

**Single Wire Saw**

**Updated Operating Instruction**

**(Control Data Transfer Method)**

**MP soft**

**Takatori Corporation**

| MODEL                |          | DOCUMENT              |          | REVISION |
|----------------------|----------|-----------------------|----------|----------|
| WSD Unit<br>(MP2500) |          | Operating Instruction |          | 1        |
| DATE                 | APPROVED | CHECKED               | DRAFT    |          |
| 2011/2/18            |          |                       | Shimaoka |          |

**Revision History**

|          |           |          |
|----------|-----------|----------|
| Rev. No. | 0         |          |
| Date     | 2011/2/18 |          |
| Chapter  | page      | Contents |
|          |           | Initial  |

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- 2. PROCEDURES ..... 2-- 6 -
- 3. CANCEL ..... 3-- 15 -

## Overview

This instruction document provides operational procedures to change the control data software version of the Single Wire Saw.

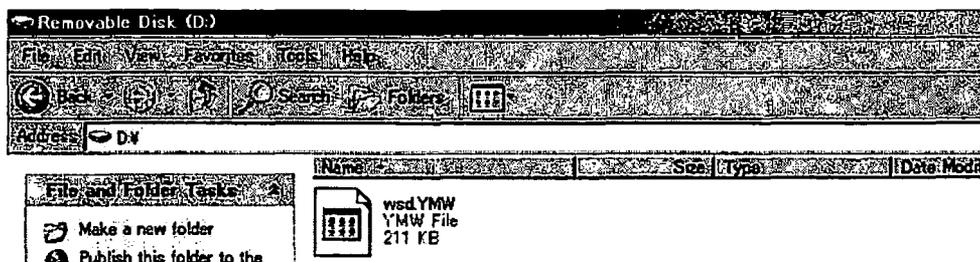
### 1. Preparation

(1) Tool required for the procedures following:.

1. USB Memory 1pc
2. Version Upgrade Data  
File name : wsd. YMW  
( The "YMW" is extension for the version upgrade data.)

Save above 2 data to the USB Memory.

The saved data is shown on the PC prepared as following picture.



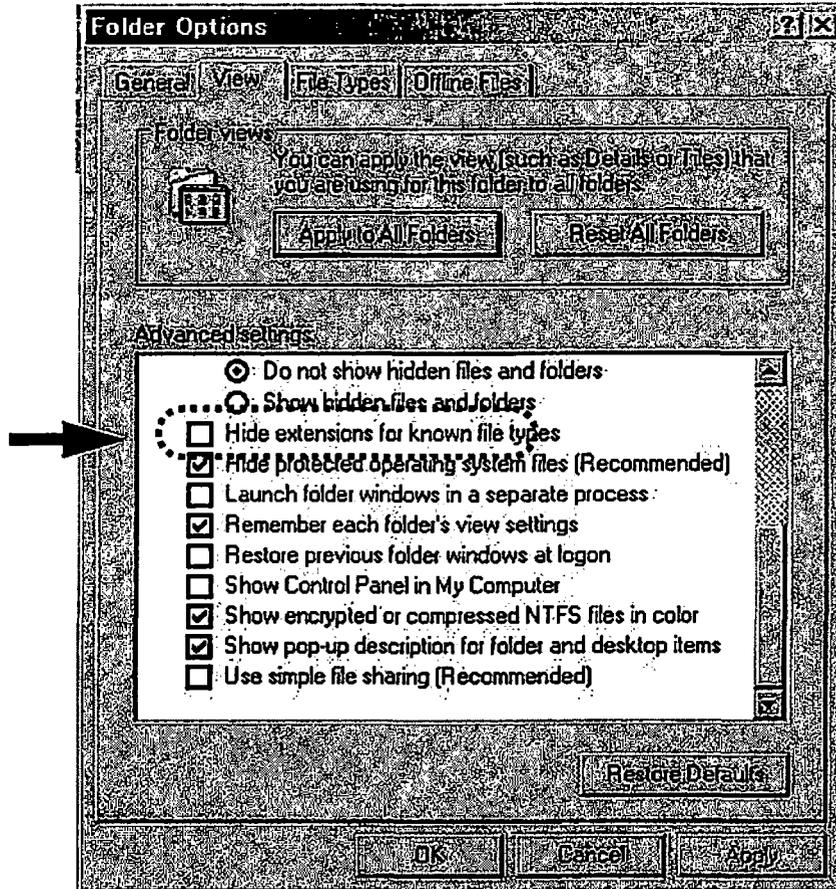
The above example picture shows the version files into the USB Memory.

| File Name | Version |
|-----------|---------|
| wsd.YMW   | ****    |

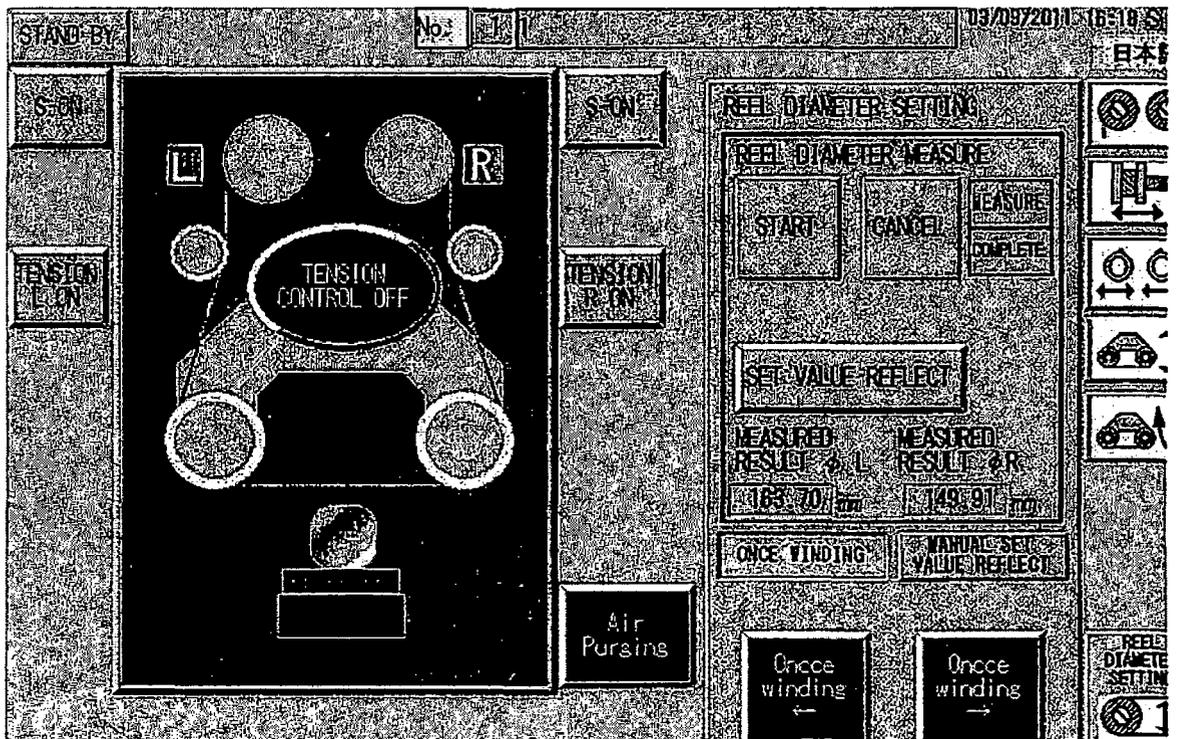
#### [Caution]

The example picture shows "wsd.YMW" but the "YMW" extension may not be indicated if the check box "Hide extensions for known file types." was checked on the PC folder option setting.

Remove the check from the check box and mouse-click "OK" as following picture.

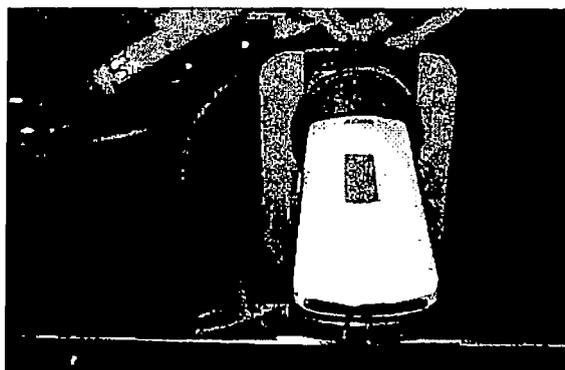
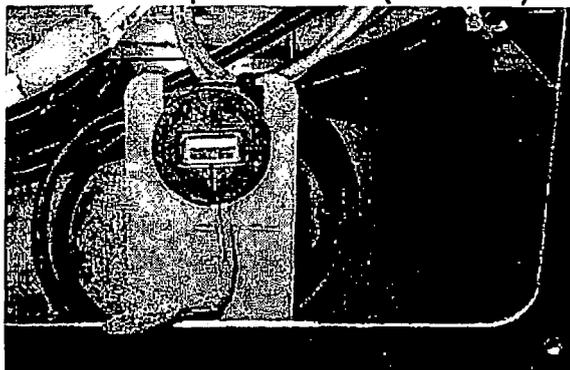


(2) Press the **TENSION CONTROL OFF** to turn OFF → press the **S-ON** Key to turn OFF the servo of the reel L and R.

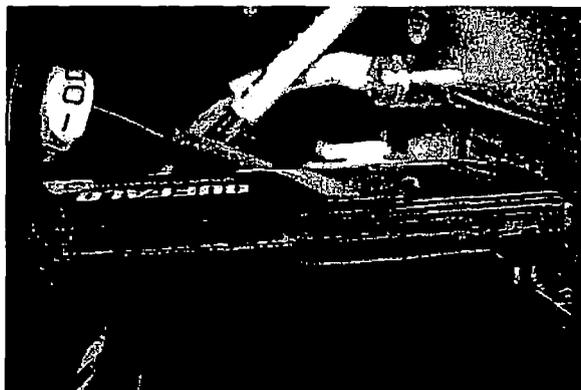
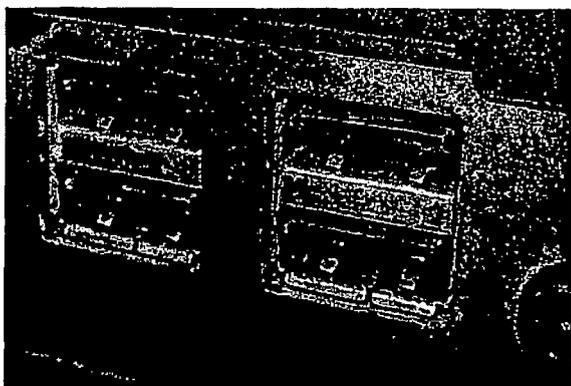


(3) Install the USB Memory to the internal USB Connector.

1: USB Adaptor installed (WSD-K2)



2: USB Adaptor non-installed (WSD-1A, WSD-2A)



### Caution

Be sure to perform after confirming following cautions.

#### Caution 1

#### IMPORTANT

Be sure that the power source never be turned off during performance.  
If the power source is turned off, all internal data will be cleared and the unit will not be in active.

## 2. Procedures

(1) Open the Menu → Version and confirm the current version.

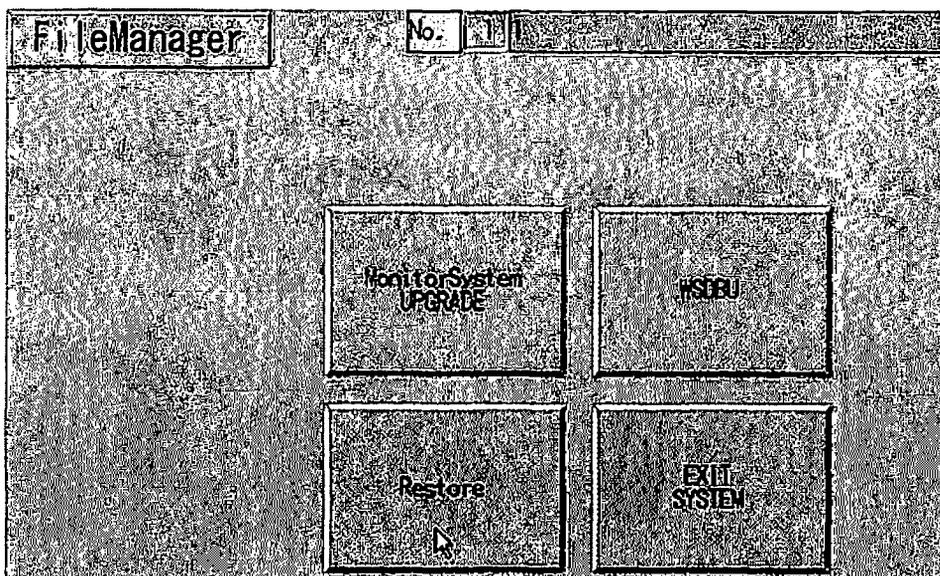
**MP software :Ver,....□.□□□**

The version of the example shown in the following picture is 2.011.  
Explain how to upgrade the version from 2.011 to 2.018 from here as example.

Close the screen by the **CLOSE** key after confirmation.

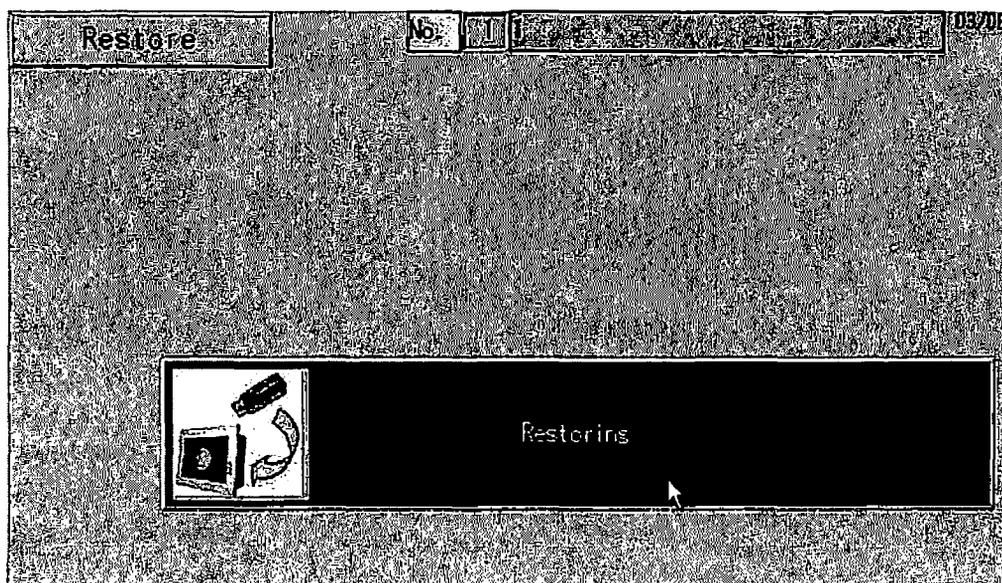


(2) Open the Menu → File Manager, and then press the **Restore** screen button.  
(MP Software Version Upgrade)



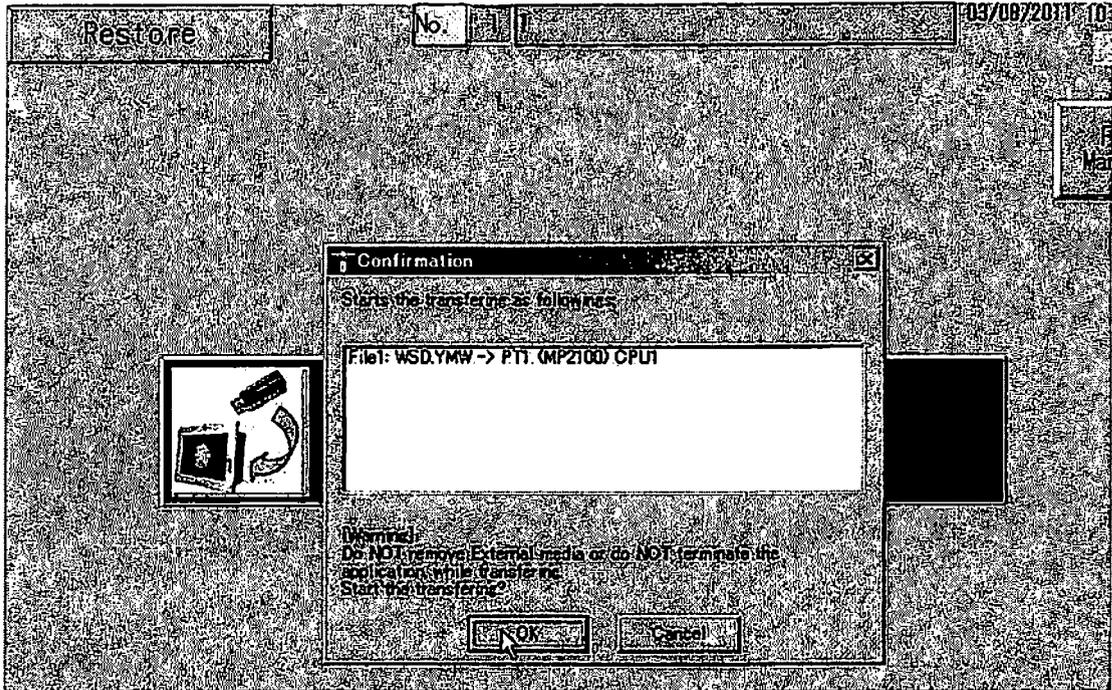
(3) Confirm the version change file exists in the USB Memory installed to the unit. If the USB Memory is not installed to the unit, install the USB Memory referring on page 1-5.

◇Please press the **Restore** key. The transfer confirmation screen is shown in following picture appears

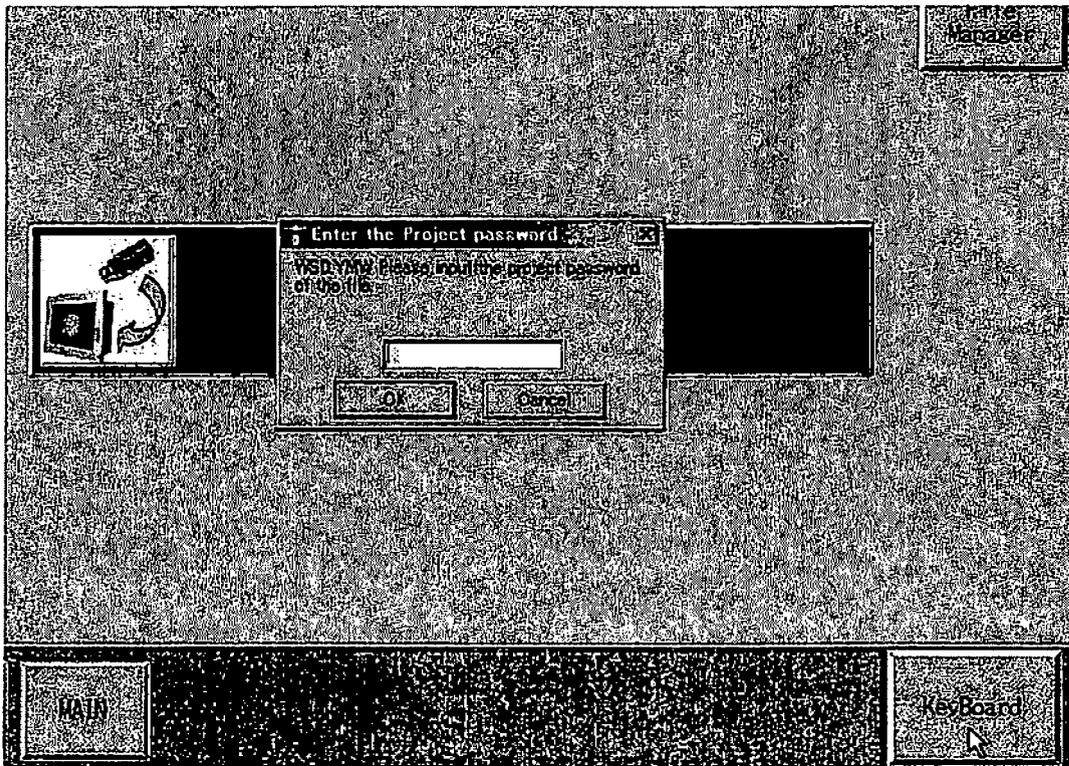


**Caution: Press each key at only one time firmly from next operation. If pressing more than one time, the operation will be cleared and the function will not move correctly.**

(4) Please press the **OK** key. The project password screen is shown in following picture appears

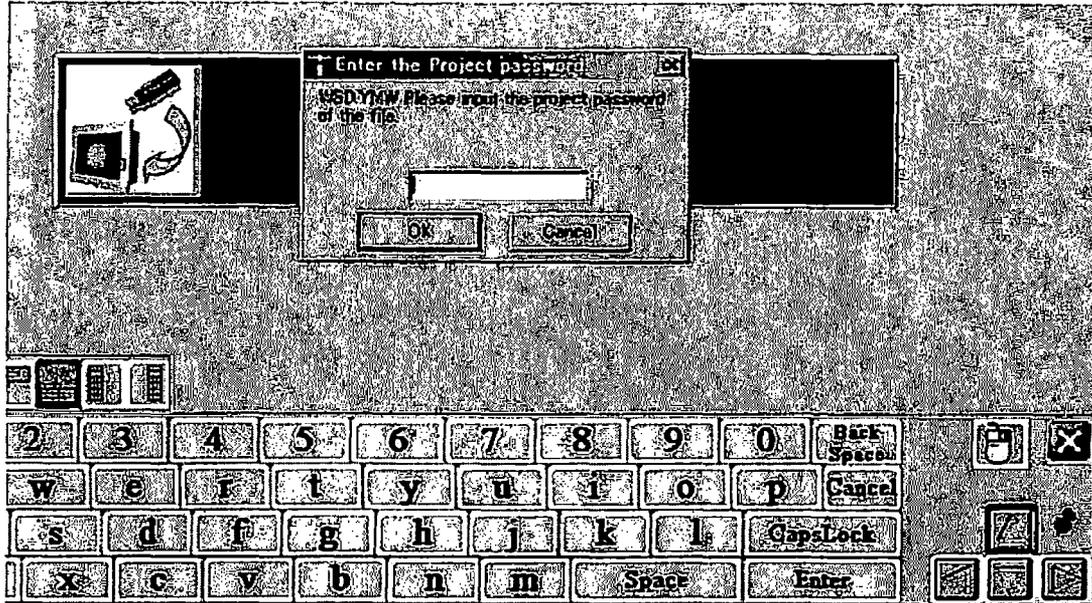


(5) To enter Project password, please press the Keyboard key .

