| ASD Status 2 | 05BBH | ASD Status | 0 | 1 | Single-Bit Read Mask |
|---|---|---|---|---|---|
| | bit 0 | accelerating | not accelerating | accelerating | 0001 |
| | bit 1 | decelerating | not decelerating | decelerating | 0002 |
| | bit 2 | for ASD use | — | — | — |
| | bit 3 | retry | not retrying | retrying | 0008 |
| | bit 4 | running (including DC inject. braking) | stopped | running | 0010 |
| | bit 5 | for ASD use | — | — | — |
| | bit 6 | for ASD use | — | — | — |
| | bit 7 | tripped | not tripped | tripped | 0080 |

### 9.2.5 Trips Registered as Past Faults

| LCD Display Message | Data (Hex) | Explanation |
|---|---|---|
| NO ERROR | ××00 | No error has been recorded since the last ASD reset or trip clear |
| OVERCURRENT (ACCEL) (PRESS CLEAR) | ××01 | Overcurrent during acceleration |
| OVERCURRENT (DECEL) (PRESS CLEAR) | ××02 | Overcurrent during deceleration |
| OVERCURRENT (RUN) (PRESS CLEAR) | ××03 | Overcurrent during constant-speed run |
| LOAD-END OVERCURRENT (PRESS CLEAR) | ××04 | Load-end overcurrent detected at start-up (output terminals, motor wiring etc.) |
| U-PHASE SHORT CKT (PRESS CLEAR) | ××05 | U-phase armature short circuit |
| V-PHASE SHORT CKT (PRESS CLEAR) | ××06 | V-phase armature short circuit |
| W-PHASE SHORT CKT (PRESS CLEAR) | ××07 | W-phase armature short circuit |
| LOST INPUT PHASE (PRESS CLEAR) | ××08 | Lost input phase (option) |
| LOST OUTPUT PHASE (PRESS CLEAR) | ××09 | Lost output phase (option) |
| OVERVOLTAGE (ACCEL) (PRESS CLEAR) | ××0A | Overvoltage during acceleration |
| OVERVOLTAGE (DECEL) (PRESS CLEAR) | ××0B | Overvoltage during deceleration |
| OVERVOLTAGE (RUN) (PRESS CLEAR) | ××0C | Overvoltage during constant-speed run |
| ASD OVERLOAD (PRESS CLEAR) | ××0D | ASD overload |
| MOTOR OVERLOAD (PRESS CLEAR) | ××0E | Motor overload |
| DBR OVERLOAD TRIP (PRESS CLEAR) | ××0F | Dynamic braking resistor overload |
| OVERHEAT TRIP (PRESS CLEAR) | ××10 | ASD overheat |
| EMERGENCY OFF (PRESS CLEAR) | ××11 | Emergency off |
| EEPROM WRITE FAILURE (PRESS CLEAR) | ××12 | EEPROM failure during write |
| EEPROM READ FAILURE (PRESS CLEAR) | ××13 | EEPROM failure during initial read |
| — | ××14 | Unused |
| RAM ERROR (PRESS CLEAR) | ××15 | RAM error |
| ROM ERROR (PRESS CLEAR) | ××16 | ROM error |
| CPU ERROR (PRESS CLEAR) | ××17 | CPU error |
| COMMUNICATION ERROR (PRESS CLEAR) | ××18 | RS232C timer time-out |

| LCD Display Message | Data (Hex) | Explanation |
|---|---|---|
| GATE ARRAY FAULT (PRESS CLEAR) | ××19 | Gate array error |
| CURRENT DETECT ERROR (PRESS CLEAR) | ××1A | Output current detection circuit error |
| OPTION PCB ERROR (PRESS CLEAR) | ××1B | Option PCB error |
| OPTION ROM ERROR | ××1C | Option ROM error |
| LOW CURRENT TRIP (PRESS CLEAR) | ××1D | Low current |
| UNDERVOLTAGE TRIP (PRESS CLEAR) | ××1E | Main circuit undervoltage |
| — | ××1F | Unused |
| OVERTORQUE TRIP (PRESS CLEAR) | ××20 | Overtorque |
| EARTH FAULT (SOFT) (PRESS CLEAR) | ××21 | Earth fault (software) |
| EARTH FAULT (HARD) (PRESS CLEAR) | ××22 | Earth fault (hardware) |
| OPEN FUSE TRIP (PRESS CLEAR) | ××23 | Open fuse |
| DBR OVERCURRENT TRIP (PRESS CLEAR) | ××24 | Dynamic braking resistor overcurrent |
| DC OVERCURRENT (ACC) (PRESS CLEAR) | ××25 | Overcurrent in DC section during acceleration |
| DC OVERCURRENT (DEC) (PRESS CLEAR) | ××26 | Overcurrent in DC section during deceleration |
| DC OVERCURRENT (RUN) (PRESS CLEAR) | ××27 | Overcurrent in DC section during constant-speed run |
| AUTO-TUNING ERROR (PRESS CLEAR) | ××28 | Auto-tuning error |
| INV TYPEFORM ERROR (PRESS READ/WRITE) | ××29 | ASD typeform error |

## 9.2.6 Trip Data Configuration

When a trip occurs, the oldest trip becomes the starting point (00H), and the most recent trip is placed at the previous starting point address (refer to Table 1 for trip codes):

= starting point

| 04F3H | 04F4H | 04F5H | 04F6H | 04F7H | Trip Status |
|---|---|---|---|---|---|
| 00H | 00H | 00H | 00H | 00H | Initial status (no trips) |
| 00H | 00H | 00H | 00H | 01H | 1st trip |
| 00H | 01H | 03H | 0BH | 01H | 4th trip |
| 0BH | 01H | 03H | 0BH | 00H | 5th trip |
| 0BH | 01H | 03H | 00H | 13H | 6th trip |

### *9.2.6.1 Pre-alarm status monitor data (bank 0)*

| 05D4H | Function | LCD Display Message | 0 | 1 |
|---|---|---|---|---|
| bit 0 ~ bit 3 | unused | — | — | — |
| bit 4 | overload pre-alarm status | OVERLOAD | no pre-alarm | pre-alarm |
| bit 5 | overvoltage pre-alarm status | OVERVOLTAGE | no pre-alarm | pre-alarm |
| bit 6 | overcurrent pre-alarm status | OVERCURRENT | no pre-alarm | pre-alarm |
| bit 7 | overheat pre-alarm status | OVERHEAT | no pre-alarm | pre-alarm |

### *9.2.6.2 Messages (non-trips)*

| LCD Display Message | Bank | Address | Mask | Data |
|---|---|---|---|---|
| ASD OFF (ST-CC IS OPEN) | 0 | 051B | 0008 | 0008: ST-CC open |
| CONTROL POWER LOW | 0 | 05B4 | 0010 | 0010: control circuit undervoltage |
| DC BUS UNDERVOLTAGE | 0 | 05B4 | 0001 | 0001: main circuit undervoltage |
| FREQUENCY POINT SETTING ERROR | 0 | 05D4 | 0002 | 0002: frequency point setting error alarm |

## 9.2.7 ASD Typeform Codes

| 230v Class | |
|---|---|
| **ASD Model** | **Typeform Data (Hex)** |
| G3-2010 | ××21 |
| G3-2015 | ××22 |
| G3-2025 | ××23 |
| G3-2035 | ××24 |
| G3-2055 | ××25 |
| G3-2080 | ××26 |
| G3-2110 | ××27 |
| G3-2160 | ××28 |
| G3-2220 | ××29 |
| G3-2270 | ××2A |
| G3-2330 | ××2B |
| G3-2400 | ××2C |

| 460v Class | |
|---|---|
| **ASD Model** | **Typeform Data (Hex)** |
| G3-4015 | ××42 |
| G3-4025 | ××43 |
| G3-4035 | ××44 |
| G3-4055 | ××45 |
| G3-4080 | ××46 |
| G3-4110 | ××47 |
| G3-4160 | ××48 |
| G3-4220 | ××49 |
| G3-4270 | ××4A |
| G3-4330 | ××4B |
| G3-4400 | ××4C |
| G3-4500 | ××4D |
| G3-4600 | ××4E |
| G3-4750 | ××4F |
| G3-410K | ××50 |
| G3-412K | ××51 |
| G3-415K | ××52 |
| G3-420K | ××53 |
| G3-425K | ××54 |
| G3-430K | ××55 |

| 575v Class | |
|---|---|
| **ASD Model** | **Typeform Data (Hex)** |
| G3-6060 | ××65 |
| G3-6120 | ××67 |
| G3-6160 | ××68 |
| G3-6220 | ××69 |
| G3-6270 | ××6A |
| G3-6330 | ××6B |
| G3-6400 | ××6C |
| G3-6500 | ××6D |
| G3-6600 | ××6E |
| G3-6750 | ××6F |
| G3-610K | ××70 |
| G3-612K | ××71 |
| G3-615K | ××72 |
| G3-620K | ××73 |