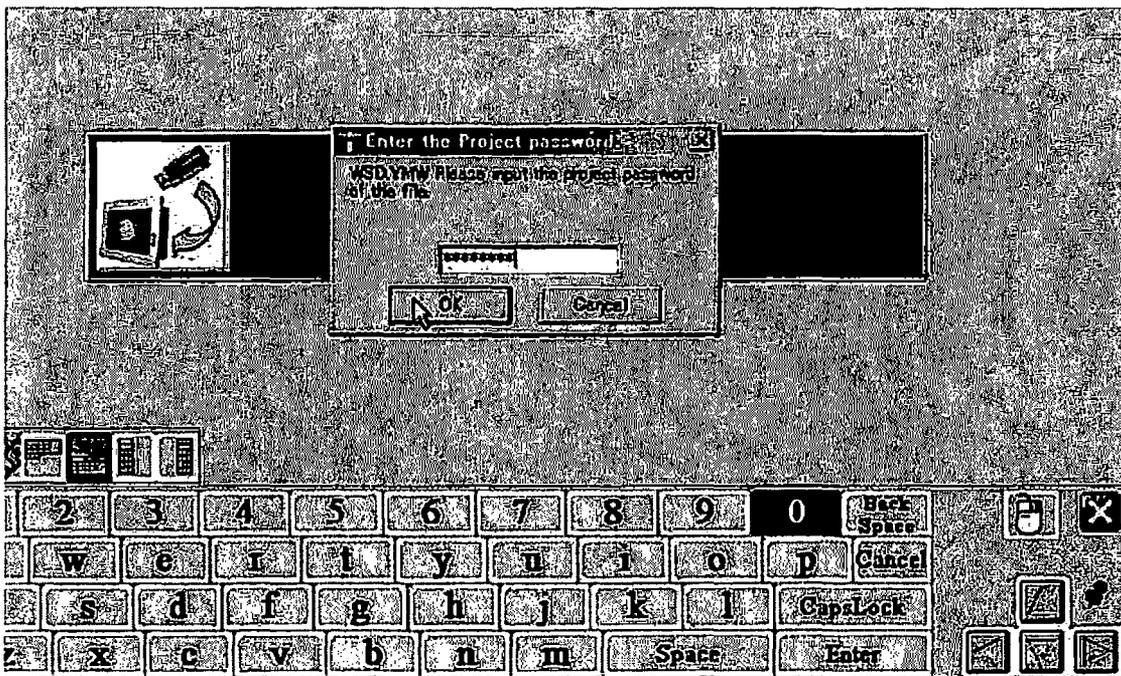


(6) Please enter password by keyboard.

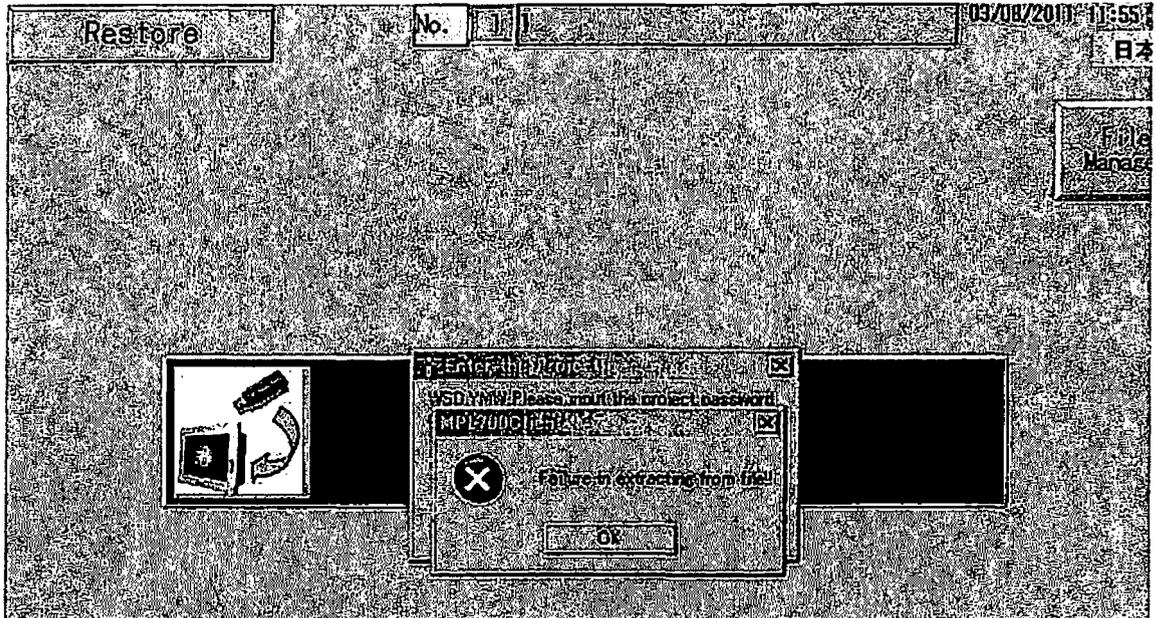
(Caution) Password is attached with program. Password is attached with program.



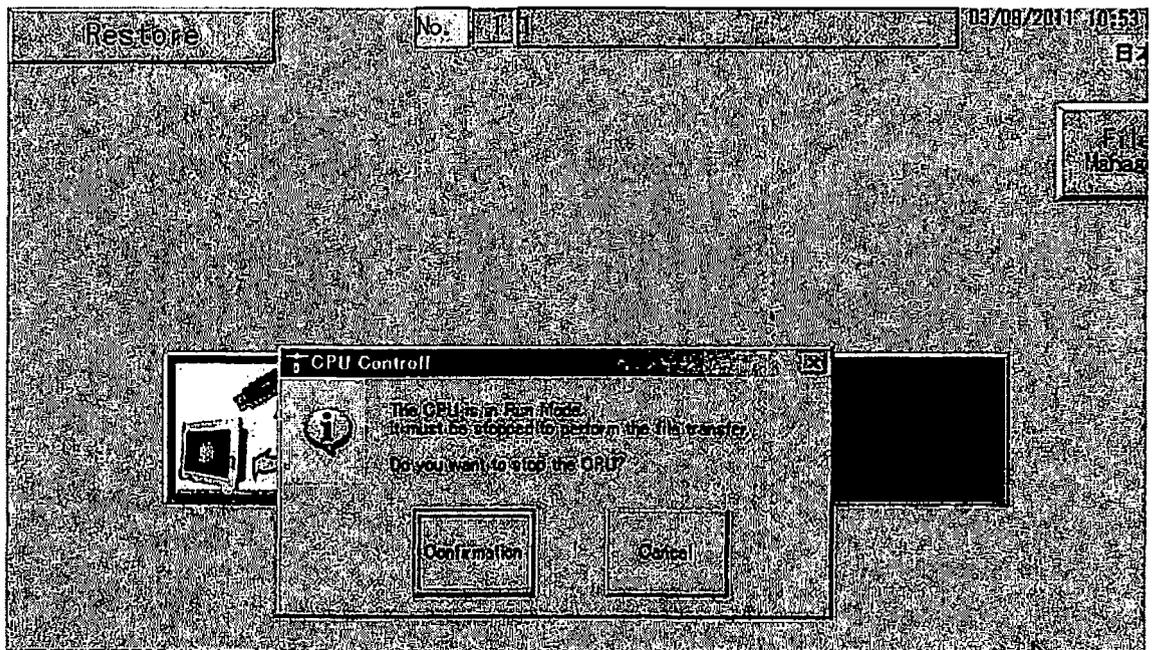
(7) After entering password, please press the **OK** key.



Caution: Press each key at only one time firmly from next operation. If pressing more than one time, the operation will be cleared and the function will not move correctly.

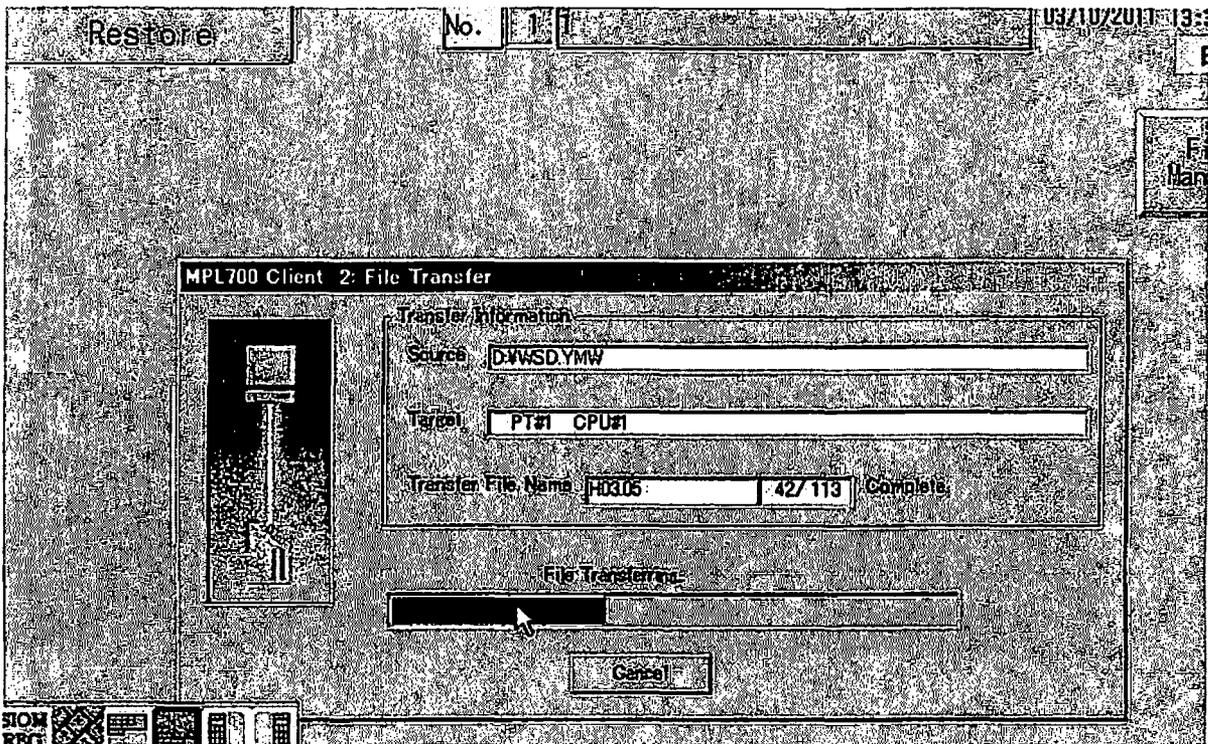


(8) Press the **Confirmation** key to stop CPU after CPU Control window comes up.

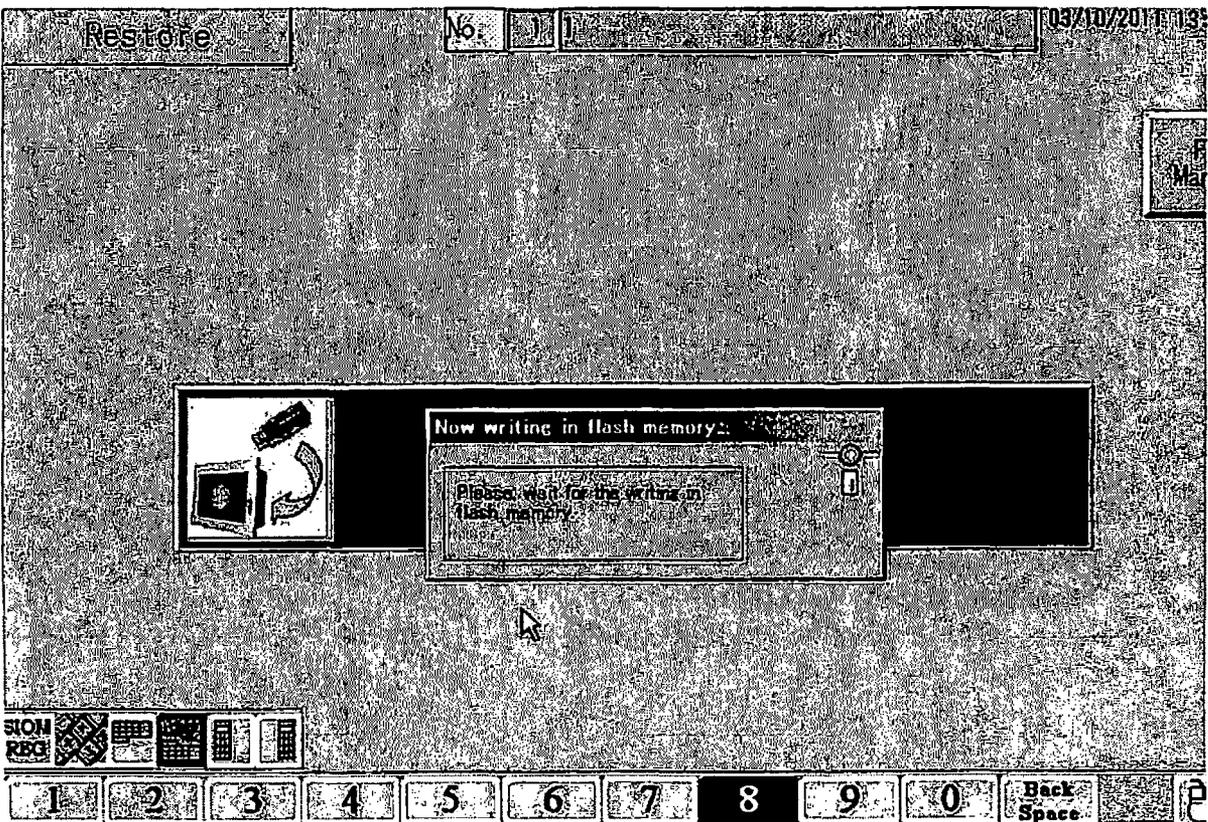


Transferring data will start.

(9) The screen shows transferring data as indicated below.



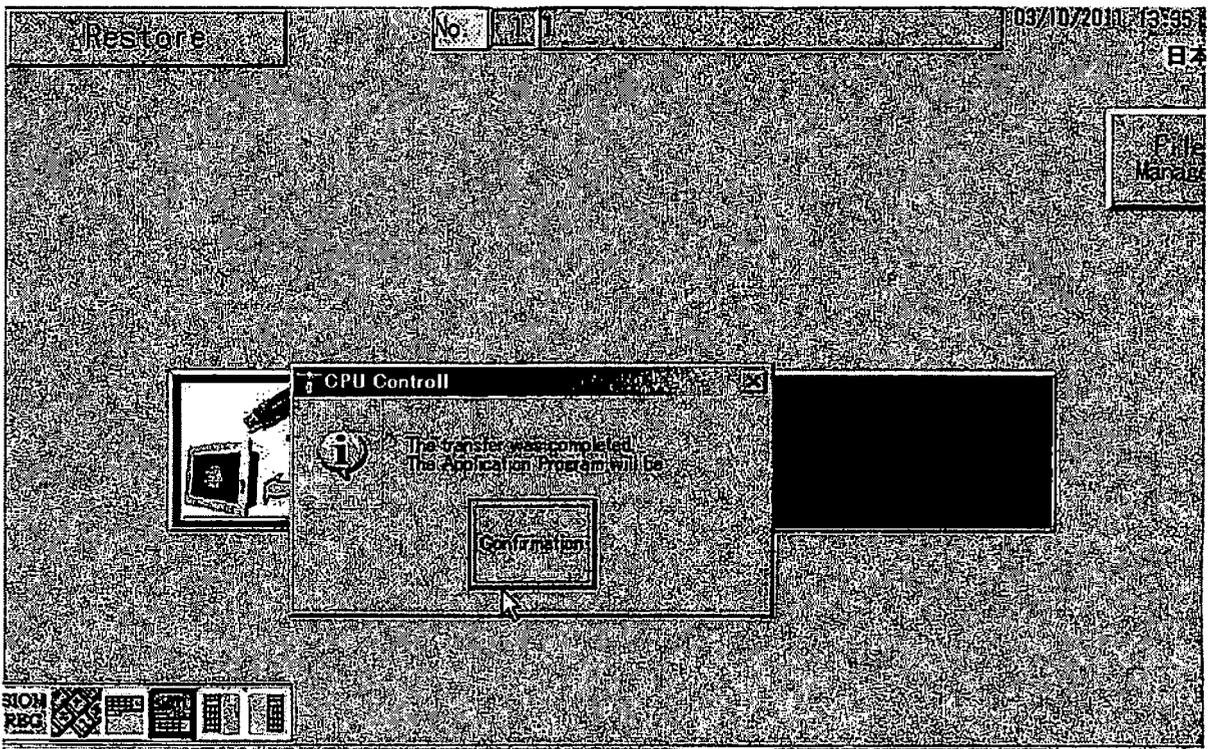
(10) The screen shows loading flash as indicated below.



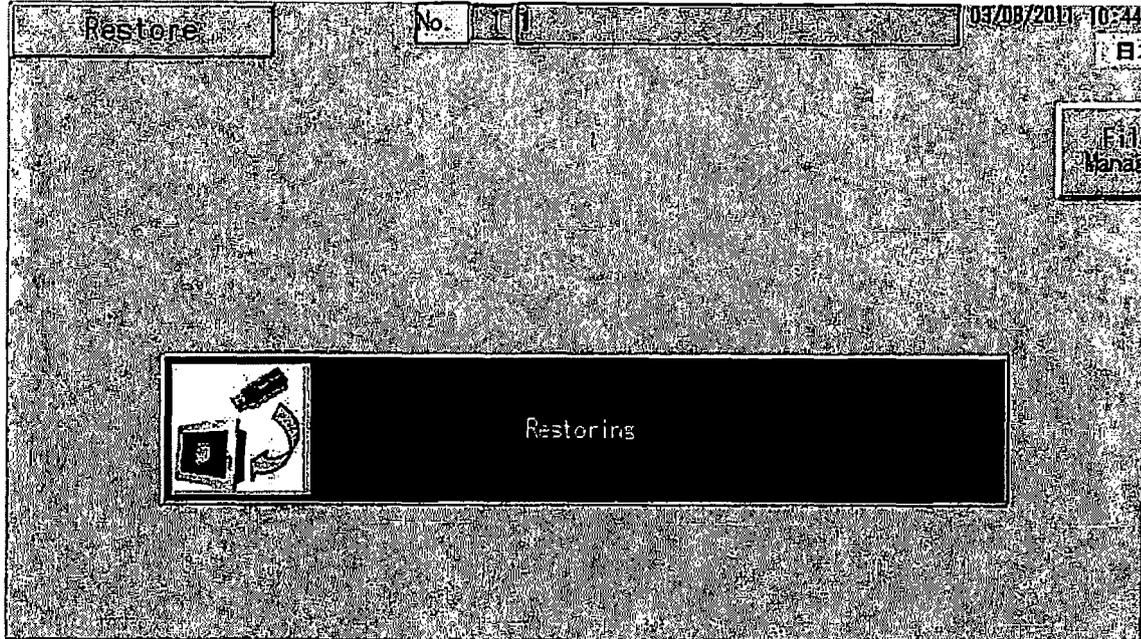
(11)The transfer was completed. CPU will run.



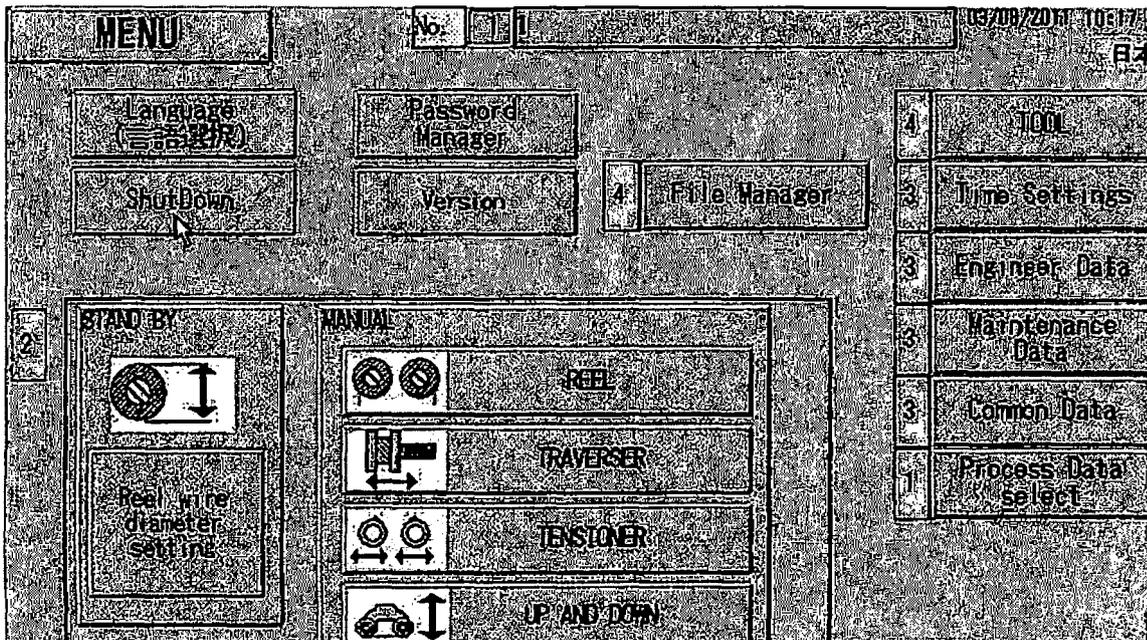
(12)Please press the **Confirmation** key.



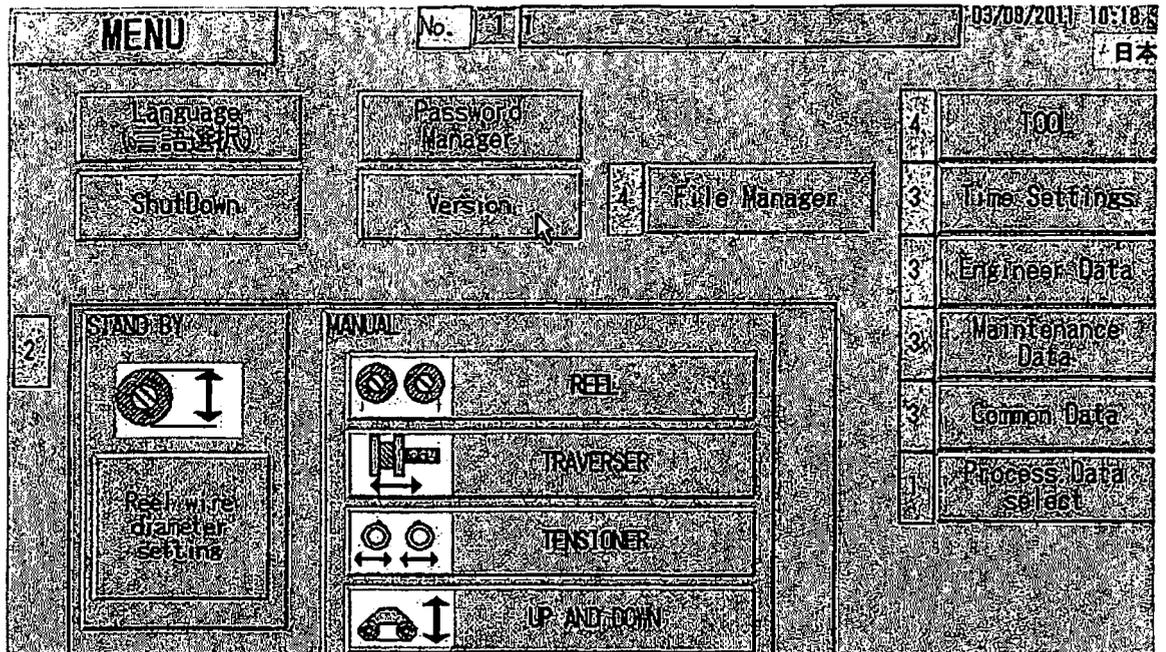
(13) The transfer is completed.



(14) The transfer operation will be completed after the unit power is turned OFF. Disconnect the USB Memory. Turn the power ON after 10 seconds. To turn the machine off, please press the **ShutDown** Key on Menu Screen.



(15) When the screen is activated, open Menu → Version to confirm the current version.



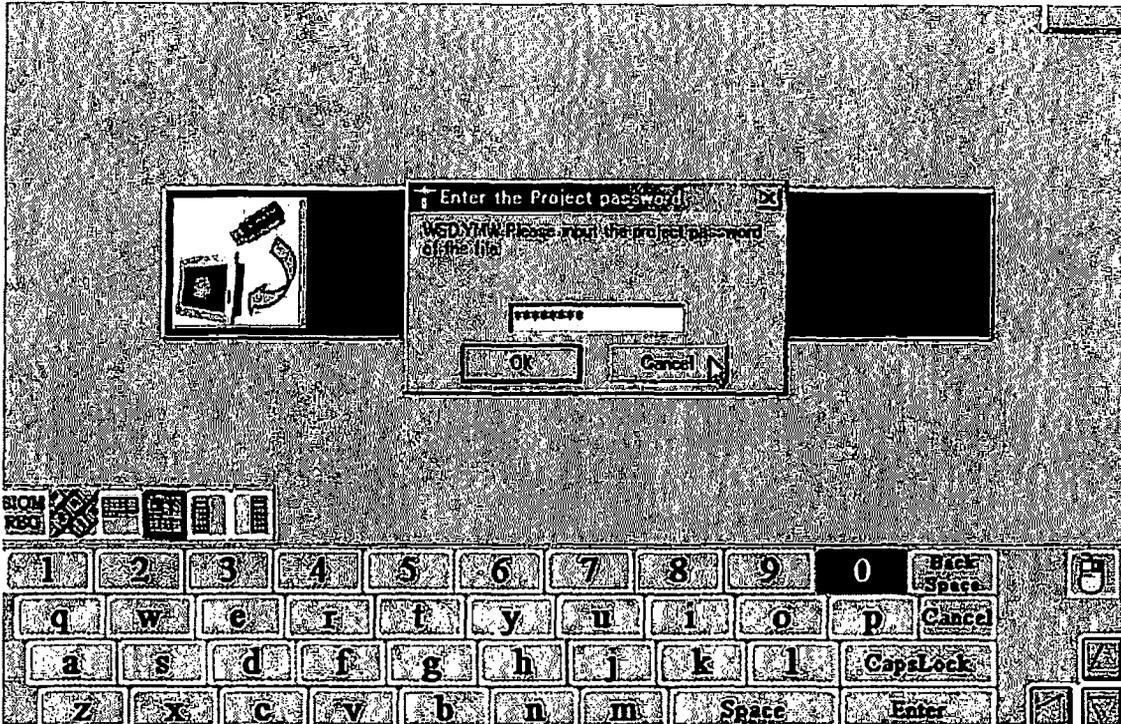
(16) Confirm that the version has been changed to 2.018 on the screen.



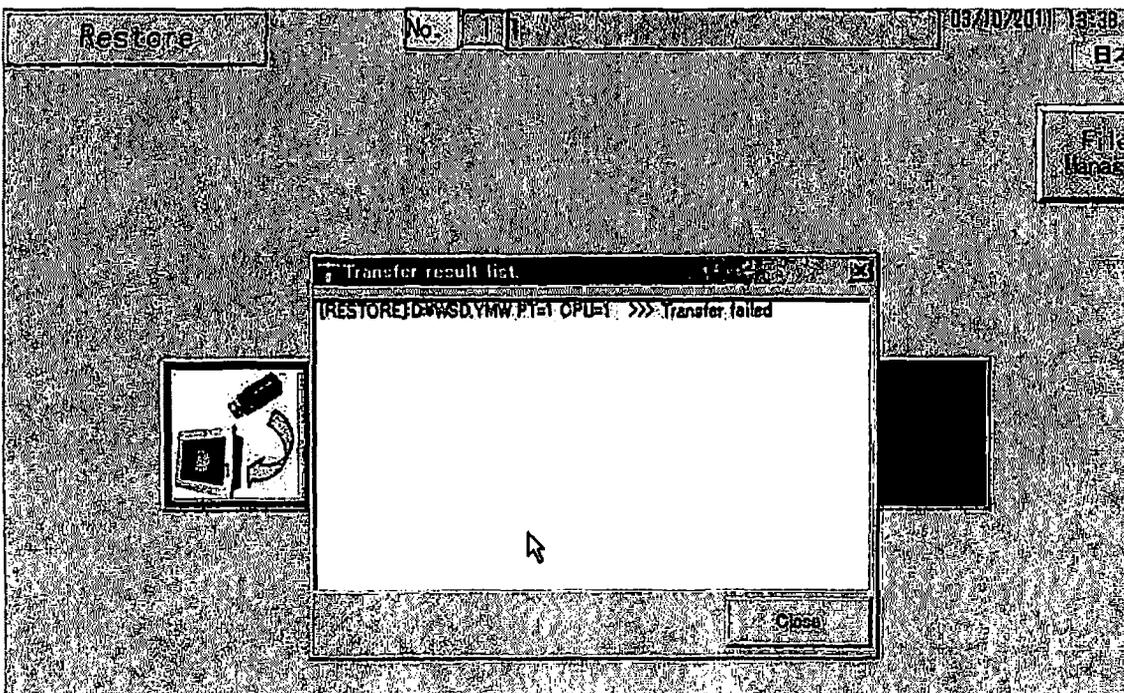
(17) This upgrade procedure is now completed.

### 3. Cancel

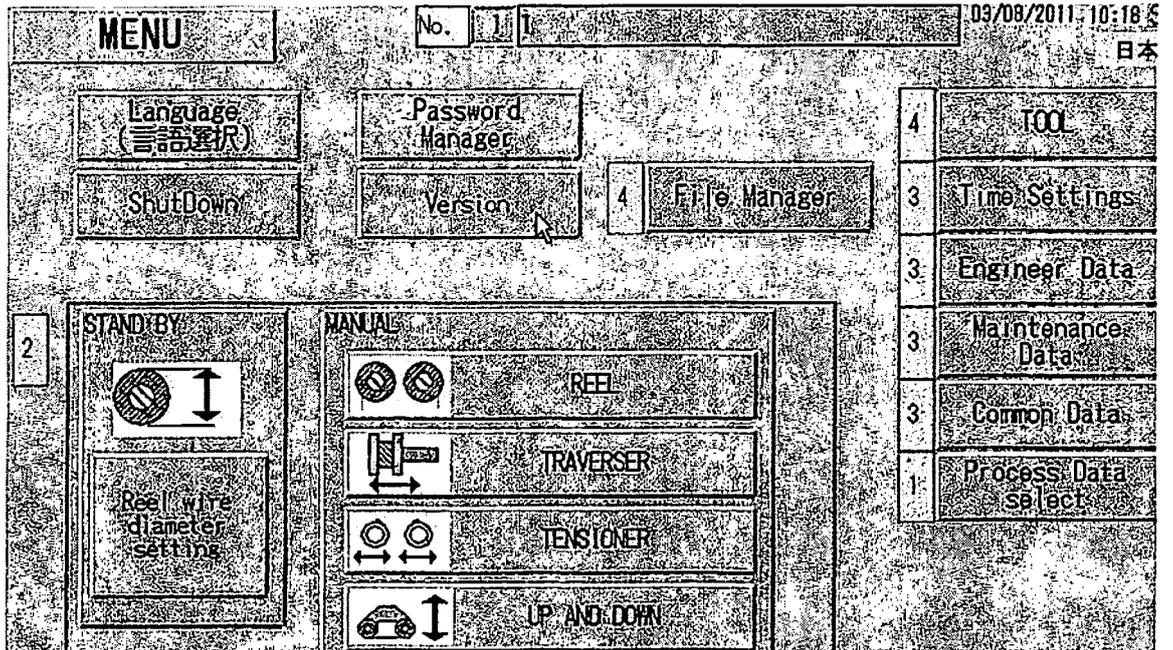
(1) If you have to cancel vision up, please press the **Cancel** key



(2) After confirming contents from Transfer result list, please press the **Close** key.



(3) Press the **Version** key to confirm that the control data is not updated.



(4) Confirm that the version is still 2.011.



**Single Wire Saw**  
**Updated Operating Instruction**  
**(Graphic Data Transfer Method)**  
**Touch Panel**

Takatori Corporation

| MODEL                |          | DOCUMENT              |          | REVISION |
|----------------------|----------|-----------------------|----------|----------|
| WSD Unit<br>(MP2500) |          | Operating Instruction |          | 1        |
| DATE                 | APPROVED | CHECKED               | DRAFT    |          |
| 2011/2/18            |          |                       | Shimaoka |          |

### Revision History

|          |           |          |
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| Rev. No. | 0         |          |
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| Chapter  | page      | Contents |
|          |           | Initial  |

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2. PROCEDURES ..... 2- 6 -

3. CANCEL..... 2- 13 -

# Overview

This instruction document provides operational procedures to change the graphic data software version of the Single Wire Saw.

## 1. Preparation

(1) Tool required for the procedures following:

1. USB Memory 1pc
2. Version Upgrade Data (Graphic Data)  
Folder Name: \*\*\*\*\*  
(The "\*" parts are arbitrary characters. The file folder is for the graphic data.)
3. Version Upgrade Data  
File Name: \*\*\*\*\*  
(The "\*" parts are arbitrary characters. The "IPP" is extension for the version upgrade data.)

Save above 2 and 3 data to the USB Memory.  
The saved data is shown on the PC prepared as following picture.



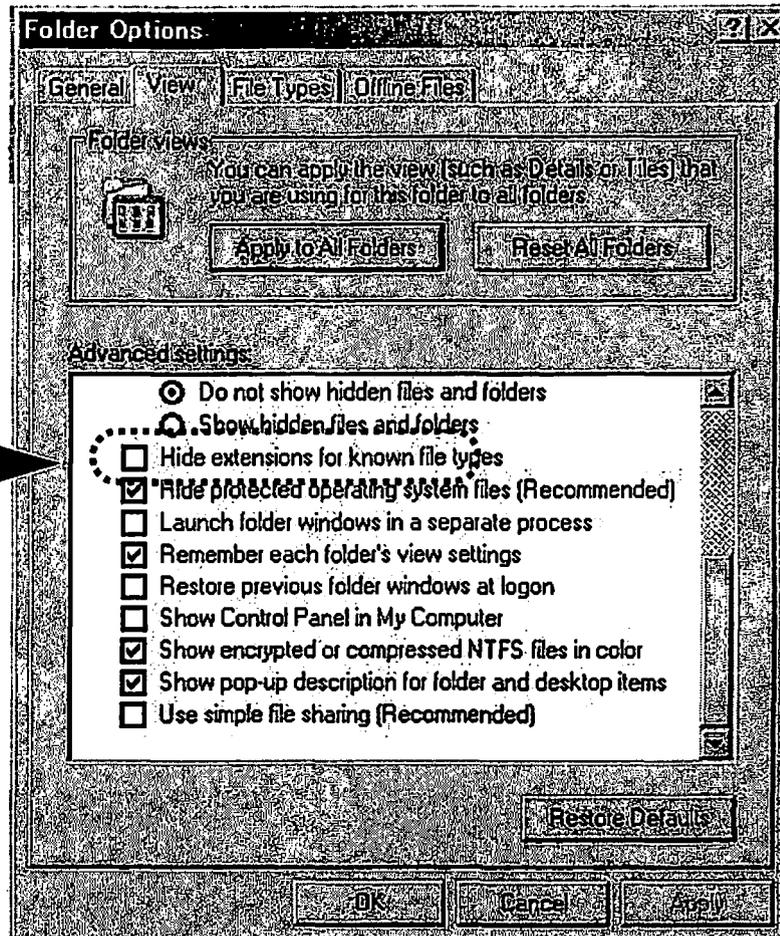
The above example picture shows the two kinds of version files into the USB Memory.

| File/Folder Name | Version |
|------------------|---------|
| WSDV1008         | 1.008   |
| WSDV1008.IPP     | 1.008   |

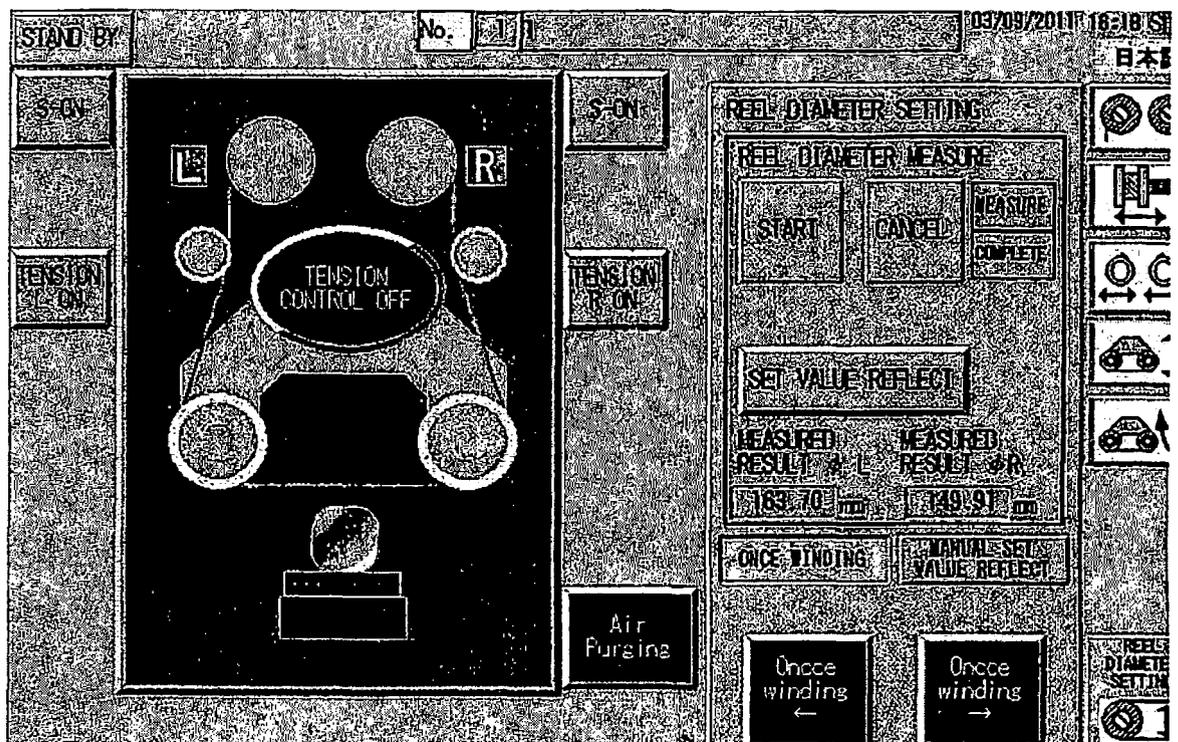
### [Caution]

The example picture shows "WSDV1008" and "WSDV1008.IPP" but the "IPP" extension may not be indicated if the check box "Hide extensions for known file types." was checked on the PC folder option setting.

Remove the check from the check box and mouse-click "OK" as following picture.

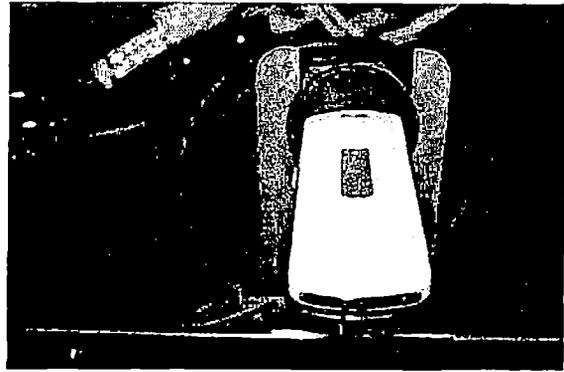
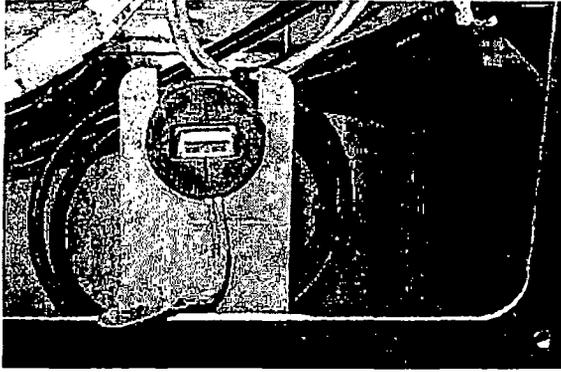


(2) Press the **TENSION CONTROL OFF** to turn OFF → press the **S-ON** Key to turn OFF the servo of the reel L and R.