## 9.2.8 Fundamental Parameters #1

| Function / Title | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|
| MAXIMUM OUTPUT FREQUENCY (✳) | 0 / 1 | 03C0 | FFFF | 0BB8 ~ 9C40 (30.00 ~ 400.00) | 0.01 |
| BASE FREQUENCY #1 | 0 / 1 | 0428 | FFFF | 09C4 ~ 9C40 (25.00 ~ 400.00) | 0.01 |
| BASE FREQUENCY VOLTAGE SELECT (**Note**, ✳) | 0 / 1 | 04BE | 0030 | 0000: Input voltage level (0)<br>0020: Automatic setting (1)<br>0030: Stationary setting (2) | — |
| MAXIMUM OUTPUT VOLTAGE #1 | 0 / 1 | 0426 | FFFF | 0000 ~ 0258 (0 ~ 600) | 1 |
| REVERSE OPERATION DISABLE SELECT | 0 / 1 | 04B6 | 0020 | 0000: Reverse allowed (0)<br>0020: Reverse not allowed (1) | — |
| UPPER LIMIT FREQUENCY<br>LOWER LIMIT FREQUENCY | 0 / 1<br>0 / 1 | 03C2<br>03C4 | FFFF<br>FFFF | 0 ~ Fmax<br>0 ~ UL, Fmax | 0.01 |
| VOLTS PER HERTZ PATTERN (**Note**, ✳) | 0 / 1 | 042D | 000F | 0000: Constant torque (1)<br>0001: Variable torque (2)<br>0002: Auto. torque boost (3)<br>0006: 3 w/ auto. eng. sav. (4)<br>000A: vector control (5)<br>000E: 5 w/ auto. eng. sav. (6) | — |
| 1 • 2 VOLTAGE BOOST #1 | 0 / 1 | 0424 | FFFF | 0000 ~ 012C (0.0 ~ 30.0) | 0.1 |
| ACCELERATION TIME #1 (**Ref. 1**)<br>DECELERATION TIME #1 | 0 / 1<br>0 / 1 | 03C6<br>03C8 | FFFF<br>FFFF | 0001 ~ EA60<br>(0.01 ~ 600.00 / 0.1 ~ 6000.0) | 0.01 / 0.1 |
| ACC/DEC PATTERN #1 SELECTION | 0 / 1 | 042D | 0030 | 0000: Linear (0)<br>0010: Self-adjusting (1)<br>0020: S-Pattern #1 (2)<br>0030: S-Pattern #2 (3) | — |
| ACCEL/DECEL PATTERN ADJUST LOW<br>ACCEL/DECEL PATTERN ADJUST HIGH | 0 / 1<br>0 / 1 | 04C4<br>04C5 | 00FF<br>00FF | 0003 ~ 00FD (0 ~ 50) | (**Special**) |

**Codes used throughout this parameter list:**

(✳) : Cannot set while ASD is running.

(**Note**) : No data checking performed → "Mask" and "Adjustment Range" sections will be shaded.

(**Special**) : Internal data = (display setting × 5 + 3), converted to hexadecimal.

(**Ref. 1**) : The adjustment range and multiplier depend on the setting of ACC/DEC TIME UNITS SELECTION in GROUP:UTILITY PARAMETERS as follows:

When ACC/DEC TIME UNITS SELECTION is set for 0.1 sec. units, adjustment range = 0.1 ~ 6000.0, and multiplier = 0.1.
When ACC/DEC TIME UNITS SELECTION is set for 0.01 sec. units, adjustment range = 0.01 ~ 600.00, and multiplier = 0.01.

In addition, if the setting of ACC/DEC TIME UNITS SELECTION is changed after setting the ACC/DEC times, the ACC/DEC times will become 10 times or 0.1 times their former value. Therefore, always reset the ACC/DEC time settings after changing the setting of ACC/DEC TIME UNITS SELECTION.

## 9.2.9 Fundamental Parameters #2

| Function / Title | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|
| BASE FREQUENCY #2 | 0 / 1 | 0432 | FFFF | 09C4 ~ 9C40 (25.00 ~ 400.00) | 0.01 |
| MAXIMUM OUTPUT VOLTAGE #2 | 0 / 1 | 0430 | FFFF | 0000 ~ 0258 (0 ~ 600) | 1 |
| VOLTAGE BOOST #2 | 0 / 1 | 042E | FFFF | 0000 ~ 012C (0.0 ~ 30.0) | 0.1 |
| ELECTRONIC THERMAL PROTECT LVL #2 | 0 / 1 | 0434 | 00FF | 000A ~ 0064 (10 ~ 100) | 1 |
| STALL PROTECTION SELECTION #2 | 0 / 1 | 0437 | 0040 | 0000: ON (0)<br>0040: OFF (1) | — |
| 0 STALL PROTECTION LEVEL #2 | 0 / 1 | 0435 | 00FF | 000A ~ 00D7 (10 ~ 215) | 1 |
| ACCELERATION TIME #2 (**Ref. 1**)<br>DECELERATION TIME #2 | 0 / 1<br>0 / 1 | 03CA<br>03CC | FFFF<br>FFFF | 0001 ~ EA60<br>(0.01 ~ 600.00 / 0.1 ~ 6000.0) | 0.01 / 0.1 |
| ACC/DEC PATTERN #2 SELECTION | 0 / 1 | 0437 | 0030 | 0000: Linear (0)<br>0010: Self-adjusting (1)<br>0020: S-Pattern #1 (2)<br>0030: S-Pattern #2 (3) | — |
| ACC/DEC #1/#2 SWITCH FREQUENCY | 0 / 1 | 0406 | FFFF | 0000 ~ Fmax | 0.01 |

<< The following functions are valid only when COMMAND MODE SELECTION in GROUP:UTILITY PARAMETERS is set to 2 (panel input valid) or 4 (local/remote changeover possible). >>

## 9.2.10 Panel Control Parameters

| Function / Title | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|
| DIRECTION SELECTION (FORWARD/REV) | 0 / 1 | 04FA | 0004 | 0000: Reverse (0)<br>0004: Forward (1) | — |
| STOP PATTERN SELECTION | 0 / 1 | 045C | 0040 | 0000: Decelerated stop (0)<br>0040: Coast stop (1) | — |
| FUNDAMENTAL PARAM SWITCHING | 0 / 1 | 04FB | 0004 | 0000: V/F #1 (1)<br>0004: V/F #2 (2) | — |
| ACCEL/DECEL #1/#2 SELECTION | 0 / 1 | 04FA | 0008 | 0000: Acc / dec #1 (1)<br>0008: Acc / dec #2 (2) | — |
| PANEL RESET SELECTION | 0 / 1 | 045C | 0030 | 0000: All possible (0)<br>0010: overload only (1)<br>0020: overload, overcurrent only (2) | — |
| PANEL FEEDBACK CONTROL (**Note 1**) | 0 / 1 | 04FB | 0001 | 0000: Feedback valid (0)<br>0001: Feedback invalid (1) | — |

(**Note 1**): This parameter only selects whether or not feedback control is valid when feedback control is selected. In order to use feedback control, parameter FEEDBACK CONTROL SELECTION in GROUP:FEEDBACK CONTROL PARAMETERS must still be set.

## 9.2.11 Terminal Selection Parameters

| Function / Title | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|
| INPUT TERMINAL SELECTION | 0 / 1 | 04BB | 0001 | 0000: Standard functions (0)<br>0001: Individual selection (1) | — |
| 1 "R" INPUT TERMINAL FUNCTION | 0 / 1 | 046C | FFFF | 0000 ~ FFFF (0 ~ 54)<br>**Refer to Table 6**<br>(**Note**) | — |
| "S1" INPUT TERMINAL FUNCTION | 0 / 1 | 046E | FFFF | | |
| "S2" INPUT TERMINAL FUNCTION | 0 / 1 | 0470 | FFFF | | |
| "S3" INPUT TERMINAL FUNCTION | 0 / 1 | 0472 | FFFF | | |
| "S4" INPUT TERMINAL FUNCTION | 0 / 1 | 0474 | FFFF | | |
| "F" INPUT TERMINAL FUNCTION | 0 / 1 | 0476 | FFFF | | |
| "RES" INPUT TERMINAL FUNCTION | 0 / 1 | 0478 | FFFF | | |
| "ST" INPUT TERMINAL FUNCTION | 0 / 1 | 047A | FFFF | | |
| "S5" INPUT TERMINAL FUNCTION | 0 / 1 | 047C | FFFF | | |
| "S6" INPUT TERMINAL FUNCTION | 0 / 1 | 047E | FFFF | | |
| "S7" INPUT TERMINAL FUNCTION | 0 / 1 | 0480 | FFFF | | |
| POTENTIAL TERMINAL FUNCTION | 0 / 1 | 0482 | FFFF | | |
| R,S1-S7 TERMINAL RESPONSE TIME | 0 / 1 | 0462 | 00FF | 0001 ~ 0064 (1 ~ 100) | 1 |
| F INPUT TERMINAL RESPONSE TIME | 0 / 1 | 0463 | 00FF | 0001 ~ 0064 (1 ~ 100) | 1 |
| RES INPUT TERMINAL RESPONSE TIME | 0 / 1 | 0464 | 00FF | 0001 ~ 0064 (1 ~ 100) | 1 |
| ST INPUT TERMINAL RESPONSE TIME | 0 / 1 | 0465 | 00FF | 0001 ~ 0064 (1 ~ 100) | 1 |
| "RCH" CONTACTS FUNCTION | 0 / 1 | 0490 | FFFF | 0 ~ FFFF (0 ~ 63) **See Table 7** | — |
| "RCH" CONTACTS DELAY TIME | 0 / 1 | 0492 | 00FF | 0001 ~ 0064 (1 ~ 100) | |
| "RCH" CONTACTS HOLD TIME (**Note**) | 0 / 1 | 0493 | 00FF | 0001 ~ 0064 (1 ~ 100) | |
| "LOW" CONTACTS FUNCTION | 0 / 1 | 048C | FFFF | 0 ~ FFFF (0 ~ 63) **See Table 7** | — |
| "LOW" CONTACTS DELAY TIME | 0 / 1 | 048E | 00FF | 0001 ~ 0064 (1 ~ 100) | |
| "LOW" CONTACTS HOLD TIME (**Note**) | 0 / 1 | 048F | 00FF | 0001 ~ 0064 (1 ~ 100) | |
| "FL" CONTACTS FUNCTION | 0 / 1 | 0494 | FFFF | 0 ~ FFFF (0 ~ 63) **See Table 7** | — |
| "FL" CONTACTS DELAY TIME | 0 / 1 | 0496 | 00FF | 0001 ~ 0064 (1 ~ 100) | |
| "FL" CONTACTS HOLD TIME (**Note**) | 0 / 1 | 0497 | 00FF | 0001 ~ 0064 (1 ~ 100) | |
| "OUT" CONTACTS FUNCTION | 0 / 1 | 0498 | FFFF | 0 ~ FFFF (0 ~ 63) **See Table 7** | — |
| "OUT" CONTACTS DELAY TIME | 0 / 1 | 049A | 00FF | 0001 ~ 0064 (1 ~ 100) | |
| "OUT" CONTACTS HOLD TIME (**Note**) | 0 / 1 | 049B | 00FF | 0001 ~ 0064 (1 ~ 100) | |
| LOW SPEED SIGNAL OUTPUT FREQ | 0 / 1 | 03FE | FFFF | 0 ~ Fmax | 0.01 |
| ACC/DEC COMPLETE DETECT BAND | 0 / 1 | 0400 | FFFF | 0 ~ Fmax | 0.01 |
| SPEED REACH MAXIMUM FREQUENCY | 0 / 1 | 0404 | FFFF | 0 ~ Fmax | 0.01 |
| SPEED REACH MINIMUM FREQUENCY | 0 / 1 | 0402 | FFFF | 0 ~ Fmax | 0.01 |
| COMMERCIAL POWER/INV SWITCHING OUTPUT | 0 / 1 | 04C1 | 00C0 | 0000: OFF (0)<br>0040: Auto. switch on trip (1)<br>0080: Switch at COMMERCIAL POWER/INV SWITCH FREQ (2)<br>00C0: Both (1) and (2) (3) | — |
| 2 • 3 COMMERCIAL POWER/INV SWITCH FREQ | 0 / 1 | 041C | FFFF | 0 ~ Fmax | 0.01 |
| "FP" OUTPUT TERMINAL PULSE FREQUENCY | 0 / 1 | 04C0 | 0003 | 0000: 48f (0)<br>0001: 96f (1)<br>0002: 360f (2) | — |
| RR INPUT SPECIAL FUNCTION SELECT (**Note**) | 0 / 1 | 04B8 | 00E0 | 0000: Standard (0)<br>0040: Fmax (1)<br>0080: TACC/TDEC mult. (2)<br>00C0: VB mult. factor (3)<br>0020: CL mult. factor (4) | — |