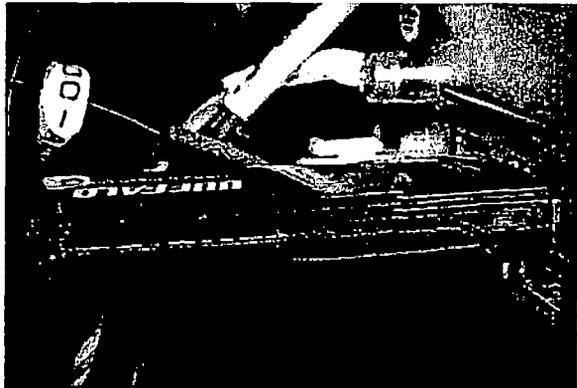


(3) Install the USB Memory to the internal USB Connector.

1: USB Adaptor installed (WSD-K2)



2: USB Adaptor non-installed (WSD-1A)



### Caution

Be sure to perform after confirming following cautions.

**Caution 1**  
**IMPORTANT**

Be sure that the power source never be turned off during performance.  
If the power source is turned off, all internal data will be cleared and the unit will not be in active.

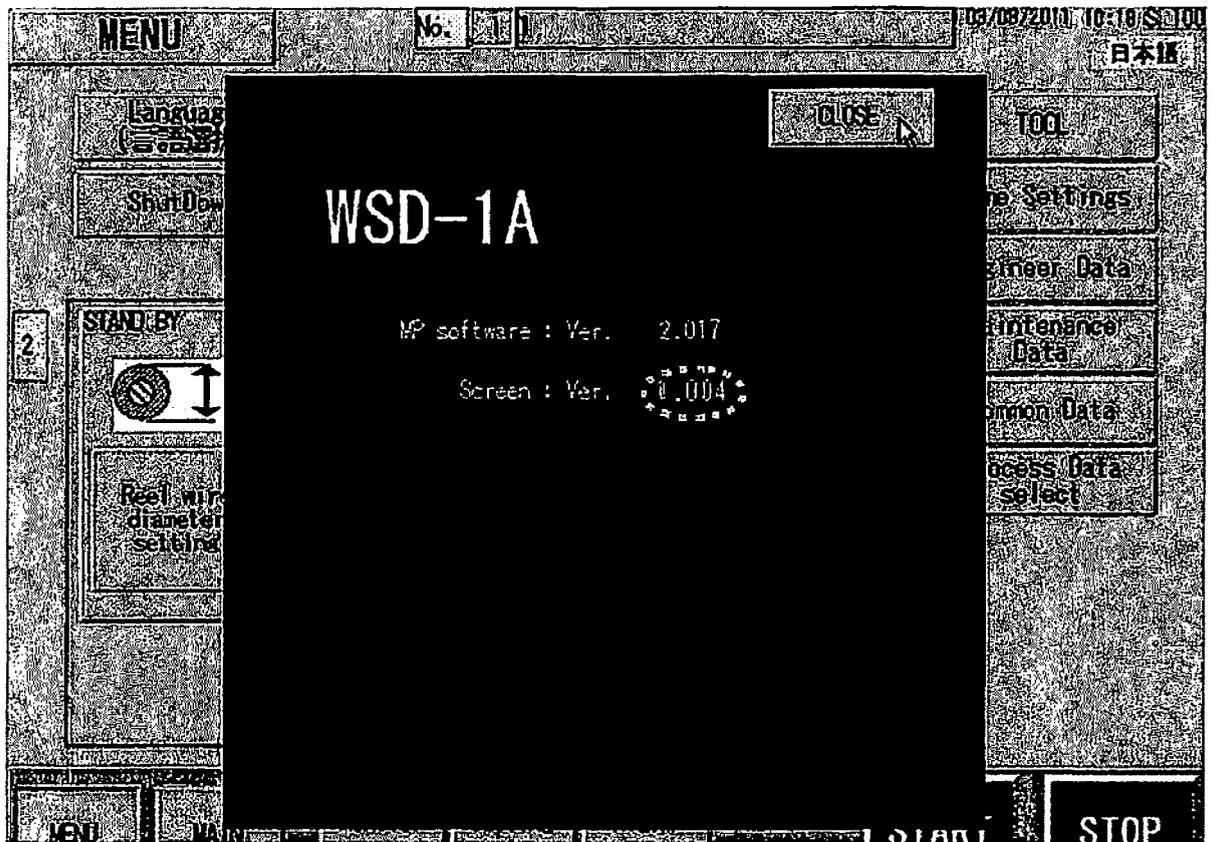
## 2. Procedures

(1) Open the Menu → Version and confirm the current version.

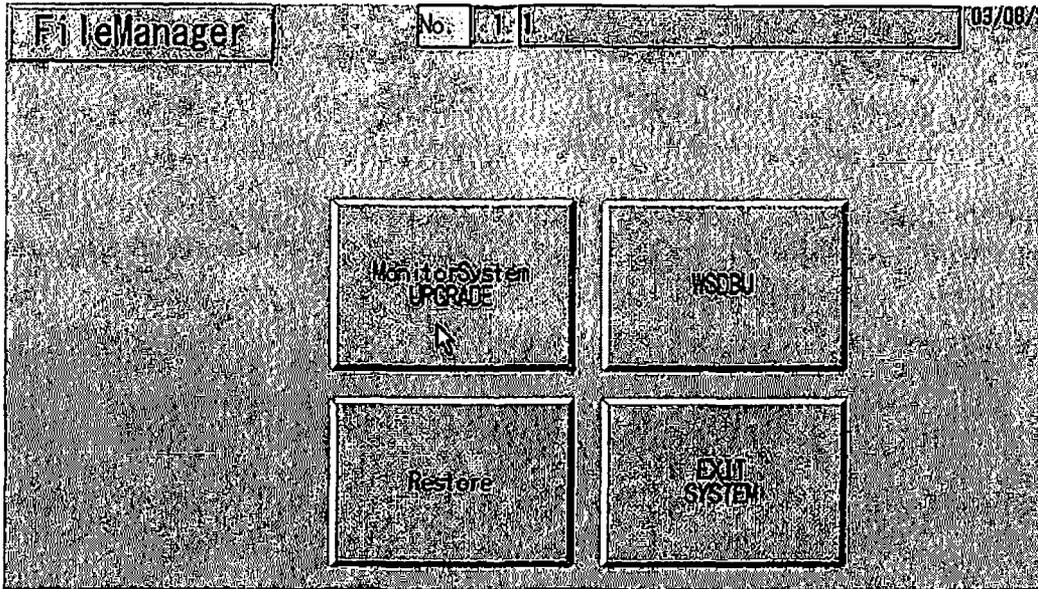
|                         |
|-------------------------|
| Screen :Ver,.....□. □□□ |
|-------------------------|

The version of the example shown in the following picture is 1.004.  
Explain how to upgrade the version from 1.004 to 1.008 from here as example.

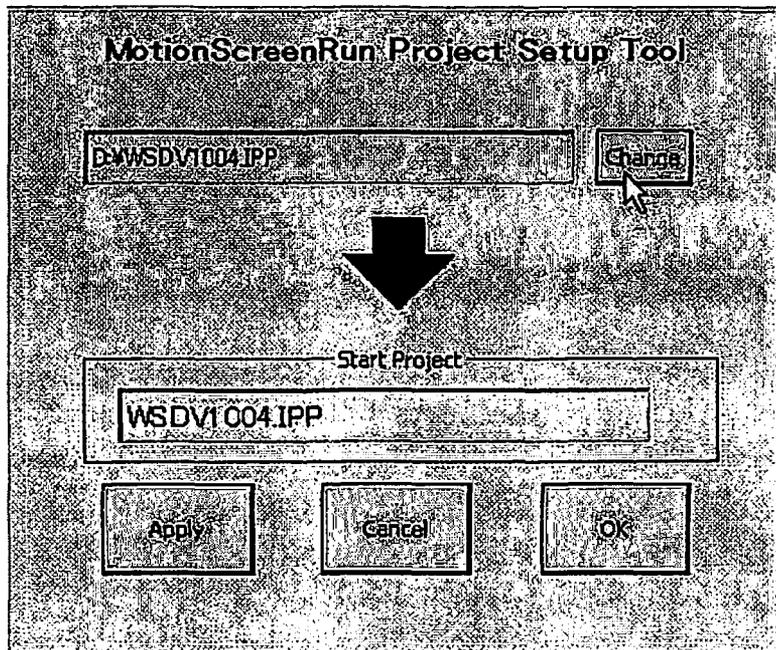
Close the screen by the **CLOSE** key after confirmation.



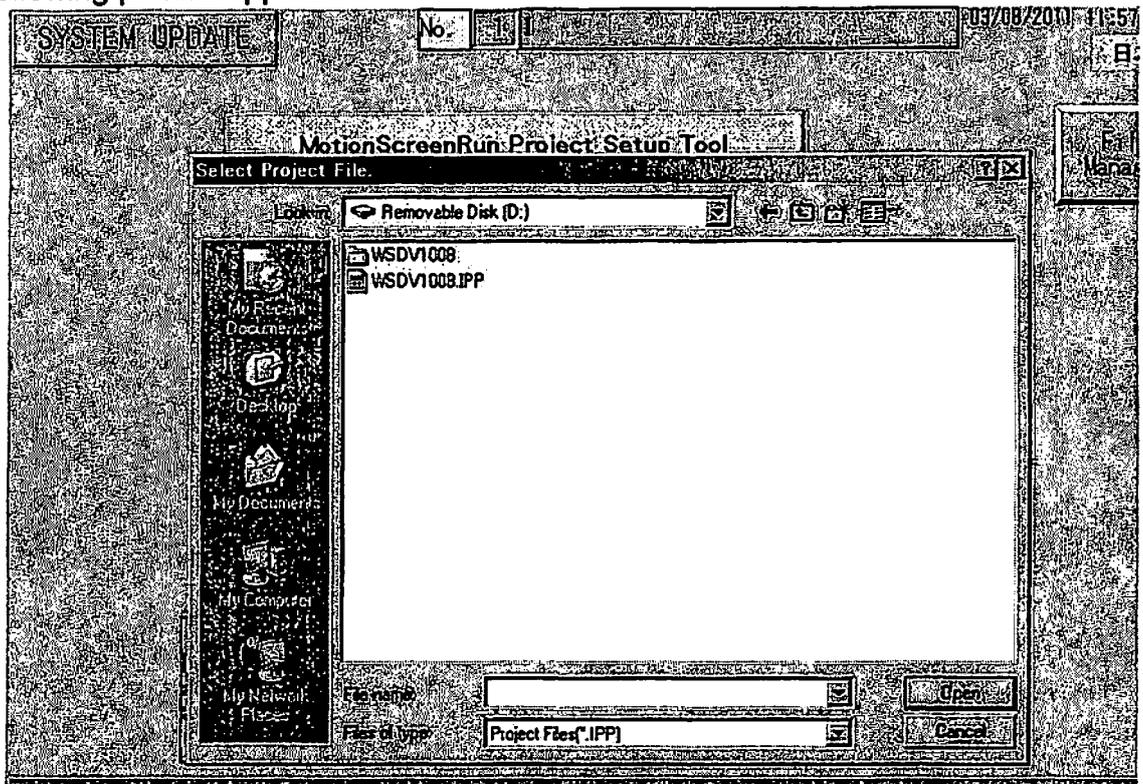
(2) Open the Menu → File Manager, and then press the **Monitor System UPGRADE** screen button.  
(Touch Panel Software Version Upgrade)



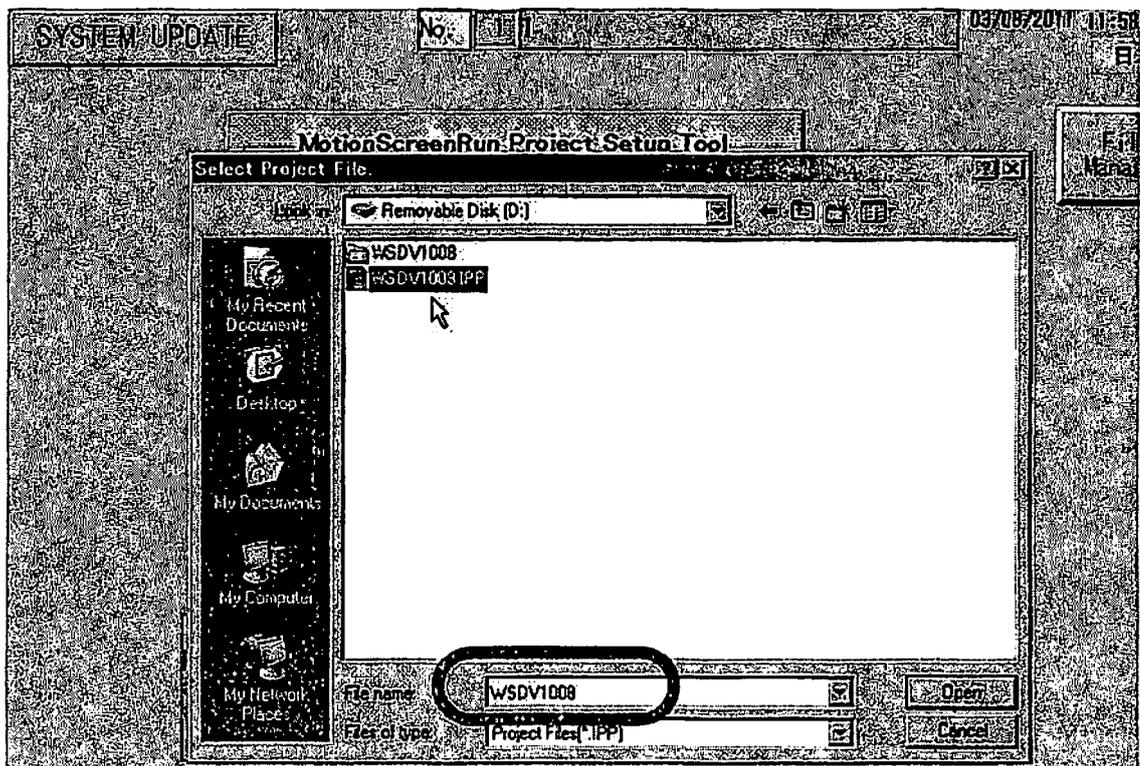
(3) The confirmation screen shown in following picture appears. Confirm the version change file exists in the USB Memory installed to the unit.  
If the USB Memory is not installed to the unit, install the USB Memory referring on page 1-5.



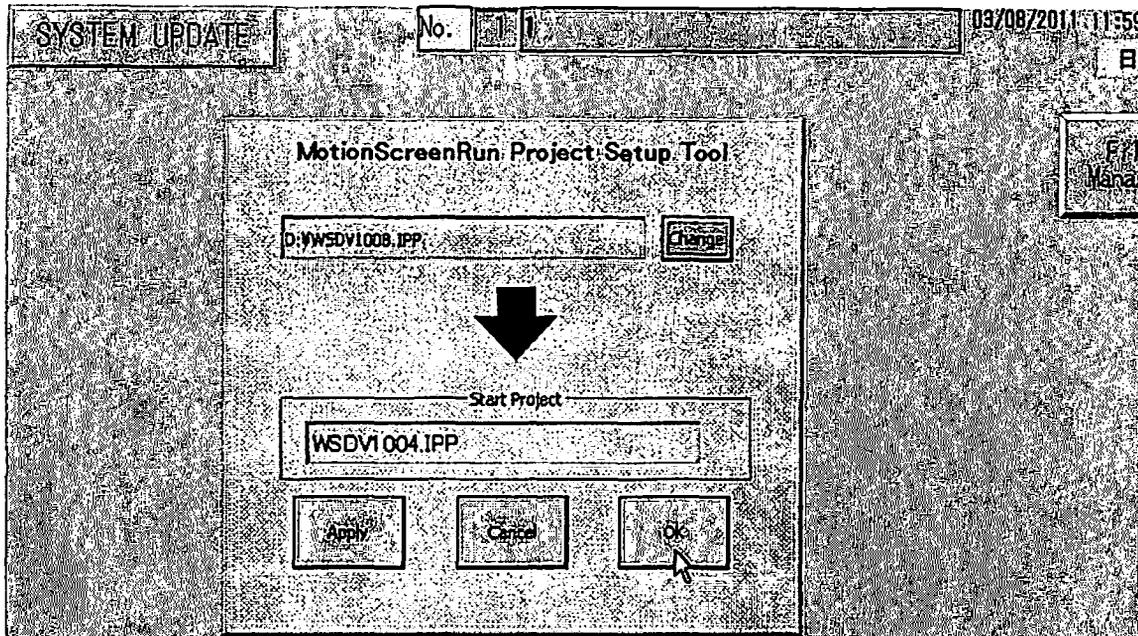
(4) When pressing the **Change** key, the data saved into the USB Memory shown in following picture appears.



(5) Touch the desired file and confirm the file name is shown in the "File name:" text box.

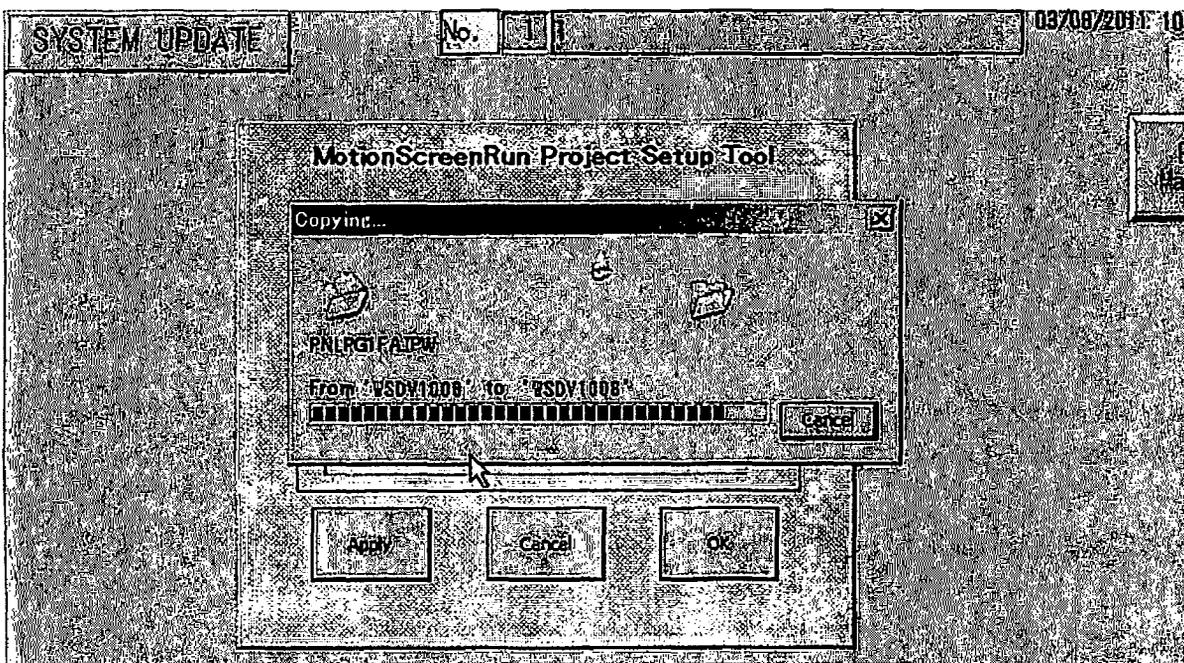


(6) Press the **Open** key after confirming the desired file.