## 9.2.12 Input Terminal Selections

| Setting Value | Data (Hex) | Function | Setting Value | Data (Hex) | Function |
|---|---|---|---|---|---|
| 0 | 10C8 | R (reverse run) | 28 | 04AF | Binary bit #6 |
| 1 | 011C | SS1 (preset speed selection) | 29 | 08AF | Binary bit #7 |
| 2 | 021C | SS2 (preset speed selection) | 30 | 10AF | Binary bit #8 |
| 3 | 041C | SS3 (preset speed selection) | 31 | 20AF | Binary bit #9 |
| 4 | 081C | SS4 (preset speed selection) | 32 | 40AF | Binary bit #10 |
| 5 | 20C8 | F (forward run) | 33 | 04CE | No effect |
| 6 | 201B | RES (fault reset) | 34 | 01C7 | UP/DOWN frequency setting (UP) |
| 7 | C0C9 | ST (gate ON/OFF) | 35 | 02C7 | UP/DOWN frequency setting (DOWN) |
| 8 | 0CC8 | JOG selection | 36 | 04C7 | UP/DOWN frequency clear |
| 9 | 081A | Acc/dec #1/#2 selection | 37 | 08C7 | PUSH-type RUN key |
| 10 | 101B | Emergency off | 38 | 10C7 | PUSH-type STOP key |
| 11 | 021B | DC injection braking ON/OFF | 39 | 02B9 | No effect |
| 12 | 041B | Fundamental parameter switching (V/F #2) | 40 | C0C8 | Forward/reverse run selection |
| 13 | 011B | Feedback control ON/OFF | 41 | 20C7 | RUN |
| 14 | 10CE | Pattern run selection #1 | 42 | 30C9 | Binary data write |
| 15 | 20CE | Pattern run selection #2 | 43 | 0198 | [LOCAL/REMOTE] key |
| 16 | 40CE | Pattern run selection #3 | 44 | 0298 | [MON] key |
| 17 | 80CE | Pattern run selection #4 | 45 | 0498 | [PRG] key |
| 18 | 02CE | Pattern run continue signal | 46 | 0898 | [UP] (▲) key |
| 19 | 01CE | Pattern run step trigger signal | 47 | 1098 | [DOWN] (▼) key |
| 20 | 0AC9 | JOG forward run | 48 | 2098 | [READ/WRITE] key |
| 21 | 06C9 | JOG reverse run | 49 | 4098 | [RUN] key |
| 22 | 10AE | Binary bit #0 | 50 | 8098 | [STOP/CLEAR] key |
| 23 | 20AE | Binary bit #1 | 51 | 08CE | Commercial power / ASD switching signal |
| 24 | 40AE | Binary bit #2 | 52 | 40C7 | Reserved for option use |
| 25 | 80AE | Binary bit #3 | 53 | 10CB | RR frequency switching input |
| 26 | 01AF | Binary bit #4 | 54 | 20CB | IV frequency switching input |
| 27 | 02AF | Binary bit #5 | | | |

(**Note**): In order for binary bit #0 ~ #10 (setting values 22 ~ 32) and UP/DOWN frequency setting (setting values 34 & 35) inputs to be valid, parameter `FREQUENCY PRIORITY SELECTION #1` or `FREQUENCY PRIORITY SELECTION #2` in `GROUP:FREQUENCY SETTING PARAMETERS` must be set to 5 (BIN (binary setting or UP/DOWN setting)).

## 9.2.13 Output Terminal Selections for Contact Outputs

| Setting Value | Data (Hex) | Function | Setting Value | Data (Hex) | Function |
|---|---|---|---|---|---|
| 0 | 0000 | Lower limit frequency | 32 | C5B7 | Executing emergency off |
| 1 | 0100 | /Lower limit frequency | 33 | CDB7 | /Executing emergency off |
| 2 | 0200 | Upper limit frequency | 34 | B5BB | Executing retry |
| 3 | 0300 | /Upper limit frequency | 35 | BDBB | /Executing retry |
| 4 | 0400 | Low speed signal | 36 | D5CF | Pattern run switching output |
| 5 | 0500 | /Low speed signal | 37 | DDCF | /Pattern run switching output |
| 6 | 0600 | Accel/decel complete | 38 | D5D8 | PID deviation limit |
| 7 | 0700 | /Accel/decel complete | 39 | DDD8 | /PID deviation limit |
| 8 | 0800 | Selected speed reach signal | 40 | C5BB | Run/stop |
| 9 | 0900 | /Selected speed reach signal | 41 | CDBB | /Run/stop |
| 10 | 0A00 | Fault | 42 | 1400 | Severe fault (armature short, load-end short, open phase, output error, earth fault) |
| 11 | 0B00 | /Fault | 43 | 1500 | /Severe fault (armature short, load-end short, open phase, output error, earth fault) |
| 12 | 0C00 | Fault other than earth fault or load-end overcurrent | 44 | 1600 | Non-severe fault (overload, overcurrent, overvoltage) |
| 13 | 0D00 | /Fault other than earth fault or load-end overcurrent | 45 | 1700 | /Non-severe fault (overload, overcurrent, overvoltage) |
| 14 | 95B5 | Overcurrent pre-alarm | 46 | E5D8 | Commercial power / ASD switching output #1 |
| 15 | 9DB5 | /Overcurrent pre-alarm | 47 | EDD8 | /Commercial power / ASD switching output #1 |
| 16 | 85C5 | ASD overload pre-alarm | 48 | F5D8 | Commercial power / ASD switching output #2 |
| 17 | 8DC5 | /ASD overload pre-alarm | 49 | FDD8 | /Commercial power / ASD switching output #2 |
| 18 | 95C5 | Motor overload pre-alarm | 50 | 85C0 | Fan ON/OFF |
| 19 | 9DC5 | /Motor overload pre-alarm | 51 | 8DC0 | /Fan ON/OFF |
| 20 | D5C5 | Overheat pre-alarm | 52 | F5B6 | Executing JOG |
| 21 | DDC5 | /Overheat pre-alarm | 53 | FDB6 | /Executing JOG |
| 22 | A5B4 | Overvoltage pre-alarm | 54 | 1800 | Local/remote operation |
| 23 | ADB4 | /Overvoltage pre-alarm | 55 | 1900 | /Local/remote operation |
| 24 | E5B4 | Undervoltage alarm | 56 | A5D1 | Cumulative timer alarm |
| 25 | EDB4 | /Undervoltage alarm | 57 | ADD1 | /Cumulative timer alarm |
| 26 | 85B5 | Undercurrent alarm | 58 | 1A00 | Communication error alarm |
| 27 | 8DB5 | /Undercurrent alarm | 59 | 1B00 | /Communication error alarm |
| 28 | 85D1 | Overtorque alarm | 60 | A5B6 | F/R |
| 29 | 8DD1 | /Overtorque alarm | 61 | ADB6 | /F/R |
| 30 | E5BB | Braking resistor OL pre-alarm | 62 | 1E00 | Run preparation complete |

| | | | | | |
|---|---|---|---|---|---|
| 31 | EDBB | /Braking resistor OL pre-alarm | 63 | 1F00 | /Run preparation complete |

## 9.2.14 Special Control Parameters

| Function / Title | | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|---|
| START-UP FREQUENCY | | 0 / 1 | 03F8 | FFFF | 0000 ~ 03E8 (0.00 ~ 10.00) | 0.01 |
| END FREQUENCY | | 0 / 1 | 03FA | FFFF | 0000 ~ 0BB8 (0.00 ~ 30.00) | 0.01 |
| RUN FREQUENCY | | 0 / 1 | 0408 | FFFF | 0000 ~ Fmax | 0.01 |
| RUN FREQUENCY HYSTERESIS | | 0 / 1 | 040A | FFFF | 0000 ~ 0BB8 (0.00 ~ 30.00) | 0.01 |
| ENABLE JUMP FREQUENCIES | | 0 / 1 | 04BB | 0080 | 0000: Function OFF (0)<br>0080: Function ON (1) | — |
| 1 | JUMP FREQUENCY #1 | 0 / 1 | 03EE | FFFF | 0000 ~ Fmax | 0.01 |
| | JUMP FREQUENCY #1 BANDWIDTH | 0 / 1 | 03EC | FFFF | 0000 ~ 0BB8 (0.00 ~ 30.00) | 0.01 |
| | JUMP FREQUENCY #2 | 0 / 1 | 03F2 | FFFF | 0000 ~ Fmax | 0.01 |
| | JUMP FREQUENCY #2 BANDWIDTH | 0 / 1 | 03F0 | FFFF | 0000 ~ 0BB8 (0.00 ~ 30.00) | 0.01 |
| | JUMP FREQUENCY #3 | 0 / 1 | 03F6 | FFFF | 0000 ~ Fmax | 0.01 |
| | JUMP FREQUENCY #3 BANDWIDTH | 0 / 1 | 03F4 | FFFF | 0000 ~ 0BB8 (0.00 ~ 30.00) | 0.01 |
| PWM CARRIER FREQUENCY (#) | | 0 / 1 | 0439 | 00FF | 0005 ~ 0064 (0.5 ~ 10.0) | 0.1 |

(#) : Adjustment range depends on ASD rating.