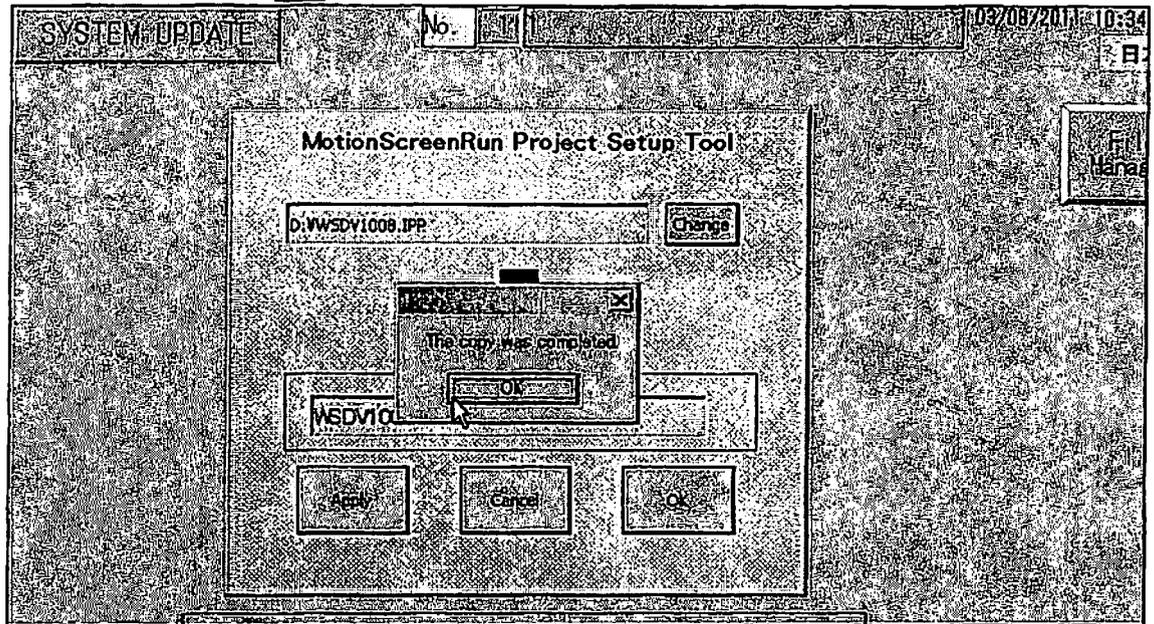


**Caution: Press each key at only one time firmly from next operation. If pressing more than one time, the operation will be cleared and the function will not move correctly.**

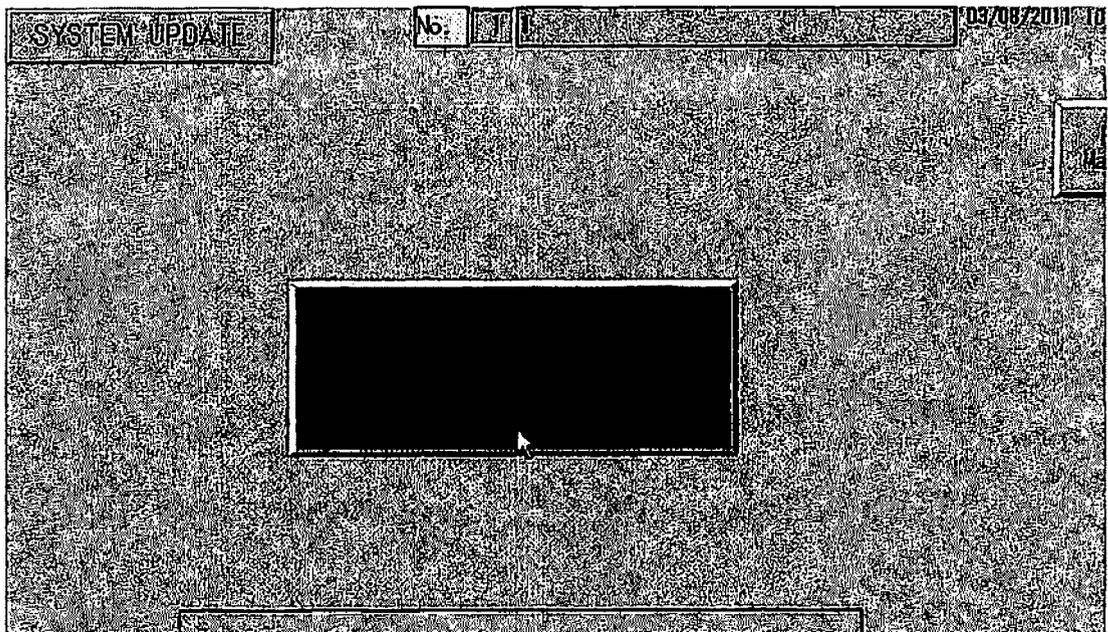
(7) Confirm the desired file has been selected, and then press the **OK** key to start copying the data after changing the screen shown in following picture.



(8) When the transferring the data, the message "The copy was completed." will appear. Press the **OK** key to move to next.

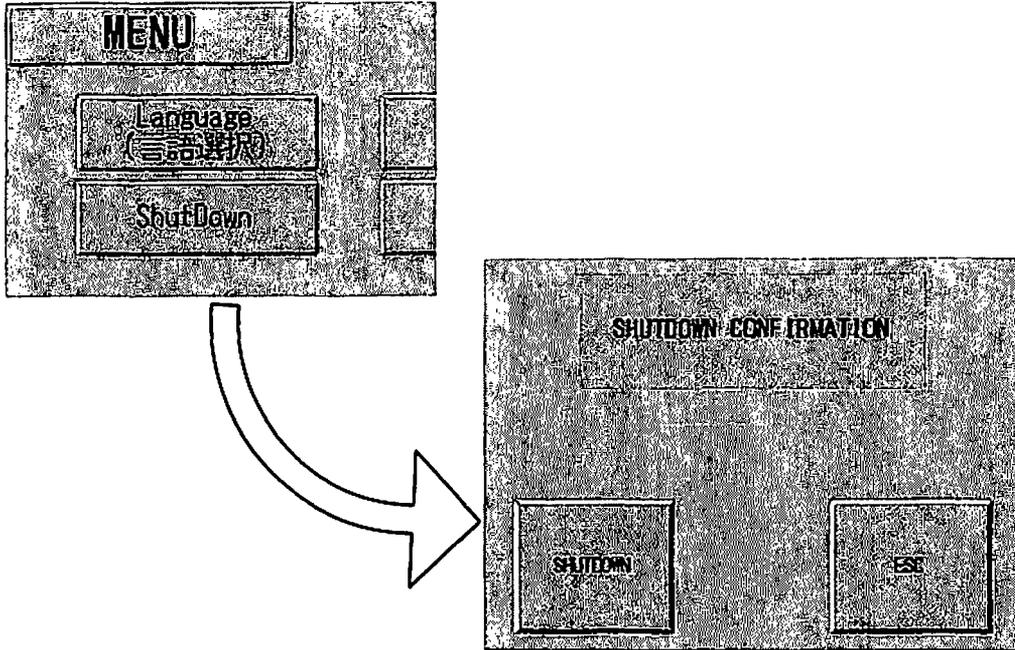


(9) The following screen will appear after pressing the **OK** key.



(10) Return to Menu screen and turn off power once.

Turn off the breaker after Touch panel screen disappears.

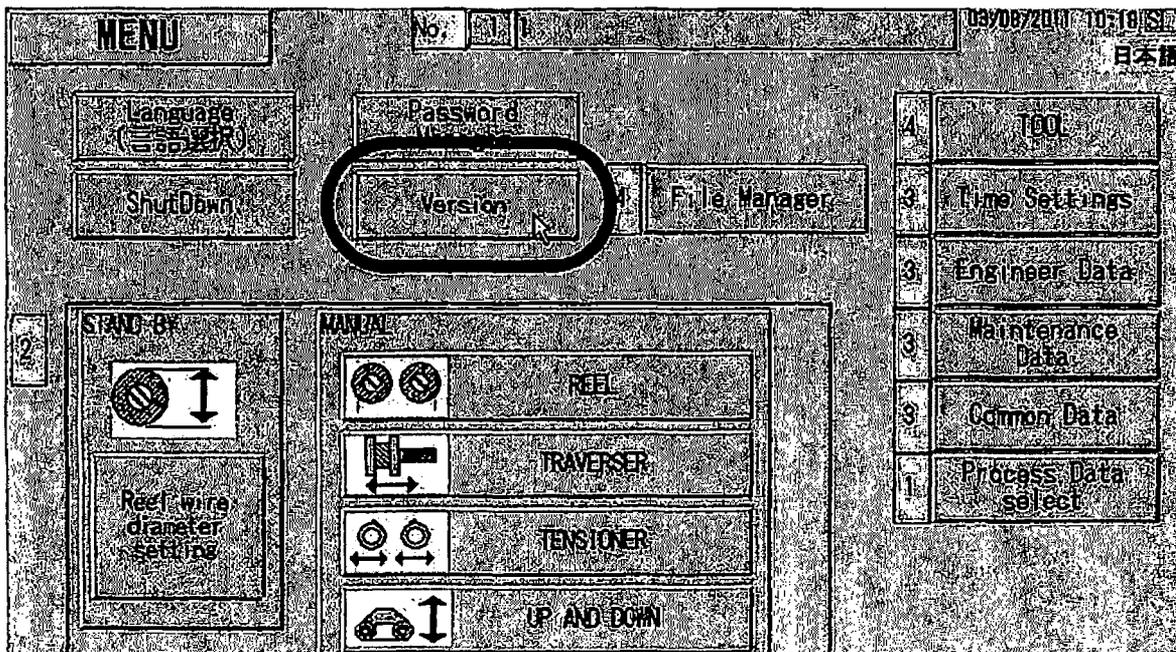


(11) The transfer operation will be completed after the unit power is turned OFF.

Disconnect the USB Memory.

Turn the power ON after 10 seconds.

When the screen is activated, open Menu → Version to confirm the current version.

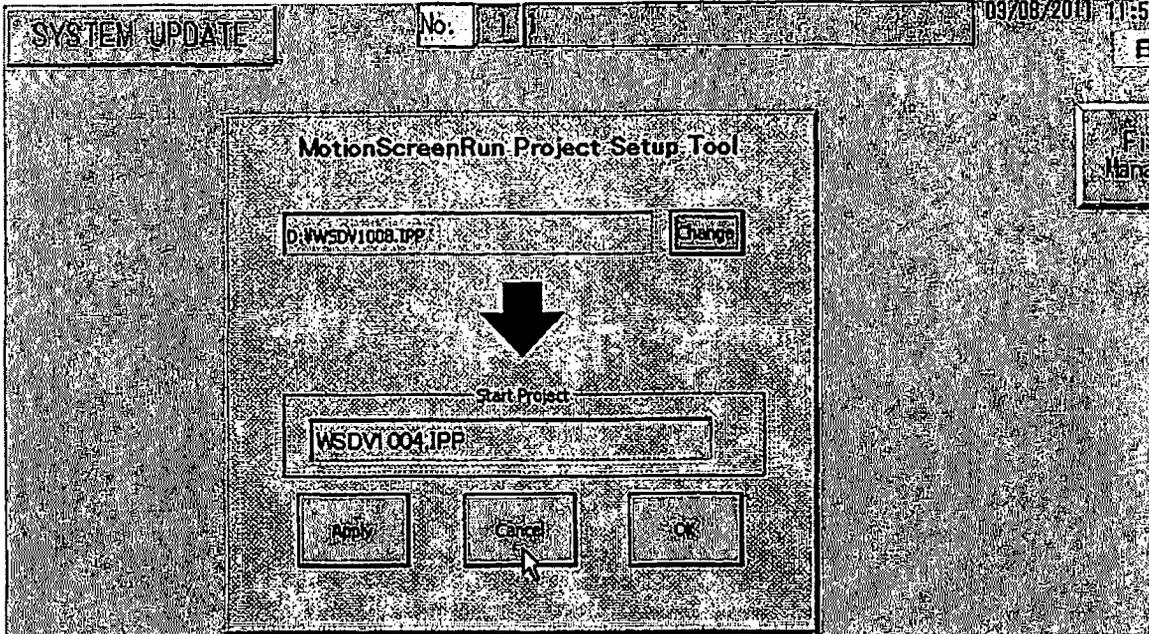


(12) Confirm that the version has been changed to 1.008 on the screen.

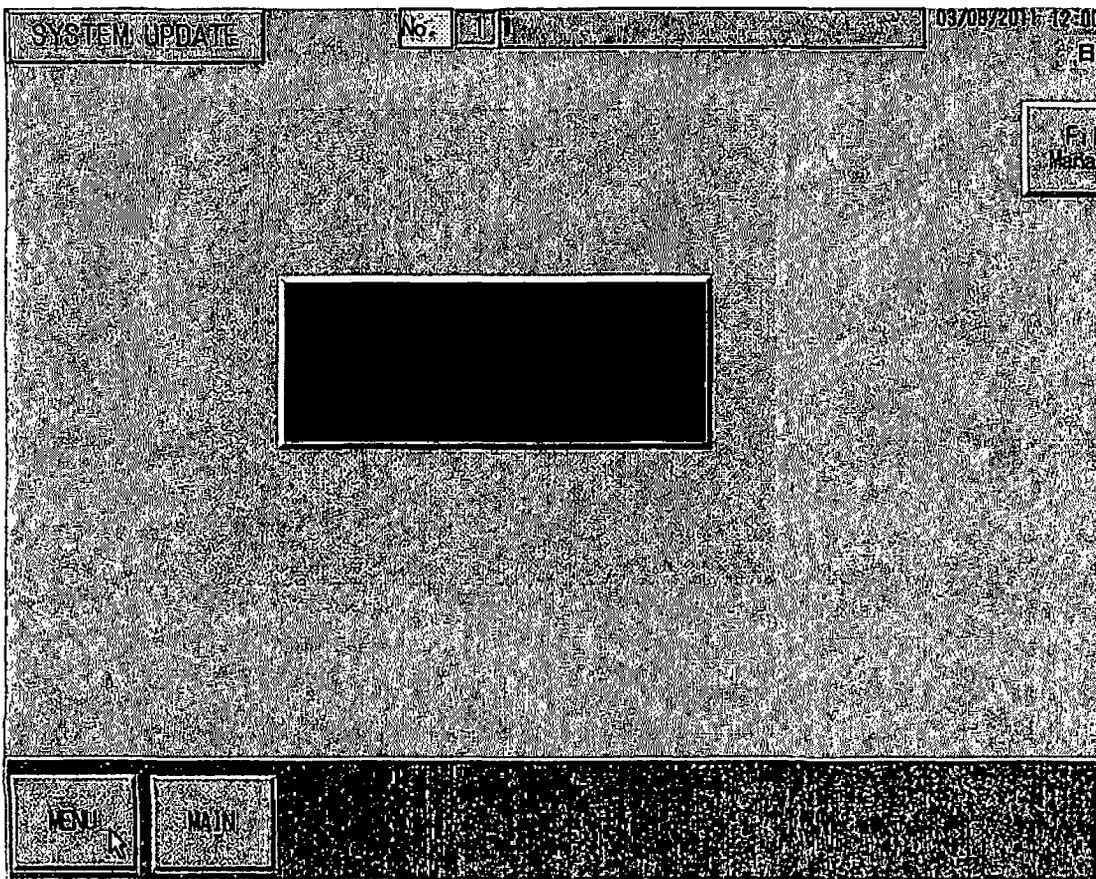


### 3.Cancel

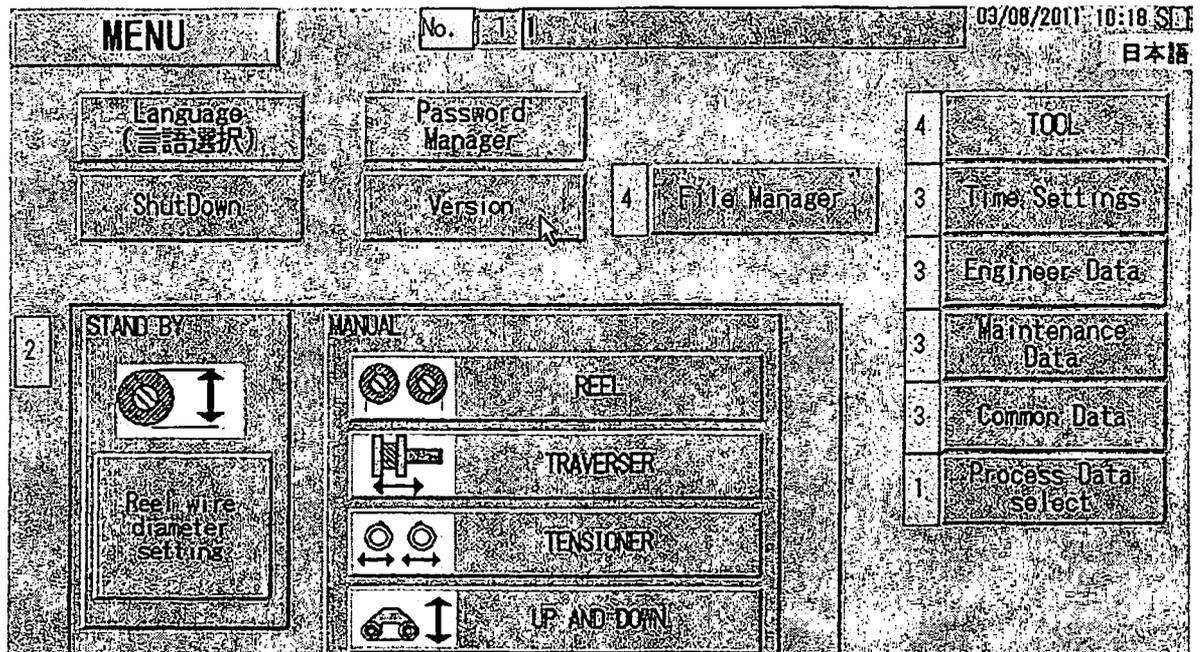
(1) If the version upgrade has to be canceled, press the **Cancel** key.



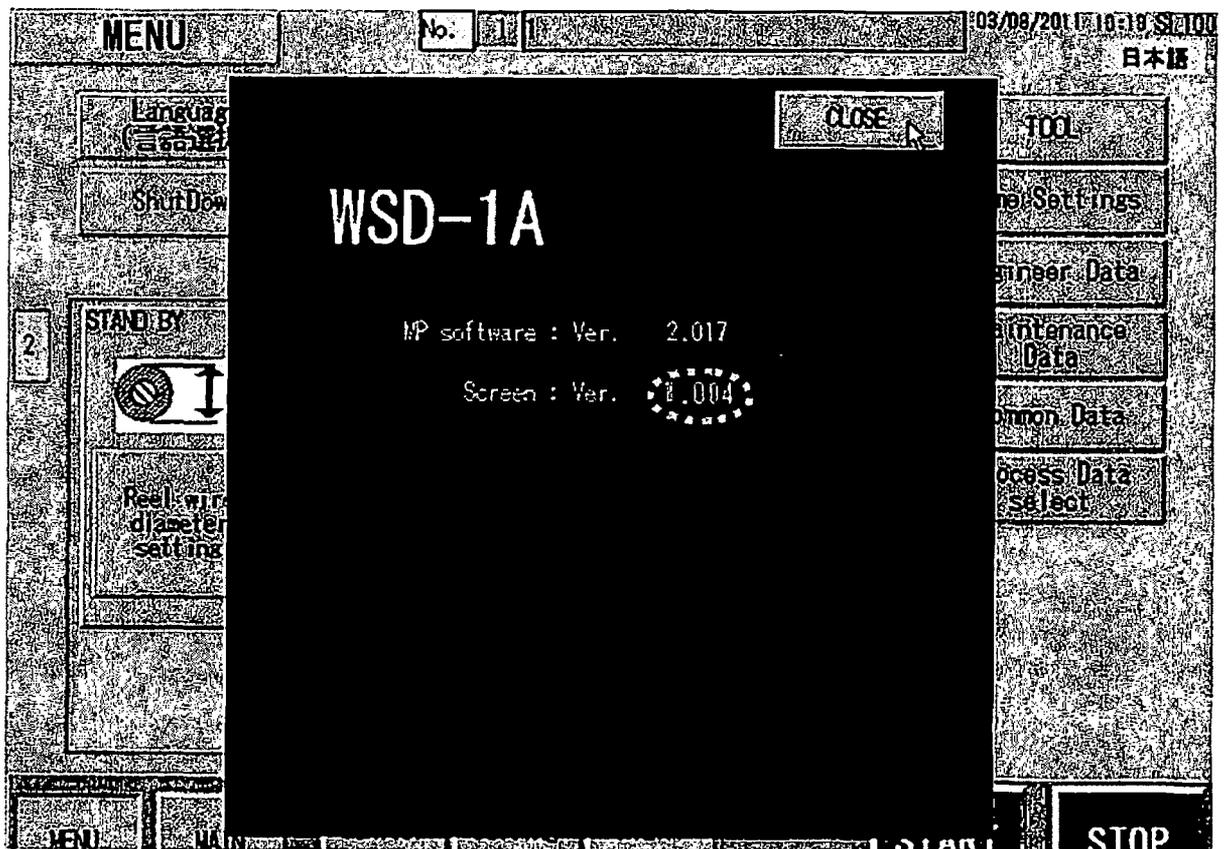
(2) Press the **Menu** key to return to the menu screen.



(3) Press the **Version** key to confirm that the graphic data is not updated.



(4) Confirm that the version is 1.004.



This completes the cancel operation.

## 6.3 Drive Alarms, Faults, and Errors

### ◆ Types of Alarms, Faults, and Errors

Check the LED operator for information about possible faults if the drive or motor fails to operate. *Refer to Using the Digital LED Operator on page 70.*

If problems occur that are not covered in this manual, contact the nearest Yaskawa representative with the following information:

- Drive model
- Software version
- Date of purchase
- Description of the problem

Table 6.4 contains descriptions of the various types of alarms, faults, and errors that may occur while operating the drive. Contact Yaskawa in the event of drive failure.

Table 6.4 Types of Alarms, Faults, and Errors

| Type                           | Drive Responses to Alarms, Faults, and Errors  |
|--------------------------------|--|
| <b>Faults</b>                  | <p>When the drive detects a fault:</p> <ul style="list-style-type: none"> <li>• The digital operator displays text that indicates the specific fault and the ALM indicator LED remains lit until the fault is reset.</li> <li>• The fault interrupts drive output and the motor coasts to a stop.</li> <li>• Depending on the setting, the drive and motor may stop via different methods than listed.</li> <li>• If a digital output is programmed for fault output (H2-□□ = E), it will close if a fault occurs.</li> </ul> <p>When the drive detects a fault, it will remain inoperable until that fault has been reset. <i>Refer to Fault Reset Methods on page 254.</i></p> |
| <b>Minor Faults and Alarms</b> | <p>When the drive detects an alarm or a minor fault:</p> <ul style="list-style-type: none"> <li>• The digital operator displays text that indicates the specific alarm or minor fault and the ALM indicator LED flashes.</li> <li>• The motor does not stop.</li> <li>• One of the multi-function contact outputs closes if set to be tripped by a minor fault (H2-□□ = 10), but not by an alarm.</li> <li>• The digital operator displays text indicating a specific alarm and ALM indicator LED flashes.</li> </ul> <p>Remove the cause of an alarm or minor fault to automatically reset.</p>   |
| <b>Operation Errors</b>        | <p>When parameter settings conflict with one another or do not match hardware settings (such as with an option card), it results in an operation error.</p> <p>When the drive detects an operation error:</p> <ul style="list-style-type: none"> <li>• The digital operator displays text that indicates the specific error.</li> <li>• Multi-function contact outputs do not operate.</li> </ul> <p>When the drive detects an operation error, it will not operate the motor until the error has been reset. Correct the settings that caused the operation error to reset.</p>   |
| <b>Tuning Errors</b>           | <p>Tuning errors occur while performing Auto-Tuning.</p> <p>When the drive detects a tuning error:</p> <ul style="list-style-type: none"> <li>• The digital operator displays text indicating the specific error.</li> <li>• Multi-function contact outputs do not operate.</li> <li>• Motor coasts to stop.</li> <li>• Remove the cause of the error and repeat the Auto-Tuning process.</li> </ul>   |

### ◆ Alarm and Error Displays

#### ■ Faults

When the drive detects a fault, the ALM indicator LEDs remain lit without flashing. If the LEDs flash, the drive has detected a minor fault or alarm. *Refer to Minor Faults and Alarms on page 230* for more information. Conditions such as overvoltage or external faults can trip both faults and minor faults, therefore it is important to note whether the LEDs remain lit or if the LEDs flash.

Table 6.5 Fault Displays

| LED Operator Display | Name  | Page | LED Operator Display | Name                               | Page |
|----------------------|---|------|----------------------|------------------------------------|------|
| bUS                  | bUS Option Communication Error  | 232  | CPF08                | EEPROM Serial Communications Fault | 233  |
| CE                   | MEMOBUS/Modbus Communication Error  | 232  | CPF11                | RAM Fault                          | 233  |
| CF                   | Control Fault   | 232  | CPF12                | FLASH Memory Fault                 | 233  |
| CoF                  | Current Offset Fault  | 232  | CPF13                | Watchdog Circuit Exception         | 233  |
| CPF02                | A/D Conversion Error  | 232  | CPF14                | Control Circuit Fault              | 233  |
| CPF03                | PWM Data Fault  | 233  | CPF15                | Clock Fault                        | 233  |
| CPF06                | Drive specification mismatch during Terminal Board or Control Board replacement | 233  | CPF17                | Timing Fault                       | 233  |
| CPF07                | Terminal Board Communication Fault  | 233  | CPF18                | Control Circuit Fault              | 233  |
|                      |   |      | CPF19                | Control Circuit Fault              | 233  |

## 6.3 Drive Alarms, Faults, and Errors

### ◆ Types of Alarms, Faults, and Errors

Check the LED operator for information about possible faults if the drive or motor fails to operate. Refer to *Using the Digital LED Operator* on page 70.

If problems occur that are not covered in this manual, contact the nearest Yaskawa representative with the following information:

- Drive model
- Software version
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Table 6.4 contains descriptions of the various types of alarms, faults, and errors that may occur while operating the drive. Contact Yaskawa in the event of drive failure.

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| <b>Faults</b>                  | When the drive detects a fault: <ul style="list-style-type: none"> <li>• The digital operator displays text that indicates the specific fault and the ALM indicator LED remains lit until the fault is reset.</li> <li>• The fault interrupts drive output and the motor coasts to a stop.</li> <li>• Depending on the setting, the drive and motor may stop via different methods than listed.</li> <li>• If a digital output is programmed for fault output (H2-□□ = E), it will close if a fault occurs.</li> </ul> When the drive detects a fault, it will remain inoperable until that fault has been reset. Refer to <i>Fault Reset Methods</i> on page 254. |
| <b>Minor Faults and Alarms</b> | When the drive detects an alarm or a minor fault: <ul style="list-style-type: none"> <li>• The digital operator displays text that indicates the specific alarm or minor fault and the ALM indicator LED flashes.</li> <li>• The motor does not stop.</li> <li>• One of the multi-function contact outputs closes if set to be tripped by a minor fault (H2-□□ = 10), but not by an alarm.</li> <li>• The digital operator displays text indicating a specific alarm and ALM indicator LED flashes.</li> </ul> Remove the cause of an alarm or minor fault to automatically reset.   |
| <b>Operation Errors</b>        | When parameter settings conflict with one another or do not match hardware settings (such as with an option card), it results in an operation error.<br>When the drive detects an operation error: <ul style="list-style-type: none"> <li>• The digital operator displays text that indicates the specific error.</li> <li>• Multi-function contact outputs do not operate.</li> </ul> When the drive detects an operation error, it will not operate the motor until the error has been reset. Correct the settings that caused the operation error to reset.   |
| <b>Tuning Errors</b>           | Tuning errors occur while performing Auto-Tuning.<br>When the drive detects a tuning error: <ul style="list-style-type: none"> <li>• The digital operator displays text indicating the specific error.</li> <li>• Multi-function contact outputs do not operate.</li> <li>• Motor coasts to stop.</li> <li>• Remove the cause of the error and repeat the Auto-Tuning process.</li> </ul>  |

### ◆ Alarm and Error Displays

#### ■ Faults

When the drive detects a fault, the ALM indicator LEDs remain lit without flashing. If the LEDs flash, the drive has detected a minor fault or alarm. Refer to *Minor Faults and Alarms* on page 230 for more information. Conditions such as overvoltage or external faults can trip both faults and minor faults, therefore it is important to note whether the LEDs remain lit or if the LEDs flash.

Table 6.5 Fault Displays

| LED Operator Display | Name  | Page | LED Operator Display | Name                               | Page |
|----------------------|---|------|----------------------|------------------------------------|------|
| bUS                  | Option Communication Error  | 232  | CPF08                | EEPROM Serial Communications Fault | 233  |
| CE                   | MEMOBUS/Modbus Communication Error  | 232  | CPF11                | RAM Fault                          | 233  |
| CF                   | Control Fault   | 232  | CPF12                | FLASH Memory Fault                 | 233  |
| CoF                  | Current Offset Fault  | 232  | CPF13                | Watchdog Circuit Exception         | 233  |
| CPF02                | A/D Conversion Error  | 232  | CPF14                | Control Circuit Fault              | 233  |
| CPF03                | PWM Data Fault  | 233  | CPF15                | Clock Fault                        | 233  |
| CPF06                | Drive specification mismatch during Terminal Board or Control Board replacement | 233  | CPF17                | Timing Fault                       | 233  |
| CPF07                | Terminal Board Communication Fault  | 233  | CPF18                | Control Circuit Fault              | 233  |
|                      |   |      | CPF19                | Control Circuit Fault              | 233  |

### 6.3 Drive Alarms, Faults, and Errors

| LED/Operator Display | Name                       | Page   |     |
|----------------------|----------------------------|--|-----|
| CPF20 or CPF21       | RAM Fault                  | 234  |     |
|                      | FLASH Memory Fault         | 234  |     |
|                      | Watchdog Circuit Exception | 234  |     |
|                      | Clock Fault                | 234  |     |
| CPF22                | CPF22                      | A/D Conversion Error                               | 234 |
| CPF23                | CPF23                      | PWM Feedback Data Fault                            | 234 |
| CPF24                | CPF24                      | Drive Capacity Signal Fault                        | 234 |
| dEv                  | dEv                        | Excessive Speed Deviation (for Simple V/f with PG) | 234 |
| dWAL                 | dWAL                       | DriveWorksEZ Program Error Output                  | 234 |
| dWFL                 | dWFL                       | DriveWorksEZ Fault                                 | 234 |
| EF0                  | EF0                        | Option Card External Fault                         | 244 |
| EF1 to EF7           | EF1 to EF7                 | External Fault (input terminal S1 to S7)           | 234 |
| FbH                  | FbH                        | Excessive PID Feedback                             | 235 |
| FbL                  | FbL                        | PID Feedback Loss                                  | 235 |
| GF                   | GF                         | Ground Fault                                       | 235 |
| LF                   | LF                         | Output Phase Loss                                  | 235 |
| LF2                  | LF2                        | Current Imbalance                                  | 235 |
| oC                   | oC                         | Overcurrent  | 236 |
| oFA00                | oFA00                      | Option Card Fault (port A)                         | 236 |
| oFA01                | oFA01                      | Option Unit Fault                                  | 236 |
| oFA03                | oFA03                      | Option Card Fault (Port A)                         | 236 |
| oFA04                | oFA04                      | Option Card Fault (Port A)                         | 236 |
| oFA30 to oFA43       | oFA30 to oFA43             | Option Card Fault (Port A)                         | 236 |
| oH                   | oH                         | Heatsink Overheat                                  | 237 |

| LED/Operator Display | Name | Page                                   |     |
|----------------------|------|--|-----|
| oH1                  | oH1  | Heatsink Overheat                      | 237 |
| oH3                  | oH3  | Motor Overheat 1 (PTC input)           | 237 |
| oH4                  | oH4  | Motor Overheat 2 (PTC input)           | 237 |
| oL1                  | oL1  | Motor Overload                         | 237 |
| oL2                  | oL2  | Drive Overload                         | 238 |
| oL3                  | oL3  | Overtorque Detection 1                 | 238 |
| oL4                  | oL4  | Overtorque Detection 2                 | 238 |
| oL5                  | oL5  | Mechanical Weakening Detection 1       | 238 |
| oL7                  | oL7  | High Slip Braking oL                   | 239 |
| oPr                  | oPr  | Operator Connection Fault              | 239 |
| oS                   | oS   | Overspeed (for Simple V/f with PG)     | 239 |
| ov                   | ov   | Overvoltage                            | 239 |
| PF                   | PF   | Input Phase Loss                       | 240 |
| PGo                  | PGo  | PG Disconnect (for Simple V/f with PG) | 240 |
| rH                   | rH   | Dynamic Braking Resistor               | 240 |
| rr                   | rr   | Dynamic Braking Transistor             | 240 |
| SEr                  | SEr  | Too Many Speed Search Restarts         | 240 |
| STO                  | STO  | Pull-Out Detection                     | 241 |
| UL3                  | UL3  | Undertorque Detection 1                | 241 |
| UL4                  | UL4  | Undertorque Detection 2                | 241 |
| UL5                  | UL5  | Mechanical Weakening Detection 2       | 241 |
| Uv1                  | Uv1  | Undervoltage                           | 241 |
| Uv2                  | Uv2  | Control Power Supply Undervoltage      | 241 |
| Uv3                  | Uv3  | Soft Charge Circuit Fault              | 242 |

<1> Displayed as CPF20 when occurring at drive power up. When one of the faults occurs after successfully starting the drive, the display will show CPF21.

#### ■ Minor Faults and Alarms

When a minor fault or alarm occurs, the ALM LED flashes and the text display shows an alarm code. A fault has occurred if the text remains lit and does not flash. Refer to Alarm Detection on page 243. An overvoltage situation, for example, can trigger both faults and minor faults. It is therefore important to note whether the LEDs remain lit or if the LEDs flash.

Table 6.6 Minor Fault and Alarm Displays

| LED/Operator Display | Name       | Minor Fault Output (H2-□□=10)                      | Page      |     |
|----------------------|------------|--|-----------|-----|
| bb                   | bb         | Drive Baseblock                                    | No output | 243 |
| bUS                  | bUS        | Option Card Communications Error                   | YES       | 243 |
| CALL                 | CALL       | Serial Communication Transmission Error            | YES       | 243 |
| CE                   | CE         | MEMOBUS/Modbus Communication Error                 | YES       | 243 |
| CrST                 | CrST       | Can Not Reset                                      | YES       | 243 |
| dEv                  | dEv        | Excessive Speed Deviation (for Simple V/f with PG) | YES       | 244 |
| dnE                  | dnE        | Drive Disabled                                     | YES       | 244 |
| dWAL                 | dWAL       | DriveWorksEZ Alarm                                 | YES       | 234 |
| EF                   | EF         | Run Command Input Error                            | YES       | 244 |
| EF1 to EF7           | EF1 to EF7 | External Fault (input terminal S1 to S7)           | YES       | 244 |
| FbH                  | FbH        | Excessive PID Feedback                             | YES       | 245 |
| FbL                  | FbL        | PID Feedback Loss                                  | YES       | 245 |
| Hbb                  | Hbb        | Safe Disable Signal Input                          | YES       | 245 |
| HbbF                 | HbbF       | Safe Disable Signal Input                          | YES       | 245 |
| HCA                  | HCA        | Current Alarm                                      | YES       | 245 |
| oH                   | oH         | Heatsink Overheat                                  | YES       | 246 |
| oH2                  | oH2        | Drive Overheat                                     | YES       | 246 |
| oH3                  | oH3        | Motor Overheat                                     | YES       | 246 |
| oL3                  | oL3        | Overtorque 1                                       | YES       | 246 |
| oL4                  | oL4        | Overtorque 2                                       | YES       | 246 |
| oL5                  | oL5        | Mechanical Weakening Detection 1                   | YES       | 246 |
| oS                   | oS         | Overspeed (for Simple V/f with PG)                 | YES       | 247 |
| ov                   | ov         | Overvoltage  | YES       | 247 |

| LED Operator Display |      | Name                                     | Minor Fault Output (H2-□□ = 10) | Page |
|----------------------|------|--|---------------------------------|------|
| PASS                 | PASS | MEMOBUS/Modbus Test Mode Complete        | No output                       | 247  |
| PGo                  | PGo  | PG Disconnect (for Simple V/f with PG)   | YES                             | 247  |
| rUn                  | rUn  | During Run 2, Motor Switch Command Input | YES                             | 247  |
| SE                   | SE   | MEMOBUS/Modbus Test Mode Fault           | YES                             | 247  |
| UL3                  | UL3  | Undertorque 1                            | YES                             | 247  |
| UL4                  | UL4  | Undertorque 2                            | YES                             | 248  |
| UL5                  | UL5  | Mechanical Weakening Detection 2         | YES                             | 241  |
| Uv                   | Uv   | Undervoltage                             | YES                             | 248  |

## ■ Operation Errors

Table 6.7 Operation Error Displays

| LED Operator Display |       |   | LED Operator Display |       |       |                                     |     |
|----------------------|-------|---|----------------------|-------|-------|-------------------------------------|-----|
| LED Operator Display |       | Name  | LED Operator Display |       | Name  |                                     |     |
|                      |       | Page  |                      |       | Page  |                                     |     |
| oPE01                | oPE01 | Drive Unit Setting Error                    | 249                  | oPE08 | oPE08 | Parameter Selection Error           | 250 |
| oPE02                | oPE02 | Parameter Setting Range Error               | 249                  | oPE09 | oPE09 | PID Control Selection Error         | 250 |
| oPE03                | oPE03 | Multi-Function Input Setting Error          | 249                  | oPE10 | oPE10 | V/f Data Setting Error              | 251 |
| oPE04                | oPE04 | Terminal Board Mismatch Error               | 250                  | oPE11 | oPE11 | Carrier Frequency Setting Error     | 251 |
| oPE05                | oPE05 | Run Command Selection Error                 | 250                  | oPE13 | oPE13 | Pulse Train Monitor Selection Error | 251 |
| oPE07                | oPE07 | Multi-Function Analog Input Selection Error | 250                  |       |       |                                     |     |

## ■ Auto-Tuning Errors

Table 6.8 Auto-Tuning Error Displays

| LED Operator Display |       |  | LED Operator Display |       |       |                               |     |
|----------------------|-------|--|----------------------|-------|-------|-------------------------------|-----|
| LED Operator Display |       | Name   | LED Operator Display |       | Name  |                               |     |
|                      |       | Page   |                      |       | Page  |                               |     |
| End1                 | End1  | Excessive V/f Setting                        | 252                  | Er-04 | Er-04 | Line-to-Line Resistance Error | 252 |
| End2                 | End2  | Motor Iron Core Saturation Coefficient Error | 252                  | Er-05 | Er-05 | No-Load Current Error         | 253 |
| End3                 | End3  | Rated Current Setting Alarm                  | 252                  | Er-08 | Er-08 | Rated Slip Error              | 253 |
| Er-01                | Er-01 | Motor Data Error                             | 252                  | Er-09 | Er-09 | Acceleration Error            | 253 |
| Er-02                | Er-02 | Alarm  | 252                  | Er-11 | Er-11 | Motor Speed Error             | 253 |
| Er-03                | Er-03 | STOP button Input                            | 252                  | Er-12 | Er-12 | Current Detection Error       | 253 |

**6.4 Fault Detection**

◆ **Fault Displays, Causes, and Possible Solutions**

**Table 6.9 Detailed Fault Displays, Causes, and Possible Solutions**

| LED Operator Display   |       | Fault Name   |
|--|-------|--|
| bUS  | bUS   | Option Communication Error   |
| Cause  |       | Possible Solution  |
| No signal received from the PLC.   |       | <ul style="list-style-type: none"> <li>• After establishing initial communication, the connection was lost.</li> <li>• Only detected when the run command frequency reference is assigned to an option card.</li> </ul>  |
| The communication cable is faulty or a short circuit exists.   |       | <ul style="list-style-type: none"> <li>• Check for faulty wiring.</li> <li>• Correct the wiring.</li> <li>• Check for loose wiring and short circuits. Repair as needed.</li> </ul>  |
| A communications data error occurred due to noise.   |       | <ul style="list-style-type: none"> <li>• Check the various options available to minimize the effects of noise.</li> <li>• Counteract noise in control circuit, main circuit, and ground wiring.</li> <li>• Ensure that other equipment such as switches or relays do not cause noise and use surge suppressors if required.</li> <li>• Use cables recommended by Yaskawa or another type of shielded line. Ground the shield on the controller side or on the drive input power side.</li> <li>• Separate all wiring for communications devices from drive input power lines. Install an EMC noise filter to the input side of the drive input power.</li> </ul> |
| The option card is damaged.  |       | <ul style="list-style-type: none"> <li>• Replace the option card if there are no problems with the wiring and the error continues to occur.</li> </ul>   |
| The option card is not properly connected to the drive.  |       | <ul style="list-style-type: none"> <li>• The connector pins on the option card are not properly lined up with the connector pins on the drive.</li> <li>• Reinstall the option card.</li> </ul>  |
| LED Operator Display   |       | Fault Name   |
| EE   | CE    | MEMOBUS/Modbus Communication Error   |
| Cause  |       | Possible Solution  |
| Faulty communications wiring, or a short circuit exists.   |       | <ul style="list-style-type: none"> <li>• Check for faulty wiring.</li> <li>• Correct the wiring.</li> <li>• Check for loose wiring and short circuits. Repair as needed.</li> </ul>  |
| A communications data error occurred due to noise.   |       | <ul style="list-style-type: none"> <li>• Check the various options available to minimize the effects of noise.</li> <li>• Counteract noise in control circuit, main circuit, and ground wiring.</li> <li>• Use Yaskawa-recommended cables, or another type of shielded line. Ground the shield on the controller side or on the drive input power side.</li> <li>• Ensure that other equipment such as switches or relays do not cause noise and use surge suppressors if required.</li> <li>• Separate all wiring for communications devices from drive input power lines. Install an EMC noise filter to the input side of the drive input power.</li> </ul>   |
| LED Operator Display   |       | Fault Name   |
| EF   | CF    | Control Fault  |
| Cause  |       | Possible Solution  |
| Motor parameters are not set properly.   |       | Check the motor parameter settings and repeat Auto-Tuning.   |
| Torque limit is too low.   |       | Set the torque limit to the most appropriate setting (L7-01 through L7-04).  |
| Load inertia is too big.   |       | <ul style="list-style-type: none"> <li>• Adjust the deceleration time (C1-02, -04, -06, -08).</li> <li>• Set the frequency to the minimum value and interrupt the run command when the drive finishes decelerating.</li> </ul>   |
| LED Operator Display   |       | Fault Name   |
| CoF  | CoF   | Current Offset Fault   |
| Cause  |       | Possible Solution  |
| While the drive automatically adjusted the current offset, the calculated value exceeded the allowable setting range. This problem may occur when attempting to restart a coasting PM motor. |       | Enable Speed Search at start (b3-01 = 1). Use the multi-function terminals to execute External Speed Search 1 and 2 (H1-□□ = 61 or 62).<br>Note: When using a PM motor, both External Speed Search 1 and 2 perform the same operation.   |
| LED Operator Display   |       | Fault Name   |
| CPF02  | CPF02 | A/D Conversion Error   |
| Cause  |       | Possible Solution  |
| Control circuit is damaged.  |       | Cycle power to the drive. If the problem continues, replace the drive.   |
| Control circuit terminals have shorted out (+V, AC).   |       | <ul style="list-style-type: none"> <li>• Check for wiring errors along the control circuit terminals.</li> <li>• Correct the wiring.</li> </ul> Check the resistance of the speed potentiometer and related wiring.  |
| Control terminal input current has exceeded allowable levels.  |       | <ul style="list-style-type: none"> <li>• Check the input current.</li> <li>• Reduce the current input to control circuit terminal (+V) to 20 mA.</li> </ul>  |

| LED Operator Display  |       | Fault Name   |
|---|-------|--|
| CPF03   | CPF03 | PWM Data Error<br>There is a problem with the PWM data.  |
| Cause   |       | Possible Solution  |
| Drive hardware is damaged.  |       | Replace the drive.   |
| LED Operator Display  |       | Fault Name   |
| CPF06   | CPF06 | EEPROM Data Error<br>There is an error in the data saved to EEPROM.  |
| Cause   |       | Possible Solution  |
| Control circuit is damaged.<br>The power supply was switched off when parameters were written (e.g., using a communications option card). |       | Cycle power to the drive. If the problem continues, replace the drive.<br>Reinitialize the drive (A1-03).      |
| LED Operator Display  |       | Fault Name   |
| CPF07   | CPF07 | Terminal Board Communications Error<br>A communication error occurred at the terminal board.                   |
| Cause   |       | Possible Solution  |
| There is a fault connection between the terminal board and control board.   |       | Turn the power off and reconnect the control circuit terminals.  |
| LED Operator Display  |       | Fault Name   |
| CPF08   | CPF08 | EEPROM Serial Communication Fault<br>EEPROM communications are not functioning properly.                       |
| Cause   |       | Possible Solution  |
| Terminal board or control board is not connected properly.  |       | Turn the power off and check the control terminal connections.   |
| LED Operator Display  |       | Fault Name   |
| CPF11   | CPF11 | RAM Fault  |
| Cause   |       | Possible Solution  |
| Hardware is damaged.  |       | Replace the drive.   |
| LED Operator Display  |       | Fault Name   |
| CPF12   | CPF12 | FLASH Memory Fault<br>Problem with the ROM (FLASH memory).   |
| Cause   |       | Possible Solution  |
| Hardware is damaged.  |       | Replace the drive.   |
| LED Operator Display  |       | Fault Name   |
| CPF13   | CPF13 | Watchdog Circuit Exception<br>Self-diagnostics problem.  |
| Cause   |       | Possible Solution  |
| Hardware is damaged.  |       | Replace the drive.   |
| LED Operator Display  |       | Fault Name   |
| CPF14   | CPF14 | Control Circuit Fault<br>CPU error (CPU operates incorrectly due to noise, etc.)                               |
| Cause   |       | Possible Solution  |
| Hardware is damaged.  |       | Replace the drive.   |
| LED Operator Display  |       | Fault Name   |
| CPF16   | CPF16 | Clock Fault<br>Standard clock error.   |
| Cause   |       | Possible Solution  |
| Hardware is damaged.  |       | Replace the drive.   |
| LED Operator Display  |       | Fault Name   |
| CPF17   | CPF17 | Timing Fault<br>A timing error occurred during an internal process.  |
| Cause   |       | Possible Solution  |
| Hardware is damaged.  |       | Replace the drive.   |
| LED Operator Display  |       | Fault Name   |
| CPF18   | CPF18 | Control Circuit Fault<br>CPU error. Non-Maskable Interrupt (An unusual interrupt was triggered by noise, etc.) |
| Cause   |       | Possible Solution  |
| Hardware is damaged.  |       | Replace the drive.   |
| LED Operator Display  |       | Fault Name   |
| CPF19   | CPF19 | Control Circuit Fault<br>CPU error (Manual reset due to noise, etc.)   |
| Cause   |       | Possible Solution  |
| Hardware is damaged.  |       | Replace the drive.   |