## 9.2.15 Frequency Setting Parameters

| Function / Title | | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|---|
| FREQUENCY PRIORITY SELECTION #1 | | 0 / 1 | 04BA | 0007 | 0001: RR (1)<br>0002: IV (2)<br>0003: RX (3)<br>0004: PG (4)<br>0005: BIN (5) | — |
| FREQUENCY PRIORITY SELECTION #2 | | 0 / 1 | 04BA | 0038 | 0008: RR (1)<br>0010: IV (2)<br>0018: RX (3)<br>0020: PG (4)<br>0028: BIN (5) | — |
| ANALOG INPUT FILTER | | 0 / 1 | 04BC | 0003 | 0000: No filter (0)<br>0001: Small filter (1)<br>0002: Medium filter (2)<br>0003: Large filter (3) | — |
| RR TERMINAL STANDARD OR ADJUSTABLE | | 0 / 1 | 04B8 | 0002 | 0000: Standard (0)<br>0002: Adjustable (1) | — |
| 1 | RR REFERENCE SETTING POINT #1 | 0 / 1 | 0449 | 00FF | 0000 ~ 0064 (0 ~ 100) | 1 |
| | RR REF POINT #1 FREQUENCY | 0 / 1 | 03DA | FFFF | 0000 ~ Fmax | 0.01 |
| | RR REFERENCE SETTING POINT #2 | 0 / 1 | 044A | 00FF | 0000 ~ 0064 (0 ~ 100) | 1 |
| | RR REF POINT #2 FREQUENCY | 0 / 1 | 03DC | FFFF | 0000 ~ Fmax | 0.01 |
| IV TERMINAL STANDARD OR ADJUSTABLE | | 0 / 1 | 04B8 | 0004 | 0000: Standard (0)<br>0004: Adjustable (1) | — |
| 1 | IV REFERENCE SETTING POINT #1 | 0 / 1 | 044B | 00FF | 0000 ~ 0064 (0 ~ 100) | 1 |
| | IV REF POINT #1 FREQUENCY | 0 / 1 | 03DE | FFFF | 0000 ~ Fmax | 0.01 |
| | IV REFERENCE SETTING POINT #2 | 0 / 1 | 044C | 00FF | 0000 ~ 0064 (0 ~ 100) | 1 |
| | IV REF POINT #2 FREQUENCY | 0 / 1 | 03E0 | FFFF | 0000 ~ Fmax | 0.01 |
| RX TERMINAL STANDARD OR ADJUSTABLE | | 0 / 1 | 04B8 | 0008 | 0000: Standard (0)<br>0008: Adjustable (1) | — |
| 1 | RX REFERENCE SETTING POINT #1 | 0 / 1 | 044D | 00FF | 009C ~ 00FF, 0000 ~ 0064<br>(-100 ~ -1, 0 ~ 100) | 1 |
| | RX REF POINT #1 FREQUENCY | 0 / 1 | 03E2 | FFFF | -Fmax ~ Fmax | 0.02 |
| | RX REFERENCE SETTING POINT #2 | 0 / 1 | 044E | 00FF | 009C ~ 00FF, 0000 ~ 0064<br>(-100 ~ -1, 0 ~ 100) | 1 |
| | RX REF POINT #2 FREQUENCY | 0 / 1 | 03E4 | FFFF | -Fmax ~ Fmax | 0.02 |
| PG TERMINAL STANDARD OR ADJUSTABLE | | 0 / 1 | 04B8 | 0010 | 0000: Standard (0)<br>0010: Adjustable (1) | — |
| 1 | PG REFERENCE SETTING POINT #1 | 0 / 1 | 044F | 00FF | 009C ~ 00FF, 0000 ~ 0064<br>(-100 ~ -1, 0 ~ 100) | 1 |
| | PG REF POINT #1 FREQUENCY | 0 / 1 | 03E6 | FFFF | -Fmax ~ Fmax | 0.02 |
| | PG REFERENCE SETTING POINT #2 | 0 / 1 | 0450 | 00FF | 009C ~ 00FF, 0000 ~ 0064<br>(-100 ~ -1, 0 ~ 100) | 1 |
| | PG REF POINT #2 FREQUENCY | 0 / 1 | 03E8 | FFFF | -Fmax ~ Fmax | 0.02 |
| BINARY INPUT STD OR ADJUSTABLE | | 0 / 1 | 04B8 | 0001 | 0000: Standard (0)<br>0001: Adjustable (1) | — |
| 1 | BINARY REF SETTING POINT #1 | 0 / 1 | 0447 | 00FF | 0000 ~ 0064 (0 ~ 100) | 1 |
| | BINARY REF POINT #1 FREQUENCY | 0 / 1 | 03D6 | FFFF | -Fmax ~ Fmax | 0.02 |
| | BINARY REF SETTING POINT #2 | 0 / 1 | 0448 | 00FF | 0000 ~ 0064 (0 ~ 100) | 1 |
| | BINARY REF POINT #2 FREQUENCY | 0 / 1 | 03D8 | FFFF | -Fmax ~ Fmax | 0.02 |
| JOG RUN FREQUENCY | | 0 / 1 | 03EA | FFFF | 0000 ~ 07D0 (0.00 ~ 20.00) | 0.01 |
| Other than 0 | JOG STOP METHOD | 0 / 1 | 04B6 | 00C0 | 0000: Decelerated stop (0)<br>0040: Coast stop (1)<br>0080: DC injection stop (2) | — |
| PRESET SPEED SELECTION | | 0 / 1 | 04A6 | 000F | 0000 ~ 000F (0 ~ 15) | 1 |
| Other than 0 | PRESET SPEED MODE ACTIVATION | 0 / 1 | 04BB | 0004 | 0000: Deactivated (0)<br>0004: Activated (1) | — |

| | Function / Title | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|---|
| | PRESET SPEED #1 FREQUENCY | 1 | 0528 | FFFF | LL ~ UL | 0.01 |
| | PRESET SPEED #1 OPERATING MODE | 1 | 052A | 040C | 0004 (0)<br>0000 (1)<br>000C (2)<br>0008 (3) (**Note 1**)<br>0404 (4)<br>0400 (5)<br>040C (6)<br>0408 (7) | 1 |
| 2 or higher | PRESET SPEED #2 FREQUENCY | 1 | 0530 | FFFF | LL ~ UL | 0.01 |
| | PRESET SPEED #2 OPERATING MODE | 1 | 0532 | 040C | (**Note 2**) | 1 |
| 3 or higher | PRESET SPEED #3 FREQUENCY | 1 | 0538 | FFFF | LL ~ UL | 0.01 |
| | PRESET SPEED #3 OPERATING MODE | 1 | 053A | 040C | (**Note 2**) | 1 |
| 4 or higher | PRESET SPEED #4 FREQUENCY | 1 | 0540 | FFFF | LL ~ UL | 0.01 |
| | PRESET SPEED #4 OPERATING MODE | 1 | 0542 | 040C | (**Note 2**) | 1 |
| 5 or higher | PRESET SPEED #5 FREQUENCY | 1 | 0548 | FFFF | LL ~ UL | 0.01 |
| | PRESET SPEED #5 OPERATING MODE | 1 | 054A | 040C | (**Note 2**) | 1 |
| 6 or higher | PRESET SPEED #6 FREQUENCY | 1 | 0550 | FFFF | LL ~ UL | 0.01 |
| | PRESET SPEED #6 OPERATING MODE | 1 | 0552 | 040C | (**Note 2**) | 1 |
| 7 or higher | PRESET SPEED #7 FREQUENCY | 1 | 0558 | FFFF | LL ~ UL | 0.01 |
| | PRESET SPEED #7 OPERATING MODE | 1 | 055A | 040C | (**Note 2**) | 1 |
| 8 or higher | PRESET SPEED #8 FREQUENCY | 1 | 0560 | FFFF | LL ~ UL | 0.01 |
| | PRESET SPEED #8 OPERATING MODE | 1 | 0562 | 040C | (**Note 2**) | 1 |
| 9 or higher | PRESET SPEED #9 FREQUENCY | 1 | 0568 | FFFF | LL ~ UL | 0.01 |
| | PRESET SPEED #9 OPERATING MODE | 1 | 056A | 040C | (**Note 2**) | 1 |
| 10 or higher | PRESET SPEED #10 FREQUENCY | 1 | 0570 | FFFF | LL ~ UL | 0.01 |
| | PRESET SPEED #10 OPERATING MODE | 1 | 0572 | 040C | (**Note 2**) | 1 |
| 11 or higher | PRESET SPEED #11 FREQUENCY | 1 | 0578 | FFFF | LL ~ UL | 0.01 |
| | PRESET SPEED #11 OPERATING MODE | 1 | 057A | 040C | (**Note 2**) | 1 |
| 12 or higher | PRESET SPEED #12 FREQUENCY | 1 | 0580 | FFFF | LL ~ UL | 0.01 |
| | PRESET SPEED #12 OPERATING MODE | 1 | 0582 | 040C | (**Note 2**) | 1 |
| 13 or higher | PRESET SPEED #13 FREQUENCY | 1 | 0588 | FFFF | LL ~ UL | 0.01 |
| | PRESET SPEED #13 OPERATING MODE | 1 | 058A | 040C | (**Note 2**) | 1 |
| 14 or higher | PRESET SPEED #14 FREQUENCY | 1 | 0590 | FFFF | LL ~ UL | 0.01 |
| | PRESET SPEED #14 OPERATING MODE | 1 | 0592 | 040C | (**Note 2**) | 1 |
| 15 | PRESET SPEED #15 FREQUENCY | 1 | 0598 | FFFF | LL ~ UL | 0.01 |
| | PRESET SPEED #15 OPERATING MODE | 1 | 059A | 040C | (**Note 2**) | 1 |

**Caution!**

- Frequency parameters RX REF POINT #1 FREQUENCY ~ BINARY REF POINT #2 FREQUENCY use signed data (data values larger than 7FFFH are negative). If internal data is 8000H or larger, the actual setting can be obtained by using the conversion formula: **actual setting = - [FFFFH - (internal data) + 1]**. In addition, due to the fact that the multiplier is 0.02, use Fmax ÷ 2 (converted to hexadecimal) for adjustment limits (-Fmax ÷ 2 ~ Fmax ÷ 2 corresponds to -Fmax ~ Fmax).
- Setting point parameters RX REFERENCE SETTING POINT #1 ~ PG REFERENCE SETTING POINT #2 use signed data (data values from 0080H to 00FFH are negative). If internal data is between 0080H and 00FFH, the actual setting can be obtained by using the conversion formula: **actual setting = - [00FFH - (internal data) + 1]**.

(**Note 1**): Use caution with these parameters, as the internal data values do not follow the same setting format as those set from the operating panel. A look-up table, etc., can be used in the application program to reference these values properly.

(**Note 2**): Adjustment range is the same as PRESET SPEED #1 OPERATING MODE.

## 9.2.16 Protection Function Parameters

| Function / Title | | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|---|
| DYNAMIC BRAKING SELECTION (**Note**) | | 0 / 1 | 04BD | 0003 | 0000: no dynam. braking (0)<br>0001: with dynamic braking, no DBR OL trip (1)<br>0003: with dynamic braking and DBR OL trip (2) | — |
| 2 | BRAKING RESISTOR VALUE | 0 / 1 | 0416 | FFFF | 000A ~ 2710 (1.0 ~ 1000) | 0.1 |
| | BRAKING RESISTOR POWER RATING | 0 / 1 | 0418 | FFFF | 0001 ~ EA60 (0.01 ~ 600.00) | 0.01 |
| OVERVOLTAGE STALL PROTECTION | | 0 / 1 | 04BD | 0004 | 0000: ON (0)<br>0004: OFF (1) | — |
| DC INJECTION START FREQUENCY | | 0 / 1 | 03FC | FFFF | 0000 ~ 2EE0 (0.00 ~ 120.00) | 0.01 |
| Other than 0 | DC INJECTION CURRENT MAGNITUDE | 0 / 1 | 043A | 00FF | 0000 ~ 0064 (0 ~ 100) | 1 |
| | DC INJECTION TIME | 0 / 1 | 043B | 00FF | 0000 ~ 0064 (0.0 ~ 10.0) | 0.1 |
| FWD/REV DC INJECTION PRIORITY CTRL | | 0 / 1 | 04BC | 0040 | 0000: OFF (0)<br>0040: ON (1) | — |
| MOTOR SHAFT STATIONARY CTRL | | 0 / 1 | 04BC | 0080 | 0000: OFF (0)<br>0080: ON (1) | — |
| EMERGENCY OFF MODE SELECTION | | 0 / 1 | 04BC | 0030 | 0000: Coast stop (0)<br>0010: Decelerated stop (1)<br>0020: DC injection stop (2) | — |
| 2 | EMERGENCY OFF DC INJECTION TIME | 0 / 1 | 043D | 00FF | 0000 ~ 0064 (0.0 ~ 10.0) | 0.1 |
| NUMBER OF RETRY ATTEMPTS | | 0 / 1 | 043F | 00FF | 0000 ~ 000A (0 ~ 10) | 1 |
| Other than 0 | TIME BETWEEN RETRY ATTEMPTS | 0 / 1 | 0440 | 00FF | 0000 ~ 0064 (0.0 ~ 10.0) | 0.1 |
| REGENERATION POWER RIDE-THROUGH | | 0 / 1 | 04BD | 0008 | 0000: OFF (0)<br>0008: ON (1) | — |
| 1 | REGENERATION RIDE-THROUGH TIME | 0 / 1 | 0446 | 00FF | 0000 ~ 00FA (0.0 ~ 25.0) | 0.1 |
| AUTO-RESTART (MOTOR SPEED SEARCH) | | 0 / 1 | 04B6 | 0018 | 0000: OFF (0)<br>0008: On power failure (1)<br>0010: On ST make/break (2)<br>0018: Both (1) and (2) (3) | — |
| ELECTRONIC THERMAL PROTECT LVL #1 | | 0 / 1 | 042A | 00FF | 000A ~ 0064 (10 ~ 100) | 1 |
| OVERLOAD REDUCTION START FREQ | | 0 / 1 | 0410 | FFFF | 0000 ~ 0BB8 (0.00 ~ 30.00) | 0.01 |
| MOTOR 150% OVERLOAD TIME LIMIT | | 0 / 1 | 0444 | 00FF | 0001 ~ 00F0 (10 ~ 2400) | 10 |
| OVERLOAD SELECTION | | 0 / 1 | 04BD | 0030 | 0000: with motor overload trip, w/o soft-stall (0)<br>0010: with motor overload trip and soft-stall (1)<br>0020: w/o soft-stall or motor overload trip (2)<br>0030: with soft-stall, w/o motor overload trip (3) | — |
| STALL PROTECTION ENABLE | | 0 / 1 | 042D | 0040 | 0000: ON (0)<br>0040: OFF (1) | — |
| 0 | STALL PROTECTION CURRENT LEVEL | 0 / 1 | 042B | 00FF | 000A ~ 00D7 (10 ~ 215) | 1 |
| UNDERVOLTAGE TRIP SELECTION | | 0 / 1 | 04BD | 0080 | 0000: Trip disabled (0)<br>0080: Trip (during run) (1) | — |
| UNDERVOLTAGE DETECT TIME | | 0 / 1 | 0414 | FFFF | 0000 ~ 03E8 (0.00 ~ 10.00) | 0.01 |
| LOW CURRENT DETECT SELECTION | | 0 / 1 | 04BC | 0008 | 0000: Trip disabled (0)<br>0008: Trip on detection (1) | — |
| LOW CURRENT DETECT LEVEL | | 0 / 1 | 0441 | 00FF | 0000 ~ 0064 (0 ~ 100) | 1 |
| LOW CURRENT DETECTION TIME | | 0 / 1 | 0442 | 00FF | 0000 ~ 00FF (0 ~ 255) | 1 |

| Function / Title | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|
| OUTPUT SHORT-CIRCUIT DETECTION SELECT | 0 / 1 | 04BE | 0003 | 0000: Standard motor (0)<br>0001: High-speed motor (1)<br>0002: Positioning use (standard motor) (2)<br>0003: Positioning use (high-speed motor) (3) | — |
| OVERTORQUE TRIP SELECTION | 0 / 1 | 04BE | 0040 | 0000: Trip disabled (0)<br>0040: Trip enabled (1) | — |
| OVERTORQUE TRIP LEVEL | 0 / 1 | 0443 | 00FF | 0000 ~ 00C8 (0 ~ 200) | 1 |
| FAULT TRIP EEPROM SAVE ENABLE | 0 / 1 | 04B6 | 0002 | 0000: Data cleared when powered OFF (0)<br>0002: Data retained when powered OFF (1) | — |
| COOLING FAN CONTROL SELECTION | 0 / 1 | 04BE | 0004 | 0000: Automatic (temperature detection) (0)<br>0004: Always ON (1) | — |
| CUMULATIVE RUN TIMER ALARM SETTING | 0 / 1 | 0422 | FFFF | 0000 ~ C34B (0.00 ~ 999.90) | 0.02 |