## 6.4 Fault Detection

| LED Operator Display  |                | Fault Name   |
|---|----------------|--|
| CPF20 or CPF21  | CPF20 or CPF21 | One of the following faults occurred: RAM fault, FLASH memory error, watchdog circuit exception, clock error<br><ul style="list-style-type: none"> <li>RAM fault.</li> <li>FLASH memory error (ROM error).</li> <li>Watchdog circuit exception (self-diagnostic error).</li> <li>Clock error.</li> </ul> |
| Cause   |                | Possible Solution  |
| Hardware is damaged.  |                | Replace the drive.   |
| LED Operator Display  |                | Fault Name   |
| CPF22   | CPF22          | A/D Conversion Fault<br>A/D conversion error.  |
| Cause   |                | Possible Solution  |
| Control circuit is damaged.   |                | <ul style="list-style-type: none"> <li>Cycle power to the drive. Refer to <i>Diagnosing and Resetting Faults</i> on page 254.</li> <li>If the problem continues, replace the drive.</li> </ul>   |
| LED Operator Display  |                | Fault Name   |
| CPF23   | CPF23          | PWM Feedback Fault<br>PWM feedback error.  |
| Cause   |                | Possible Solution  |
| Hardware is damaged.  |                | Replace the drive.   |
| LED Operator Display  |                | Fault Name   |
| CPF24   | CPF24          | Drive Capacity Signal Fault<br>Entered a capacity that does not exist. (Checked when the drive is powered up.)   |
| Cause   |                | Possible Solution  |
| Hardware is damaged.  |                | Replace the drive.   |
| LED Operator Display  |                | Fault Name   |
| dEv   | dEv            | Speed Deviation (for Simple V/f with PG)<br>According to the pulse input (RP), the speed deviation is greater than the setting in F1-10 for longer than the time set to F1-11.   |
| Cause   |                | Possible Solution  |
| Load is too heavy.  |                | Reduce the load.   |
| Acceleration and deceleration times are set too short.  |                | Increase the acceleration and deceleration times (C1-01 through C1-08).  |
| The load is locked up.  |                | Check the machine.   |
| Parameters are not set appropriately.   |                | Check the settings of parameters F1-10 and F1-11.  |
| Motor brake engaged.  |                | Ensure the motor brake releases properly.  |
| LED Operator Display  |                | Fault Name   |
| dWJFL   | dWFL           | DriveWorksEZ Fault   |
| dWJRL   | dWAL           | DriveWorksEZ Program Error Output  |
| Cause   |                | Possible Solution  |
| Fault output by DriveWorksEZ  |                | <ul style="list-style-type: none"> <li>Correct whatever caused the fault.</li> </ul>   |
| LED Operator Display  |                | Fault Name   |
| EF0   | EF0            | Option Card External Fault<br>An external fault condition is present.  |
| Cause   |                | Possible Solution  |
| An external fault was received from the PLC with other than F6-03 = 3 "alarm only" (the drive continued to run after external fault). |                | <ul style="list-style-type: none"> <li>Remove the cause of the external fault.</li> <li>Remove the external fault input from the PLC.</li> </ul>   |
| Problem with the PLC program.   |                | Check the PLC program and correct problems.  |
| LED Operator Display  |                | Fault Name   |
| EF1   | EF1            | External Fault (input terminal S1)<br>External fault at multi-function input terminal S1.  |
| EF2   | EF2            | External Fault (input terminal S2)<br>External fault at multi-function input terminal S2.  |
| EF3   | EF3            | External Fault (input terminal S3)<br>External fault at multi-function input terminal S3.  |
| EF4   | EF4            | External Fault (input terminal S4)<br>External fault at multi-function input terminal S4.  |
| EF5   | EF5            | External Fault (input terminal S5)<br>External fault at multi-function input terminal S5.  |
| EF6   | EF6            | External Fault (input terminal S6)<br>External fault at multi-function input terminal S6.  |
| EF7   | EF7            | External Fault (input terminal S7)<br>External fault at multi-function input terminal S7.  |
| Cause   |                | Possible Solution  |
| An external device has tripped an alarm function.   |                | Remove the cause of the external fault and reset the fault.  |

|   |     |  |
|---|-----|--|
| Wiring is incorrect.  |     | <ul style="list-style-type: none"> <li>Ensure the signal lines have been connected properly to the terminals assigned for external fault detection (H1-□□ = 20 to 2F).</li> <li>Reconnect the signal line.</li> </ul>  |
| Incorrect setting of multi-function contact inputs.                               |     | <ul style="list-style-type: none"> <li>Check if the unused terminals set for H1-□□ = 20 to 2F (External Fault).</li> <li>Change the terminal settings.</li> </ul>  |
| LED Operator Display  |     | Fault Name   |
| Err   | Err | EEPROM Write Error   |
| Cause   |     | Data does not match the EEPROM being written to.   |
| Possible Solution   |     | <ul style="list-style-type: none"> <li>Press the  button.</li> <li>Correct the parameter settings.</li> <li>Cycle power to the drive. Refer to <i>Diagnosing and Resetting Faults on page 254</i>.</li> </ul>   |
| LED Operator Display  |     | Fault Name   |
| FbH   | FbH | Excessive PID Feedback   |
| Cause   |     | PID feedback input is greater than the level set b5-36 for longer than the time set to b5-37. To enable fault detection, set b5-12 = "2" or "5".   |
| Possible Solution   |     | <ul style="list-style-type: none"> <li>Check the settings of parameters b5-36 and b5-37.</li> </ul>  |
| Parameters are not set appropriately.   |     | Correct the wiring.  |
| Wiring for PID feedback is incorrect.   |     | <ul style="list-style-type: none"> <li>Check the sensor on the control side.</li> <li>Replace the sensor if damaged.</li> </ul>  |
| There is a problem with the feedback sensor.                                      |     | LED Operator Display   |
| Cause   |     | Fault Name   |
| FbL   | FbL | PID Feedback Loss  |
| Cause   |     | This fault occurs when PID Feedback Loss Detection is programmed to fault (b5-12 = 2) and the PID Feedback < PID Feedback Loss Detection Level (b5-13) for the PID Feedback Loss Detection Time (b5-14).   |
| Possible Solution   |     | <ul style="list-style-type: none"> <li>Check the settings of parameters b5-13 and b5-14.</li> </ul>  |
| Parameters are not set appropriately.   |     | Correct the wiring.  |
| Wiring for PID feedback is incorrect.   |     | Check the sensor on the controller side. If damaged, replace the sensor.   |
| There is a problem with the feedback sensor.                                      |     | LED Operator Display   |
| Cause   |     | Fault Name   |
| GF  | GF  | Ground Fault   |
| Cause   |     | <ul style="list-style-type: none"> <li>Current shorted to ground exceeded 50% of rated current on output side of the drive.</li> <li>Setting L8-09 to 1 enables ground fault detection in models 5.5 kW or larger.</li> </ul>  |
| Possible Solution   |     | <ul style="list-style-type: none"> <li>Check the insulation resistance of the motor.</li> <li>Replace the motor.</li> </ul>  |
| Motor insulation is damaged.  |     | <ul style="list-style-type: none"> <li>Check the motor cable.</li> <li>Remove the short circuit and turn the power back on.</li> <li>Check the resistance between the cable and the ground terminal ⊕.</li> <li>Replace the cable.</li> </ul>  |
| A damaged motor cable is creating a short circuit.                                |     | <ul style="list-style-type: none"> <li>Reduce the carrier frequency.</li> <li>Reduce the amount of stray capacitance.</li> </ul>   |
| The leakage current at the drive output is too high.                              |     | <ul style="list-style-type: none"> <li>The value set exceeds the allowable setting range while the drive automatically adjusts the current offset (this happens only attempting to restart a PM motor that is coasting to stop).</li> <li>Enable Speed Search at start (b3-01 = 1).</li> <li>Perform Speed Search 1 or 2 (H1-□□ = 61 or 62) via one of the external terminals. Note: Speed Search 1 and 2 are the same when using PM OLV.</li> </ul> |
| The drive started to run during Current Offset Fault or while coasting to a stop. |     | <ul style="list-style-type: none"> <li>Replace the drive.</li> </ul>   |
| Hardware problem.   |     | LED Operator Display   |
| Cause   |     | Fault Name   |
| LF  | LF  | Output Phase Loss  |
| Cause   |     | <ul style="list-style-type: none"> <li>Phase loss on the output side of the drive.</li> <li>Phase Loss Detection is enabled when L8-07 is set to "1" or "2".</li> </ul>  |
| Possible Solution   |     | <ul style="list-style-type: none"> <li>Check for wiring errors and ensure the output cable is connected properly.</li> <li>Correct the wiring.</li> </ul>  |
| The output cable is disconnected.   |     | <ul style="list-style-type: none"> <li>Check the resistance between motor lines.</li> <li>Replace the motor if the winding is damaged.</li> </ul>  |
| The motor winding is damaged.   |     | <ul style="list-style-type: none"> <li>Apply the tightening torque specified in this manual to fasten the terminals. Refer to <i>Wire Size and Torque Specifications on page 57</i>.</li> </ul>  |
| The output terminal is loose.   |     | Check the drive and motor capacities.  |
| The motor being used is less than 5% of the drive rated current.                  |     | Replace the drive.   |
| An output transistor is damaged.  |     | The drive being used cannot operate a single phase motor.  |
| A single-phase motor is being used.   |     | LED Operator Display   |
| Cause   |     | Fault Name   |
| LF2   | LF2 | Output current imbalance   |
| Cause   |     | One or more of the phases in the output current is lost.   |
| Possible Solution   |     | <ul style="list-style-type: none"> <li>Check for faulty wiring or poor connections on the output side of the drive.</li> <li>Correct the wiring.</li> </ul>  |
| Phase loss has occurred on the output side of the drive.                          |     |  |

## 6.4 Fault Detection

|   |  |
|---|--|
| Terminal wires on the output side of the drive are loose.   | Apply the tightening torque specified in this manual to fasten the terminals. Refer to <i>Wire Size and Torque Specifications</i> on page 57.  |
| No signal displays from the gate driver board.  | Replace the drive. Contact Yaskawa for assistance.   |
| Motor impedance or motor phases are uneven.   | <ul style="list-style-type: none"> <li>• Measure the line-to-line resistance for each motor phase. Ensure all values are the same.</li> <li>• Replace the motor. Contact Yaskawa for assistance.</li> </ul>  |
| <b>LED Operator Display</b> <span style="float: right;"><b>Fault Name</b></span>                        |  |
| oC  | oC   |
| <b>Cause</b>  | <b>Possible Solution</b>   |
| The motor has been damaged due to overheating or the motor insulation is damaged.                       | <ul style="list-style-type: none"> <li>• Check the insulation resistance.</li> <li>• Replace the motor.</li> </ul>   |
| One of the motor cables has shorted out or there is a grounding problem.                                | <ul style="list-style-type: none"> <li>• Check the motor cables.</li> <li>• Remove the short circuit and power the drive back up.</li> <li>• Check the resistance between the motor cables and the ground terminal.</li> <li>• Replace damaged cables.</li> </ul>  |
| The load is too heavy.  | <ul style="list-style-type: none"> <li>• Measure the current flowing into the motor.</li> <li>• Replace the drive with a larger capacity unit if the current value exceeds the rated current of the drive.</li> <li>• Determine if there is sudden fluctuation in the current level.</li> <li>• Reduce the load to avoid sudden changes in the current level or switch to a larger drive.</li> </ul>                         |
| The acceleration or deceleration times are too short.   | Calculate the torque needed during acceleration relative to the load inertia and the specified acceleration time.<br>If the right amount of torque cannot be set, make the following changes: <ul style="list-style-type: none"> <li>• Increase the acceleration time (C1-01, -03, -05, -07)</li> <li>• Increase the S-curve characteristics (C2-01 through C2-04)</li> <li>• Increase the capacity of the drive.</li> </ul> |
| The drive is attempting to operate a specialized motor or a motor larger than the maximum size allowed. | <ul style="list-style-type: none"> <li>• Check the motor capacity.</li> <li>• Ensure that the rated capacity of the drive is greater than or equal to the capacity rating found on the motor nameplate.</li> </ul>   |
| Magnetic contactor (MC) on the output side of the drive has turned on or off.                           | Set up the operation sequence so that the MC is not tripped while the drive is outputting current.   |
| V/f setting is not operating as expected.   | <ul style="list-style-type: none"> <li>• Check the ratios between the voltage and frequency.</li> <li>• Set parameter E1-04 through E1-10 appropriately. Set E3-04 through E3-10 when using a second motor.</li> <li>• Lower the voltage if it is too high relative to the frequency.</li> </ul>   |
| Excessive torque compensation.  | <ul style="list-style-type: none"> <li>• Check the amount of torque compensation.</li> <li>• Reduce the torque compensation gain (C4-01) until there is no speed loss and less current.</li> </ul>   |
| Drive fails to operate properly due to noise interference.  | <ul style="list-style-type: none"> <li>• Review the possible solutions provided for handling noise interference.</li> <li>• Review the section on handling noise interference and check the control circuit lines, main circuit lines and ground wiring.</li> </ul>  |
| Overexcitation gain is set too high.  | <ul style="list-style-type: none"> <li>• Check if fault occurs simultaneously to overexcitation function operation.</li> <li>• Consider motor flux saturation and reduce the value of n3-13 (Overexcitation Deceleration Gain).</li> </ul>   |
| Run command applied while motor was coasting.   | <ul style="list-style-type: none"> <li>• Enable Speed Search at start (b3-01 = "1").</li> <li>• Program the Speed Search command input through one of the multi-function contact input terminals (H1-□□ = "61" or "62").</li> </ul>  |
| The wrong motor code has been entered for PM Open Loop Vector (Yaskawa motors only).                    | Enter the correct motor code to E5-01 to indicate that a PM motor is connected.  |
| The motor control method and motor do not match.  | Check which motor control method the drive is set to (A1-02). <ul style="list-style-type: none"> <li>• For IM motors, set A1-02 = "0" or "2".</li> <li>• For PM motors, set A1-02 = "5".</li> </ul>  |
| The motor cable is too long   | Use a larger drive.  |
| <b>LED Operator Display</b> <span style="float: right;"><b>Fault Name</b></span>                        |  |
| oFR00   | oFA00  |
| <b>Cause</b>  | <b>Possible Solution</b>   |
| The option card is incompatible with the drive.   | Use a compatible option card.  |
| <b>LED Operator Display</b> <span style="float: right;"><b>Fault Name</b></span>                        |  |
| oFR01   | oFA01  |
| <b>Cause</b>  | <b>Possible Solution</b>   |
| The option card is not connected properly to the drive.   | Turn the power off and reconnect the option card.  |
| <b>LED Operator Display</b> <span style="float: right;"><b>Fault Name</b></span>                        |  |
| oFR03   | oFA03  |
| oFR04   | oFA04  |
| oFR30 to oFR43  | oFA30 to oFA43   |
|   |  |

| Cause   |            | Possible Solution   |
|---|------------|---|
| Option card or hardware is damaged.   |            | Replace the option card. Contact Yaskawa for consultation.  |
| <b>LED Operator Display</b>   |            | <b>Fault Name</b>   |
| <b>oH</b>   | <b>oH</b>  | <b>Heatsink Overheat</b>  |
|   |            | The temperature of the heatsink exceeded the value set to L8-02 (90-100°C). Default value for L8-02 is determined by drive capacity (o2-04).  |
| Cause   |            | Possible Solution   |
| Surrounding temperature is too high.  |            | <ul style="list-style-type: none"> <li>Check the temperature surrounding the drive. Verify temperature is within drive specifications.</li> <li>Improve the air circulation within the enclosure panel.</li> <li>Install a fan or air conditioner to cool the surrounding area.</li> <li>Remove anything near the drive that might be producing excessive heat.</li> </ul>  |
| Load is too heavy.  |            | <ul style="list-style-type: none"> <li>Measure the output current.</li> <li>Decrease the load.</li> <li>Lower the carrier frequency (C6-02).</li> </ul>   |
| Internal cooling fan is stopped.  |            | <ul style="list-style-type: none"> <li>Replace the cooling fan. <i>Refer to Cooling Fan Replacement on page 269.</i></li> <li>After replacing the drive, reset the cooling fan maintenance parameter (o4-03 = "0").</li> </ul>  |
| <b>LED Operator Display</b>   |            | <b>Fault Name</b>   |
| <b>oH1</b>  | <b>oH1</b> | <b>Overheat 1 (Heatsink Overheat)</b>   |
|   |            | The temperature of the heatsink has exceeded the overheat detection level.  |
| Cause   |            | Possible Solution   |
| Surrounding temperature is too high.  |            | <ul style="list-style-type: none"> <li>Check the temperature surrounding the drive.</li> <li>Improve the air circulation within the enclosure panel.</li> <li>Install a fan or air conditioner to cool the surrounding area.</li> <li>Remove anything near the drive that might be producing excessive heat.</li> </ul>   |
| Load is too heavy.  |            | <ul style="list-style-type: none"> <li>Measure the output current.</li> <li>Lower the carrier frequency (C6-02).</li> <li>Reduce the load.</li> </ul>   |
| The internal cooling fan has reached its performance life or has malfunctioned. |            | <ul style="list-style-type: none"> <li>Check the maintenance time for the cooling fan (U4-04).</li> <li>If U4-04 exceeds 90%, replace the cooling fan. <i>Refer to Cooling Fan Replacement on page 269.</i></li> <li>After replacing fan, reset the fan maintenance time (o4-03 = "0").</li> </ul>  |
| Current flowing to control circuit terminal +V exceeded the tolerance level.    |            | <ul style="list-style-type: none"> <li>Check the current level of the terminal.</li> <li>Set the current to the control circuit terminal to be 20 mA or less.</li> </ul>  |
| <b>LED Operator Display</b>   |            | <b>Fault Name</b>   |
| <b>oH3</b>  | <b>oH3</b> | <b>Motor Overheat Alarm (PTC Input)</b>   |
|   |            | <ul style="list-style-type: none"> <li>The motor overheat signal to analog input terminal A1 or A2 exceeded the alarm detection level.</li> <li>Detection requires multi-function analog input H3-02 or H3-10 be set to "E".</li> </ul>   |
| Cause   |            | Possible Solution   |
| Motor has overheated  |            | <ul style="list-style-type: none"> <li>Check the size of the load, the accel/decel times and the cycle times.</li> <li>Decrease the load.</li> <li>Increase the acceleration and deceleration times (C1-01 through C1-08).</li> <li>Adjust the preset V/f pattern (E1-04 through E1-10). This will mainly involve reducing E1-08 and E1-10.</li> <li>Be careful not to lower E1-08 and E1-10 excessively, as this reduces load tolerance at low speeds.</li> <li>Check the motor-rated current.</li> <li>Enter the motor-rated current as indicated on the motor nameplate (E2-01).</li> <li>Ensure the motor cooling system is operating normally.</li> <li>Repair or replace the motor cooling system.</li> </ul> |
| <b>LED Operator Display</b>   |            | <b>Fault Name</b>   |
| <b>oH4</b>  | <b>oH4</b> | <b>Motor Overheat Fault (PTC Input)</b>   |
|   |            | <ul style="list-style-type: none"> <li>The motor overheat signal to analog input terminal A1 or A2 exceeded the fault detection level.</li> <li>Detection requires that multi-function analog input H3-02 or H3-10 = "E".</li> </ul>  |
| Cause   |            | Possible Solution   |
| Motor has overheated.   |            | <ul style="list-style-type: none"> <li>Check the size of the load, the accel/decel times and the cycle times.</li> <li>Decrease the load.</li> <li>Increase the acceleration and deceleration times (C1-01 through C1-08).</li> <li>Adjust the preset V/f pattern (E1-04 through E1-10). This will mainly involve reducing E1-08 and E1-10. Be careful not to lower E1-08 and E1-10 excessively because this reduces load tolerance at low speeds.</li> <li>Check the motor-rated current.</li> <li>Enter the motor-rated current as indicated on the motor nameplate (E2-01).</li> <li>Ensure the motor cooling system is operating normally.</li> <li>Repair or replace the motor cooling system.</li> </ul>      |
| <b>LED Operator Display</b>   |            | <b>Fault Name</b>   |
| <b>oL1</b>  | <b>oL1</b> | <b>Motor Overload</b>   |
|   |            | The electrothermal sensor tripped overload protection.  |
| Cause   |            | Possible Solution   |
| Load is too heavy.  |            | Reduce the load.  |
| Cycle times are too short during acceleration and deceleration.                 |            | Increase the acceleration and deceleration times (C1-01 through C1-08).   |