## 9.2.17 Pattern Run Control Parameters

| Function / Title | | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|---|
| PATTERN RUN SELECTION | | 0 / 1 | 04A7 | 0008 | 0000: OFF (0)<br>0008: ON (1) | — |
| 1 | PATTERN RUN CONTINUE MODE | 0 / 1 | 04A7 | 0001 | 0000: reset on stop (0)<br>0001: switch when done (1) | — |
| | PATTERN GROUP #1 SPEED #0 | 1 | 0500 | 00FF | 0000: Skip (0)<br>0001 ~ 000F: Speeds 1 ~ 15 | 1 |
| | PATTERN GROUP #1 SPEED #1 | 1 | 0501 | 00FF | | |
| | PATTERN GROUP #1 SPEED #2 | 1 | 0502 | 00FF | | |
| | PATTERN GROUP #1 SPEED #3 | 1 | 0503 | 00FF | | |
| | PATTERN GROUP #1 SPEED #4 | 1 | 0504 | 00FF | | |
| | PATTERN GROUP #1 SPEED #5 | 1 | 0505 | 00FF | | |
| | PATTERN GROUP #1 SPEED #6 | 1 | 0506 | 00FF | | |
| | PATTERN GROUP #1 SPEED #7 | 1 | 0507 | 00FF | | |
| | PATTERN GROUP #1 NUMBER OF CYCLES | 0 / 1 | 049E | 00FF | 0001 ~ 00FF: 1 ~ 255 | 1 |
| | PATTERN GROUP #2 SPEED #0 | 1 | 0508 | 00FF | 0000: Skip (0)<br>0001 ~ 000F: Speeds 1 ~ 15 | 1 |
| | PATTERN GROUP #2 SPEED #1 | 1 | 0509 | 00FF | | |
| | PATTERN GROUP #2 SPEED #2 | 1 | 050A | 00FF | | |
| | PATTERN GROUP #2 SPEED #3 | 1 | 050B | 00FF | | |
| | PATTERN GROUP #2 SPEED #4 | 1 | 050C | 00FF | | |
| | PATTERN GROUP #2 SPEED #5 | 1 | 050D | 00FF | | |
| | PATTERN GROUP #2 SPEED #6 | 1 | 050E | 00FF | | |
| | PATTERN GROUP #2 SPEED #7 | 1 | 050F | 00FF | | |
| | PATTERN GROUP #2 NUMBER OF CYCLES | 0 / 1 | 04A0 | 00FF | 0001 ~ 00FF: 1 ~ 255 | 1 |
| | PATTERN GROUP #3 SPEED #0 | 1 | 0510 | 00FF | 0000: Skip (0)<br>0001 ~ 000F: Speeds 1 ~ 15 | 1 |
| | PATTERN GROUP #3 SPEED #1 | 1 | 0511 | 00FF | | |
| | PATTERN GROUP #3 SPEED #2 | 1 | 0512 | 00FF | | |
| | PATTERN GROUP #3 SPEED #3 | 1 | 0513 | 00FF | | |
| | PATTERN GROUP #3 SPEED #4 | 1 | 0514 | 00FF | | |
| | PATTERN GROUP #3 SPEED #5 | 1 | 0515 | 00FF | | |
| | PATTERN GROUP #3 SPEED #6 | 1 | 0516 | 00FF | | |
| | PATTERN GROUP #3 SPEED #7 | 1 | 0517 | 00FF | | |
| | PATTERN GROUP #3 NUMBER OF CYCLES | 0 / 1 | 04A2 | 00FF | 0001 ~ 00FF: 1 ~ 255 | 1 |
| | PATTERN GROUP #4 SPEED #0 | 1 | 0518 | 00FF | 0000: Skip (0)<br>0001 ~ 000F: Speeds 1 ~ 15 | 1 |
| | PATTERN GROUP #4 SPEED #1 | 1 | 0519 | 00FF | | |
| | PATTERN GROUP #4 SPEED #2 | 1 | 051A | 00FF | | |
| | PATTERN GROUP #4 SPEED #3 | 1 | 051B | 00FF | | |
| | PATTERN GROUP #4 SPEED #4 | 1 | 051C | 00FF | | |
| | PATTERN GROUP #4 SPEED #5 | 1 | 051D | 00FF | | |
| | PATTERN GROUP #4 SPEED #6 | 1 | 051E | 00FF | | |
| | PATTERN GROUP #4 SPEED #7 | 1 | 051F | 00FF | | |
| | PATTERN GROUP #4 NUMBER OF CYCLES | 0 / 1 | 04A4 | 00FF | 0001 ~ 00FF: 1 ~ 255 | 1 |
| | SPEED #1 CONTINUE MODE | 1 | 052E | 00FF | 0000: Count in seconds from time of activation (0)<br>0001: Count in minutes from time of activation (1)<br>0002: Count in seconds from speed reach (2)<br>0003: Count in minutes from speed reach (3)<br>0004: Non-stop (continue until STOP command) (4)<br>0005: Continue until next step command (5) | — |
| | Less than 4 SPEED #1 DRIVE TIME | 1 | 052C | FFFF | 0000 ~ 1F40 (0 ~ 8000) | 1 |
| | SPEED #2 CONTINUE MODE | 1 | 0536 | 00FF | Same as SPEED #1 CONTINUE MODE | — |

| Function / Title | | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|---|
| Less than 4 | SPEED #2 DRIVE TIME | 1 | 0534 | FFFF | 0000 ~ 1F40 (0 ~ 8000) | 1 |
| SPEED #3 CONTINUE MODE | | 1 | 053E | 00FF | Same as SPEED #1 CONTINUE MODE | — |
| Less than 4 | SPEED #3 DRIVE TIME | 1 | 053C | FFFF | 0000 ~ 1F40 (0 ~ 8000) | 1 |
| SPEED #4 CONTINUE MODE | | 1 | 0546 | 00FF | Same as SPEED #1 CONTINUE MODE | — |
| Less than 4 | SPEED #4 DRIVE TIME | 1 | 0544 | FFFF | 0000 ~ 1F40 (0 ~ 8000) | 1 |
| SPEED #5 CONTINUE MODE | | 1 | 054E | 00FF | Same as SPEED #1 CONTINUE MODE | — |
| Less than 4 | SPEED #5 DRIVE TIME | 1 | 054C | FFFF | 0000 ~ 1F40 (0 ~ 8000) | 1 |
| SPEED #6 CONTINUE MODE | | 1 | 0556 | 00FF | Same as SPEED #1 CONTINUE MODE | — |
| Less than 4 | SPEED #6 DRIVE TIME | 1 | 0554 | FFFF | 0000 ~ 1F40 (0 ~ 8000) | 1 |
| SPEED #7 CONTINUE MODE | | 1 | 055E | 00FF | Same as SPEED #1 CONTINUE MODE | — |
| Less than 4 | SPEED #7 DRIVE TIME | 1 | 055C | FFFF | 0000 ~ 1F40 (0 ~ 8000) | 1 |
| SPEED #8 CONTINUE MODE | | 1 | 0566 | 00FF | Same as SPEED #1 CONTINUE MODE | — |
| Less than 4 | SPEED #8 DRIVE TIME | 1 | 0564 | FFFF | 0000 ~ 1F40 (0 ~ 8000) | 1 |
| SPEED #9 CONTINUE MODE | | 1 | 056E | 00FF | Same as SPEED #1 CONTINUE MODE | — |
| Less than 4 | SPEED #9 DRIVE TIME | 1 | 056C | FFFF | 0000 ~ 1F40 (0 ~ 8000) | 1 |
| SPEED #10 CONTINUE MODE | | 1 | 0576 | 00FF | Same as SPEED #1 CONTINUE MODE | — |
| Less than 4 | SPEED #10 DRIVE TIME | 1 | 0574 | FFFF | 0000 ~ 1F40 (0 ~ 8000) | 1 |
| SPEED #11 CONTINUE MODE | | 1 | 057E | 00FF | Same as SPEED #1 CONTINUE MODE | — |
| Less than 4 | SPEED #11 DRIVE TIME | 1 | 057C | FFFF | 0000 ~ 1F40 (0 ~ 8000) | 1 |
| SPEED #12 CONTINUE MODE | | 1 | 0586 | 00FF | Same as SPEED #1 CONTINUE MODE | — |
| Less than 4 | SPEED #12 DRIVE TIME | 1 | 0584 | FFFF | 0000 ~ 1F40 (0 ~ 8000) | 1 |
| SPEED #13 CONTINUE MODE | | 1 | 058E | 00FF | Same as SPEED #1 CONTINUE MODE | — |
| Less than 4 | SPEED #13 DRIVE TIME | 1 | 058C | FFFF | 0000 ~ 1F40 (0 ~ 8000) | 1 |
| SPEED #14 CONTINUE MODE | | 1 | 0596 | 00FF | Same as SPEED #1 CONTINUE MODE | — |
| Less than 4 | SPEED #14 DRIVE TIME | 1 | 0594 | FFFF | 0000 ~ 1F40 (0 ~ 8000) | 1 |
| SPEED #15 CONTINUE MODE | | 1 | 059E | 00FF | Same as SPEED #1 CONTINUE MODE | — |
| Less than 4 | SPEED #15 DRIVE TIME | 1 | 059C | FFFF | 0000 ~ 1F40 (0 ~ 8000) | 1 |

## 9.2.18 Feedback Control Parameters

| Function / Title | | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|---|
| FEEDBACK CONTROL SELECTION | | 0 / 1 | 04B9 | 0060 | 0020: No feedback (0)<br>0040: PID control (1)<br>0060: Speed feedback (2) | — |
| 1 • 2 | FEEDBACK INPUT SIGNAL SELECTION | 0 / 1 | 04B9 | 001C | 0004: RR input (1)<br>0008: IV input (2)<br>000C: RX input (3)<br>0010: PG feedback (4)<br>0014: RS232C input (5)<br>0018: Communication/12-bit binary option board (6)<br>001C: BIN input (7) | — |
| | PROPORTIONAL GAIN | 0 / 1 | 04A8 | 00FF | 0001 ~ 00FF (0.01 ~ 2.55) | 0.01 |
| | INTEGRAL GAIN | 0 / 1 | 04AA | FFFF | 0001 ~ 8CA0 (0.01 ~ 360.00) | 0.01 |
| | ANTI-HUNTING GAIN | 0 / 1 | 04AC | 00FF | 0000 ~ 00FF (0.0 ~ 25.5) | 0.1 |
| | LAG TIME CONSTANT | 0 / 1 | 04AD | 00FF | 0000 ~ 00FF (0 ~ 255) | 1 |
| | PID LOWER LIMIT FREQUENCY | 0 / 1 | 03D2 | FFFF | 0 ~ Fmax | 0.01 |
| PID DEVIATION LIMIT SELECTION | | 0 / 1 | 04BE | 0080 | 0000: No PID deviation lim. (0)<br>0080: PID deviation limited (1) | — |
| 1 | PID DEVIATION UPPER LIMIT | 0 / 1 | 04C8 | 00FF | 0000 ~ 0032 (0 ~ 50) | 1 |
| | PID DEVIATION LOWER LIMIT | 0 / 1 | 04C9 | 00FF | 0000 ~ 0032 (0 ~ 50) | 1 |
| PG INPUT: NUMBER OF PULSES | | 0 / 1 | 040E | FFFF | 0001 ~ 270F (1 ~ 9999) | 1 |
| PG INPUT: NUMBER OF PHASES | | 0 / 1 | 04B9 | 0001 | 0000: Single-phase input (1)<br>0001: Two-phase input (2) | — |
| DROOPING CONTROL ENABLE | | 0 / 1 | 04B9 | 0002 | 0000: OFF (0)<br>0002: ON (1) | — |
| 1 | DROOPING CONTROL AMOUNT | 0 / 1 | 0451 | 00FF | 0000 ~ 0064 (0 ~ 10.0) | 0.1 |
| OVERRIDE CONTROL SELECTION | | 0 / 1 | 04C1 | 0007 | 0000: OFF (0)<br>0001: FCRR (1)<br>0002: FCIV (2)<br>0003: FCRX (3)<br>0004: FCPG (4)<br>0005: FCPNL (5)<br>0006: FCOPT (6)<br>0007: FCMLT (7) | — |
| 7 | OVERRIDE MULTIPLIER INPUT SELECTION | 0 / 1 | 04C1 | 0038 | 0000: Reference (0)<br>0008: KRR (1)<br>0010: KIV (2)<br>0018: KRX (3)<br>0020: KBIN (4) | — |
| | OVERRIDE CHANGE MULTIPLIER | 0 / 1 | 0420 | FFFF | FC18 ~ 03E8 (-100.0 ~ 100.0) | 0.1 |

## 9.2.19 Communication Setting Parameters

| Function / Title | | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|---|
| RS232 BAUD RATE | | 1 | 04AE | 0018 | 0000: 2400 baud (0)<br>0008: 4800 baud (1)<br>0010: 9600 baud (2) | — |
| NUMBER OF DATA BITS | | 1 | 04AE | 0040 | 0000: 7 bits (0)<br>0040: 8 bits (1) | — |
| PARITY SETTING | | 1 | 04AE | 0080 | 0000: Even parity (0)<br>0080: Odd parity (1) | — |
| ASD ID NUMBER | | 1 | 04B1 | 00FF | 0000 ~ 00FF (0 ~ 255) | 1 |
| COMMUNICATION SELECTION | | 1 | 04AE | 0007 | 0000: OFF (0)<br>0001: RS485 (1)<br>0002: F-10, DNet, RIO (2)<br>0003: TOSLINE S-20 (3)<br>0004: 12 bit binary input (4)<br>0005: 3-digit BCD (0.1Hz) (5)<br>0006: 3-digit BCD (1Hz) (6) | — |
| 1 | MASTER/SLAVE SELECTION | 1 | 04AF | 0018 | 0000: Slave (0)<br>0008: Master (frequency command) (1)<br>0010: Master (output frequency) (2) | — |
| | RS485 BAUD RATE | 1 | 04AF | 0004 | 0000: Normal mode (0)<br>0004: High-speed mode (1) | — |
| 2 | TOSLINE-F10 COMMAND INPUT | 1 | 04B0 | 0003 | 0000: OFF (0)<br>0001: Frequency command (1)<br>0002: Command input (2)<br>0003: Both (1) and (2) (3) | — |
| | TOSLINE-F10 MONITOR OUTPUT | 1 | 04B0 | 003C | 0000: (0) 0020: (8)<br>0004: (1) 0024: (9)<br>0008: (2) 0028: (10)<br>000C: (3) 002C: (11)<br>0010: (4) 0030: (12)<br>0014: (5) 0034: (13)<br>0018: (6) 0038: (14)<br>001C: (7) 003C: (15) | — |
| | TOSLINE-F10 COMM ERROR MODE | 1 | 04B0 | 0080 | 0000: Data cleared (0)<br>0080: Data retained (1) | — |
| 3 | TOSLINE-S20 RECEIVE ADDRESS | 1 | 04CE | FFFF | 0000 ~ 03FF (0 ~ 1023) | 1 |
| | TOSLINE-S20 TRANSMIT ADDRESS | 1 | 04D0 | FFFF | 0000 ~ 03FF (0 ~ 1023) | 1 |
| | TOSLINE-S20 COMMAND INPUT | 1 | 04D2 | 001F | 0000 ~ 001F (0 ~ 31) | 1 |
| | TOSLINE-S20 MONITOR OUTPUT | 1 | 04D3 | 001F | 0000 ~ 001F (0 ~ 31) | 1 |
| | TOSLINE-S20 FREQ REF ADDR SELECT | 1 | 04D4 | 0001 | 0000: Disable (0)<br>0001: Enable (1) | 1 |
| | 1 TOSLINE-S20 FREQ REFERENCE ADDR | 1 | 04D5 | FFFF | 0000 ~ 03FF (0 ~ 1023) | 1 |
| | TOSLINE-S20 COMM ERROR MODE | 1 | 04D4 | 0002 | 0000: Data cleared (0)<br>0002: Data retained (1) | 1 |
| | TOSLINE-S20 COMM OPTION RESET | 1 | 02DC | 0004 | 0000: No effect (0)<br>0004: Reset (1) | 1 |
| RS485/12-BIT BINARY BIAS,GAIN | | 0 / 1 | 04AF | 0020 | 0000: OFF (0)<br>0020: ON (1) | — |
| 1 | RS485/12-BIT BINARY POINT #1 (**Ref. 1**) | 0 / 1 | 04CA | 00FF | 0000 ~ 0064 (0 ~ 100) | 1 |
| | RS485/12-BIT BINARY PT. #1 FREQ | 0 / 1 | 04B2 | FFFF | 0000 ~ Fmax (0 ~ Fmax) | 0.01 |
| | RS485/12-BIT BINARY POINT #2 (**Ref. 1**) | 0 / 1 | 04CB | 00FF | 0000 ~ 0064 (0 ~ 100) | 1 |
| | RS485/12-BIT BINARY PT. #2 FREQ | 0 / 1 | 04B4 | FFFF | 0000 ~ Fmax (0 ~ Fmax) | 0.01 |

(**Note**) All parameters in GROUP:COMMUNICATION SETTING PARAMETERS (except for RS485/12-BIT BINARY BIAS, GAIN, RS485/12-BIT BINARY POINT #1, RS485/12-BIT BINARY PT. #1 FREQ, RS485/12-BIT BINARY POINT #2, and RS485/12-BIT BINARY PT. #2 FREQ) must be set in the EEPROM (bank 1) to be valid. (These parameters can be set in bank 0 (RAM), but the data settings will be written over by the values contained in the EEPROM the next time RAM is reset. Therefore, always write the data settings for these parameters to the EEPROM (bank 1)). After changing the settings of these communication parameters, reset the ASD to validate the data.

(**Ref. 1**) The data settings for parameters RS485/12-BIT BINARY POINT #1 and RS485/12-BIT BINARY POINT #2 are proportional to MAXIMUM OUTPUT FREQUENCY in GROUP:FUNDAMENTAL PARAMETERS #1.

**Ex:** If MAXIMUM OUTPUT FREQUENCY = 80Hz, RS485/12-BIT BINARY POINT #1 = 10%, RS485/12-BIT BINARY PT. #1 FREQ = 20Hz, and an 8Hz frequency command is input, the output frequency will be 20Hz.

## 9.2.20 AM/FM Terminal Adjustment Parameters

| Function / Title | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|
| FM TERMINAL FUNCTION SELECTION (**Note**) | 0 / 1 | 0484 | FFFF | 1194: Pre-compensation reference frequency (0)<br>6686: Post-compensation output frequency (1)<br>1500: Frequency setting (2)<br>2576: Output current (3)<br>2689: DC voltage (4)<br>5668: Output voltage (5)<br>3684: Torque current (6)<br>2688: Excitation current (7)<br>7506: PID feedback value (8)<br>0584: Motor overload ratio (9)<br>0586: Inv. overload ratio (10)<br>0588: Dynamic braking resistor OL ratio (11)<br>835C: Input power (12)<br>835E: Output power (13)<br>A000: Fixed output (14)<br>2304: Peak output current (15)<br>8302: Peak input voltage (16) | — |
| FREQUENCY METER ADJUSTMENT | 0 / 1 | 0486 | FFFF | 0000 ~ FFFF | 1 |
| AM TERMINAL FUNCTION SELECTION (**Note**) | 0 / 1 | 0488 | FFFF | Same as FM TERMINAL FUNCTION SELECTION | — |
| CURRENT METER ADJUSTMENT | 0 / 1 | 048A | FFFF | 0000 ~ FFFF | 1 |

## 9.2.21 Utility Parameters

| Function / Title | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|
| INDUSTRIAL APPLICATIONS<br>(previous setting monitor for read use)<br><br>**Note**: If data is written to this address, the previous setting displayed on the panel will be changed. | 0 / 1 | 0438 | 00FF | 0000: Std. shpmt. setting (0)<br>0001: Pump application (1)<br>0002: Fan application (2)<br>0003: Conveyor application (3)<br>0004: Hoist application (4)<br>0005: Textiles application (5)<br>0006: Machine tools appl. (6) | — |
| INDUSTRIAL APPLICATIONS<br>(for write use)<br><br>(**Note**, ✳) | 0 / 1 | 04C2 | 00FF | 0000: Does nothing (0)<br>0011: Pump application (1)<br>0012: Fan application (2)<br>0013: Conveyor application (3)<br>0014: Hoist application (4)<br>0015: Textiles application (5)<br>0016: Machine tools appl. (6) | — |
| STANDARD SETTING MODE SELECTION<br><br>(**Note**, ✳)<br>(**Ref. 1**) | 0 / 1 | 04C2 | 00FF | 0000: Does nothing (0)<br>0001: 50Hz std. settings (1)<br>0002: 60Hz std. settings (2)<br>0003: Factory settings (3)<br>0004: Trip clear (4)<br>0005: Save user-set param. (5)<br>0006: TYPE 5 reset (6)<br>0007: Initialize typeform (7) | — |
| COMMAND MODE SELECTION | 0 / 1 | 04B7 | 0007 | 0000: Only RS232C valid (0)<br>0001: Terminal input valid (1)<br>0002: Panel input valid (2)<br>0003: Communication option input valid (3)<br>0004: local/remote valid (4) | — |
| FREQUENCY MODE SELECTION | 0 / 1 | 04B7 | 0038 | 0000: Only RS232C valid (0)<br>0008: Terminal input valid (1)<br>0010: Panel input valid (2)<br>0018: Comm./12-bit binary option input valid (3)<br>0020: local/remote valid (4) | — |
| PANEL OPERATION MODE SELECTION (**Ref. 2**) | 0 / 1 | 0452 | 00FB | 0000 ~ 003F (0 ~ 63)<br>(except 0004, 0008, 000C....) | 1 |
| PASS NUMBER | 0 / 1 | 049D | 00FF | 0000 ~ 0063 (0 ~ 99) | 1 |
| CPU VERSION<br>ROM VERSION<br>EEPROM VERSION | 2<br>3<br>1 | 8000<br>0000<br>0380 | — | (Monitor only) | 1 |
| ASD TYPEFORM | 0 | 05CA | — | (Monitor only) | — |
| STATUS MONITOR #1 DISPLAY SELECT | 0 / 1 | 0454 | FFFF | 0001 ~ 0010 (1 ~ 16) | 1 |
| STATUS MONITOR #2 DISPLAY SELECT | 0 / 1 | 0456 | FFFF | 0001 ~ 0010 (1 ~ 16) | 1 |
| STATUS MONITOR #3 DISPLAY SELECT | 0 / 1 | 0458 | FFFF | 0001 ~ 0010 (1 ~ 16) | 1 |
| STATUS MONITOR #4 DISPLAY SELECT | 0 / 1 | 045A | FFFF | 0001 ~ 0010 (1 ~ 16) | 1 |
| FREQUENCY UNITS SCALE FACTOR | 0 / 1 | 0412 | FFFF | 0000 ~ 4E20 (0.00 ~ 200.00) | 0.01 |
| FREQUENCY DISPLAY RESOLUTION | 0 / 1 | 045D | 0003 | 0000: 1Hz (0)<br>0001: 0.1Hz (1)<br>0002: 0.01Hz (2) | — |
| ACC/DEC TIME UNITS SELECTION (**Ref. 3**) | 0 / 1 | 045D | 0004 | 0000: 0.1 sec. (0)<br>0004: 0.01 sec. (1) | — |
| CURRENT UNITS SELECTION | 0 / 1 | 045D | 0008 | 0000: % (0)<br>0008: A (1) | — |

| | Function / Title | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|---|
| VOLTAGE UNITS SELECTION | | 0 / 1 | 045D | 0010 | 0000: % (0)<br>0010: V (1) | — |
| BLIND FUNCTION SELECTION | | 0 / 1 | 045E | 0001 | 0000: Blind (0)<br>0001: Selective unblinding (1) | — |
| 1 | FUNDAMENTAL PARAMS #2 BLIND | 0 / 1 | 045E | 0040 | 0000: Blind (0)<br>0040: Unblind (1) | — |
| | PANEL CONTROL PARAMS BLIND | 0 / 1 | 045E | 0080 | 0000: Blind (0)<br>0080: Unblind (1) | — |
| | TERMINAL SELECTION PARAMS BLIND | 0 / 1 | 045F | 0001 | 0000: Blind (0)<br>0001: Unblind (1) | — |
| | SPECIAL CONTROL PARAMS BLIND | 0 / 1 | 045F | 0002 | 0000: Blind (0)<br>0002: Unblind (1) | — |
| | FREQUENCY SETTING PARAMS BLIND | 0 / 1 | 045F | 0004 | 0000: Blind (0)<br>0004: Unblind (1) | — |
| | PROTECTION FUNCTION PARAMS BLIND | 0 / 1 | 045F | 0008 | 0000: Blind (0)<br>0008: Unblind (1) | — |
| | PATTERN RUN CONTROL PARAMS BLIND | 0 / 1 | 045F | 0010 | 0000: Blind (0)<br>0010: Unblind (1) | — |
| | FEEDBACK CONTROL PARAMS BLIND | 0 / 1 | 045F | 0020 | 0000: Blind (0)<br>0020: Unblind (1) | — |
| | COMMUNICATION PARAMS BLIND | 0 / 1 | 045F | 0040 | 0000: Blind (0)<br>0040: Unblind (1) | — |
| | INDUSTRIAL APPL:PUMP PARAMS BLIND | 0 / 1 | 045F | 0080 | 0000: Blind (0)<br>0080: Unblind (1) | — |
| | INDUSTRIAL APPL:FAN PARAMS BLIND | 0 / 1 | 0460 | 0001 | 0000: Blind (0)<br>0001: Unblind (1) | — |
| | INDUSTRIAL APPL: CONVEYOR BLIND | 0 / 1 | 0460 | 0002 | 0000: Blind (0)<br>0002: Unblind (1) | — |
| | INDUSTRIAL APPL: HOIST BLIND | 0 / 1 | 0460 | 0004 | 0000: Blind (0)<br>0004: Unblind (1) | — |
| | INDUSTRIAL APPL: TEXTILES BLIND | 0 / 1 | 0460 | 0008 | 0000: Blind (0)<br>0008: Unblind (1) | — |
| | INDUST APPL:MACHINE TOOLS BLIND | 0 / 1 | 0460 | 0010 | 0000: Blind (0)<br>0010: Unblind (1) | — |
| | AM/FM ADJUSTMENT PARAMS BLIND | 0 / 1 | 0461 | 0001 | 0000: Blind (0)<br>0001: Unblind (1) | — |
| | MOTOR PARAMETERS BLIND | 0 / 1 | 0461 | 0004 | 0000: Blind (0)<br>0004: Unblind (1) | — |

(**Ref. 1**): The data setting value will be retained in the EEPROM even if it was written to RAM (bank 0).
**Note**) If 0000 (does nothing) is written to the EEPROM, the previous setting monitor value will become 0. Also, if the industrial application parameters selection is written to after writing to the standard setting mode selection, the standard setting mode selection's previous data setting will be cleared.

(**Ref. 2**): If the setting value is written to RAM only, the value displayed on the panel will not change. Also, when the setting value is written to EEPROM, the value displayed on the panel will not change until a reset is performed.

(**Ref. 3**): If the setting of ACC/DEC TIME UNITS SELECTION is changed after setting the ACC/DEC times, the ACC/DEC times will become 10 times or 0.1 times their former value. Therefore, always reset the ACC/DEC time settings after changing the setting of ACC/DEC TIME UNITS SELECTION.

## 9.2.22 Motor Rating Parameters

| Function / Title | | Bank | Address | Mask | Adjustment Range | Multiplier |
|---|---|---|---|---|---|---|
| NUMBER OF MOTOR POLES | | 0 / 1 | 04C3 | 00FF | 0001: (2)<br>0002: (4)<br>0003: (6)<br>0004: (8)<br>0005: (10)<br>0006: (12)<br>0007: (14)<br>0008: (16) | 2 |
| MOTOR RATED CAPACITY | | 0 / 1 | 041E | FFFF | 0001 ~ 270F (0.1 ~ 999.9) | 0.1 |
| MOTOR TYPE | | 0 / 1 | 04BF | 0030 | 0000:Toshiba EQPIII motor (0)<br>0010:Toshiba STD motor (1)<br>0020:Other (2) | — |
| 2 | MOTOR RATED VOLTAGE<br>(230 / 460v units)<br>(575v units) | 0 / 1 | 04C6<br>042C | 00FF | 0012 ~ 0078 (90 ~ 600)<br>001A ~ 00AC (130 ~ 860) | 5 |
| | MOTOR RATED FREQUENCY | 0 / 1 | 04C7 | 00FF | 0000 ~ 00C8 (0 ~ 400) | 2 |
| | MOTOR RATED RPM | 0 / 1 | 040C | FFFF | 0000 ~ 270F (0 ~ 9999) | 1 |
| | AUTO-TUNING ENABLE | 0 | 04BE | 0008 | 0000: Auto-tuning disabled (0)<br>0008: Auto-tuning enabled (1) | — |
| LOAD MOMENT OF INERTIA | | 0 / 1 | 04BF | 00C0 | 0000: Small (0)<br>0040: Medium (1)<br>0080: Large (2)<br>00C0: Very large (3) | — |

# 10. Other G3 Communication Options Available

Toshiba is committed to providing the best connectivity possible for the G3 ASD. Below are some of the networks we support. Please give us a call if you need a support for a network not shown below. Also let us know if you would like technical literature on any of our communication option cards. We value your feedback concerning what networks are important for us to support.

## 10.1 Modbus Plus

Modbus Plus is a trademark of Group Schneider. Toshiba is a ModConnect Partner, and this option card is certified as being Modbus Plus compatible.

Modbus Plus is a communication network supported by Modicon, Square D, and Allen-Bradley PLCs.

## 10.2 Modbus RTU RS485

Modbus is a trademark of Group Schneider.

Modbus is a low speed communication network generally used to connect a computer to multiple remote devices. Almost all Supervisory Control and Data Acquisition software packages support Modbus. Consult the factory for availability of this card.

## 10.3 DeviceNet

DeviceNet is a trademark of ODVA (Open DeviceNet Vendor Association), of which Toshiba is a member, and the G3's DeviceNet card is certified by ODVA as being DeviceNet compatible.

DeviceNet is used to connect PLCs, computers, ASDs, and a wide variety of input / output devices. Toshiba PLCs support DeviceNet in addition to the drives.

## 10.4 Tosline F10

Tosline F10 is a proprietary network of Toshiba. Toshiba PLCs and drives support this network. It is a high-speed, RS485 network.

## 10.5 Fiber Optic Tosline S20

Tosline S20 is a proprietary network of Toshiba. Fiber Optic Tosline S20 connects the G3 ASD to Toshiba's PLCs. This is Toshiba's highest speed and performance network, intended for the most demanding applications.

## 10.6 RS232

The G3 has a built-in RS232 port. This port is generally used to set up the drive using Toshiba's Windows-based software.

## 10.7 RS485

The RS485 option card allows multiple G3 drives to be multi-dropped back to a main computer. Also, this card allows a master-follower network to be set up in which a multiple G3s run at a speed proportional to the master G3. No computer is needed when the master-follower network is used.

# 11. Support

## 11.1 Contact Information

Toshiba and your local ASD distributor provide technical support on this product. To obtain this support, please contact your local ASD distributor, or contact Toshiba in Houston, Texas.

Toshiba International Corporation
Industrial Division
13131 West Little York Road
Houston, TX 77041

Telephone 713-466-0277
Toll Free U.S. 800-231-1412
Toll Free Mexico 95-800-527-1204
Toll Free Canada 800-872-2192
Fax 713-466-0277

When contacting us, please ask for the ASD Marketing Department. Please have your G3 Operations Manual and this manual available, so that we can refer to it over the telephone.

## 11.2 Documentation

To operate this product, you will need the following manuals:
G3 Remote I/O Option Card Manual (this manual)
G3 Operation Manual (Part #45086-000)

Each of these manuals is available at no charge. Please contact us to obtain them.

# 12. Notes

TOSHIBA

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