## 6.4 Fault Detection

|  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Drive overloaded at low speeds.</li> <li>• Overload may occur at low speeds when using a general-purpose motor, even if operating within the rated current limitation.</li> </ul> | <ul style="list-style-type: none"> <li>• Reduce the load.</li> <li>• Increase the speed.</li> <li>• If the drive is supposed to operate at low speeds, either increase the motor capacity or use a motor specifically designed to operate with the drive.</li> </ul>  |
| Although a special type of motor is being used, the motor protection selection is set for a general-purpose motor (L1-01 = 1).   | Set L1-01 = "2".  |
| Voltage is too high for the V/f characteristics.   | <ul style="list-style-type: none"> <li>• Adjust the user set V/f patterns (E1-04 through E1-10). Parameters E1-08 and E1-10 may need to be reduced.</li> <li>• If E1-08 and E1-10 are set too high, there may be very little load tolerance at low speed.</li> </ul>  |
| The wrong motor-rated current is set to E2-01.   | <ul style="list-style-type: none"> <li>• Check the motor-rated current.</li> <li>• Enter the value written on the motor nameplate to parameter E2-01.</li> </ul>  |
| The maximum frequency for the drive input power is set too low.  | <ul style="list-style-type: none"> <li>• Check the rated frequency indicated on the motor nameplate.</li> <li>• Enter the rated frequency to E1-06 (Base Frequency).</li> </ul>   |
| Multiple motors are running off the same drive.  | Disable the Motor Protection function (L1-01 = "0") and install a thermal relay to each motor.  |
| The electrical thermal protection characteristics and motor overload characteristics do not match.   | <ul style="list-style-type: none"> <li>• Check the motor characteristics.</li> <li>• Correct the value set to L1-01 (Motor Protection Function).</li> <li>• Install an external thermal relay.</li> </ul>   |
| The electrical thermal relay is operating at the wrong level.  | <ul style="list-style-type: none"> <li>• Check the current rating listed on the motor nameplate.</li> <li>• Check the value set for the motor-rated current (E2-01).</li> </ul>   |
| Motor overheated by overexcitation operation.  | <ul style="list-style-type: none"> <li>• Overexcitation increases the motor losses and the motor temperature. If applied too long, motor damage can occur. Prevent excessive overexcitation operation or apply proper cooling to the motor.</li> <li>• Reduce the excitation deceleration gain (n3-13).</li> <li>• Set L3-04 (Stall Prevention during Deceleration) to a value other than 4.</li> </ul> |
| Speed Search related parameters are not set to the proper values.  | <ul style="list-style-type: none"> <li>• Check values set to Speed Search related parameters.</li> <li>• Adjust the Speed Search current and Speed Search deceleration times (b3-02 and b3-03 respectively).</li> <li>• After Auto-Tuning, enable Speed Estimation Type Search (b3-24 = "1").</li> </ul>  |
| Output current fluctuation due to input phase loss   | Check the power supply for phase loss.  |
| <b>LED Operator Display</b>  |   |
| oL2  | oL2   |
| <b>Cause</b>   | <b>Fault Name</b>   |
| Load is too heavy.   | Drive Overload  |
| Cycle times are too short during acceleration and deceleration.  | The thermal sensor of the drive triggered overload protection.  |
| <b>Possible Solution</b>   |   |
| Reduce the load.   |   |
| Adjust the settings for the acceleration and deceleration times (C1-01 through C1-08).   |   |
| Voltage is too high for the V/f characteristics.   | <ul style="list-style-type: none"> <li>• Adjust the preset V/f pattern (E1-04 through E1-10). This will mainly involve reducing E1-08 and E1-10.</li> <li>• Be careful not to lower E1-08 and E1-10 excessively because this reduces load tolerance at low speeds.</li> </ul>   |
| Drive capacity is too small.   | Replace the drive with a larger model.  |
| Overload occurred when operating at low speeds.  | <ul style="list-style-type: none"> <li>• Reduce the load when operating at low speeds.</li> <li>• Replace the drive with a model that is one frame size larger.</li> <li>• Lower the carrier frequency (C6-02).</li> </ul>  |
| Excessive torque compensation.   | Reduce the torque compensation gain (C4-01) until there is no speed loss but less current.  |
| Speed Search related parameters are not set correctly.   | <ul style="list-style-type: none"> <li>• Check the settings for all Speed Search related parameters.</li> <li>• Adjust the current used during Speed Search and the Speed Search deceleration time (b3-03 and b3-02 respectively).</li> <li>• After Auto-Tuning the drive, enable the Speed Search Estimation Type (b3-24 = "1").</li> </ul>  |
| Output current fluctuation due to input phase loss   | Check the power supply for phase loss.  |
| <b>LED Operator Display</b>  |   |
| oL3  | oL3   |
| <b>Cause</b>   | <b>Fault Name</b>   |
| Parameter settings are not appropriate for the type of load.   | Overtorque Detection 1  |
| There is a fault on the machine side (e.g., the machine is locked up).   | The current has exceeded the value set for torque detection (L6-02) for longer than the allowable time (L6-03).   |
| <b>Possible Solution</b>   |   |
| Check the settings of parameters L6-02 and L6-03.  |   |
| Check the status of the load. Remove the cause of the fault.   |   |
| <b>LED Operator Display</b>  |   |
| oL4  | oL4   |
| <b>Cause</b>   | <b>Fault Name</b>   |
| Parameter settings are not appropriate for the type of load.   | Overtorque Detection 2  |
|  | The current has exceeded the value set for Overtorque Detection 2 (L6-05) for longer than the allowable time (L6-06).   |
| <b>Possible Solution</b>   |   |
| Check the settings of parameters L6-05 and L6-06.  |   |
| <b>LED Operator Display</b>  |   |
| oL5  | oL5   |
| <b>Cause</b>   | <b>Fault Name</b>   |
|  | Mechanical Weakening Detection 1  |
|  | Overtorque occurred, matching the conditions specified in L6-08.  |

| Cause  |     | Possible Solution   |
|--|-----|---|
| Overtorque occurred, triggering the mechanical weakening level set to L6-08.   |     | Check for the cause of mechanical weakening.  |
| <b>LED Operator Display</b>  |     | <b>Fault Name</b>   |
| oL7  | oL7 | <b>High-Slip Braking oL</b><br>The output frequency stayed constant for longer than the time set in n3-04 during High-slip Braking.   |
| Cause  |     | Possible Solution   |
| Excessive load inertia.  |     | <ul style="list-style-type: none"> <li>Reduce deceleration times using parameters C1-02, -04, -06 and -08 in applications that do not use High-slip Braking.</li> <li>Use a braking resistor to shorten deceleration time.</li> </ul>   |
| Motor is driven by the load.   |     |   |
| Something on the load side is restricting deceleration.  |     |   |
| The overload time during High-slip Braking is too short.   |     | <ul style="list-style-type: none"> <li>Increase parameter n3-04 (High-slip Braking Overload Time).</li> <li>Install a thermal relay and increase the parameter setting of n3-04 to the maximum value.</li> </ul>  |
| <b>LED Operator Display</b>  |     | <b>Fault Name</b>   |
| oPr  | oPr | <b>External Digital Operator Connection Fault</b><br><ul style="list-style-type: none"> <li>The external operator has been disconnected from the drive.</li> </ul> <b>Note:</b> An oPr fault will occur when all of the following conditions are true: <ul style="list-style-type: none"> <li>Output is interrupted when the operator is disconnected (o2-06 = 1).</li> <li>The run command is assigned to the operator (b1-02 = 0 and LOCAL has been selected).</li> </ul> |
| Cause  |     | Possible Solution   |
| External operator is not properly connected to the drive.  |     | <ul style="list-style-type: none"> <li>Check the connection between the operator and the drive.</li> <li>Replace the cable if damaged.</li> <li>Turn off the drive input power and disconnect the operator. Next reconnect the operator and turn the drive input power back on.</li> </ul>  |
| <b>LED Operator Display</b>  |     | <b>Fault Name</b>   |
| oS   | oS  | <b>Overspeed (Simple V/f with PG)</b><br>Pulse input (RP) indicates that motor speed feedback exceeded F1-08 setting.   |
| Cause  |     | Possible Solution   |
| Overshoot or undershoot is occurring.  |     | <ul style="list-style-type: none"> <li>Adjust the gain by using the pulse train input parameters (H6-02 through H6-05).</li> <li>Increase the settings for C5-01 (Speed Control Proportional Gain 1) and reduce C5-02 (Speed Control Integral Time 1).</li> </ul>   |
| Incorrect PG pulse settings.   |     | Set the H6-02 (Pulse Train Input Scaling) = 100%, the number of pulses during maximum motor revolutions.  |
| Inappropriate parameter settings.  |     | Check the setting for the overspeed detection level and the overspeed detection time (F1-08 and F1-09).   |
| <b>LED Operator Display</b>  |     | <b>Fault Name</b>   |
| oV   | oV  | <b>Overvoltage</b><br>Voltage in the DC bus has exceeded the overvoltage detection level. <ul style="list-style-type: none"> <li>For 200 V class: approximately 410 V</li> <li>For 400 V class: approximately 820 V (740 V when E1-01 is less than 400)</li> </ul>  |
| Cause  |     | Possible Solution   |
| Deceleration time is too short and regenerative energy flows from the motor into the drive.  |     | <ul style="list-style-type: none"> <li>Increase the deceleration time (C1-02, -04, -06, -08).</li> <li>Install a braking resistor or a dynamic braking resistor unit.</li> <li>Enable stall prevention during deceleration (L3-04 = "1"). Stall prevention is enabled as the default setting.</li> </ul>  |
| Fast acceleration time causes the motor to overshoot the speed reference.  |     | <ul style="list-style-type: none"> <li>Check if sudden drive acceleration triggers an overvoltage alarm.</li> <li>Increase the acceleration time.</li> <li>Use longer S-curve acceleration and deceleration times.</li> </ul>   |
| Excessive braking load.  |     | The braking torque was too high, causing regenerative energy to charge the DC bus. Reduce the braking torque, use a braking option, or lengthen decel time.   |
| Surge voltage entering from the drive input power.   |     | Install a DC reactor.<br><b>Note:</b> Voltage surge can result from thyristor convertor and phase advancing capacitor using same drive main input power supply.   |
| Ground fault in the output circuit causing the DC bus capacitor to overcharge.   |     | <ul style="list-style-type: none"> <li>Check the motor wiring for ground faults.</li> <li>Correct grounding shorts and turn the power back on.</li> </ul>   |
| Improper Setting of Speed Search related parameters. (Includes Speed Search after a momentary power loss and after a fault restart.) |     | <ul style="list-style-type: none"> <li>Check the settings for Speed Search related parameters.</li> <li>Enable Speed Search Retry function (b3-19 greater than or equal to 1 to 10).</li> <li>Adjust the current level during Speed Search and the deceleration time (b3-02 and b3-03 respectively).</li> <li>Perform Line-to-Line Resistance Auto-Tuning and then enable Speed Estimation Type Speed Search (b3-24 = "1").</li> </ul>                                      |
| Excessive regeneration when overshoot occurs after acceleration.   |     | <ul style="list-style-type: none"> <li>Enable the Overvoltage Suppression function (L3-11 = "1").</li> <li>Lengthen the S-curve at acceleration end.</li> </ul>   |
| Drive input power voltage is too high.   |     | <ul style="list-style-type: none"> <li>Check the voltage.</li> <li>Lower drive input power voltage within the limits listed in the specifications.</li> </ul>   |
| The dynamic braking transistor is damaged.   |     | Replace the drive.  |
| The braking transistor is wired incorrectly.   |     | <ul style="list-style-type: none"> <li>Check braking transistor wiring for errors.</li> <li>Properly rewire the braking resistor device.</li> </ul>   |
| Drive fails to operate properly due to noise interference.   |     | <ul style="list-style-type: none"> <li>Review the list of possible solutions provided for controlling noise.</li> <li>Review the section on handling noise interference and check the control circuit lines, main circuit lines and ground wiring.</li> </ul>   |

## 6.4 Fault Detection

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| Load inertia has been set incorrectly.  | <ul style="list-style-type: none"> <li>Check the load inertia settings when using KEB, overvoltage suppression or Stall Prevention during deceleration.</li> <li>Adjust L3-25 (Load Inertia Ratio) in accordance with the load.</li> </ul>   |
| Braking function is being used in PM Open Loop Vector Control.  | Connect a braking resistor.  |
| Motor hunting occurs.   | <ul style="list-style-type: none"> <li>Adjust the parameters that control hunting.</li> <li>Set the hunting prevention gain (n1-02).</li> <li>Adjust the AFR time constant (n2-02 and n2-03) when in OLV Control.</li> <li>Use parameters n8-45 (PM Speed Feedback Detection Suppression Gain) and n8-47 (Pull-In Current Compensation Time Constant).</li> </ul>  |
| <b>LED Operator Display</b>   |  |
| <b>Fault Name</b>   |  |
| PF  | PF   |
| <b>Input Phase Loss</b>   |  |
| Drive input power has an open phase or has a large imbalance of voltage between phases. Detected when L8-05 = 1 (enabled).  |  |
| <b>Cause</b>  | <b>Possible Solution</b>   |
| There is phase loss in the drive input power.   | <ul style="list-style-type: none"> <li>Check for wiring errors in the main circuit drive input power.</li> <li>Correct the wiring.</li> </ul>  |
| There is loose wiring in the drive input power terminals.   | <ul style="list-style-type: none"> <li>Ensure the terminals are tightened properly.</li> <li>Apply the tightening torque specified in this manual to fasten the terminals. <i>Refer to Wire Gauges and Tightening Torque on page 51</i></li> </ul>   |
| There is excessive fluctuation in the drive input power voltage.  | <ul style="list-style-type: none"> <li>Check the voltage from the drive input power.</li> <li>Review the possible solutions for stabilizing the drive input power.</li> <li>Disable Input Phase Loss Detection (L8-05 = "0"). PF is detected if DC bus ripple is too high. If it is disabled, there is no fault but the ripple is still too high, thereby the capacitors are stressed more and lose lifetime.</li> </ul>   |
| There is poor balance between voltage phases.   | <ul style="list-style-type: none"> <li>Stabilize drive input power or disable phase loss detection.</li> </ul>   |
| The main circuit capacitors are worn.   | <ul style="list-style-type: none"> <li>Check the maintenance time for the capacitors (U4-05).</li> <li>Replace the drive if U4-05 is greater than 90%.</li> <li>Check for anything wrong with the drive input power.</li> <li>If nothing is wrong with the drive input power, try the following solutions if the alarm continues: <ul style="list-style-type: none"> <li>Disable Input Phase Loss Protection selection (L8-05 = "0"). PF is detected if DC bus ripple is too high. If it is disabled, there is no fault but the ripple is still too high, thereby the capacitors are stressed more and lose lifetime.</li> <li>Replace the drive.</li> </ul> </li> </ul> |
| <b>LED Operator Display</b>   |  |
| <b>Fault Name</b>   |  |
| PGo   | PGo  |
| <b>PG Disconnect (for Simple V/f with PG)</b>   |  |
| No PG pulses are received for longer than the time set to F1-14.  |  |
| <b>Cause</b>  | <b>Possible Solution</b>   |
| Pulse input (RP) is disconnected.   | Reconnect the pulse input (RP).  |
| Pulse input (RP) wiring is wrong.   | Correct the wiring.  |
| Motor brake engaged.  | Ensure the motor brake releases properly.  |
| <b>LED Operator Display</b>   |  |
| <b>Fault Name</b>   |  |
| rH  | rH   |
| <b>Braking Resistor Overheat</b>  |  |
| Braking resistor protection was triggered. Fault detection is enabled when L8-01 = 1 (disabled as a default).   |  |
| <b>Cause</b>  | <b>Possible Solution</b>   |
| Deceleration time is too short and excessive regenerative energy is flowing back into the drive.  | <ul style="list-style-type: none"> <li>Check the load, deceleration time and speed.</li> <li>Reduce the load.</li> <li>Increase the acceleration and deceleration times (C1-01 through C1-08).</li> <li>Replace the braking option with a larger device that can handle the power that is discharged.</li> </ul>   |
| Excessive braking inertia.  | Recalculate braking load and braking power. Then try reducing the braking load and checking the braking resistor settings and improve braking capacity.  |
| The proper braking resistor has not been installed.   | <ul style="list-style-type: none"> <li>Check the specifications and conditions for the braking resistor device.</li> <li>Select the optimal braking resistor.</li> </ul>   |
| <b>Note:</b> The magnitude of the braking load trips the braking resistor overheat alarm, NOT the surface temperature. Using the braking resistor more frequently than its rating trips the alarm even when the braking resistor surface is not very hot. |  |
| <b>LED Operator Display</b>   |  |
| <b>Fault Name</b>   |  |
| rr  | rr   |
| <b>Dynamic Braking Transistor</b>   |  |
| The built-in dynamic braking transistor failed.   |  |
| <b>Cause</b>  | <b>Possible Solution</b>   |
| The braking transistor is damaged.  | <ul style="list-style-type: none"> <li>Cycle power to the drive and check if the fault reoccurs. <i>Refer to Diagnosing and Resetting Faults on page 254.</i></li> <li>Replace the drive if the fault continues.</li> </ul>  |
| The control circuit is damaged.   |  |
| <b>LED Operator Display</b>   |  |
| <b>Fault Name</b>   |  |
| SEr   | SEr  |
| <b>Too Many Speed Search Restarts</b>   |  |
| The number of speed search restarts exceeded the number set to b3-19.   |  |
| <b>Cause</b>  | <b>Possible Solution</b>   |
| Speed Search parameters are set to the wrong values.  | <ul style="list-style-type: none"> <li>Reduce the detection compensation gain during Speed Search (b3-10).</li> <li>Increase the current level when attempting Speed Search (b3-17).</li> <li>Increase the detection time during Speed Search (b3-18).</li> <li>Repeat Auto-Tuning.</li> </ul>   |

|  |   |
|--|---|
| The motor is coasting in the opposite direction of the run command.  | Enable Bi-directional Speed Search (b3-14 = "1").   |
| <b>LED Operator Display</b>  | <b>Fault Name</b>   |
| 5f0  | STO   |
| <b>Cause</b>   | <b>Possible Solution</b>  |
| The wrong motor code has been set (Yaskawa motors only).   | <ul style="list-style-type: none"> <li>Enter the correct motor code for the PM being used into E5-01.</li> <li>For special-purpose motors, enter the correct data to all E5 parameters according to the Test Report provided for the motor.</li> </ul>                  |
| Load is too heavy.   | <ul style="list-style-type: none"> <li>Increase the value set to n8-55 (Load Inertia for PM).</li> <li>Increase the value set to n8-51 (Pull-In Current during Accel/Decel for PM).</li> <li>Reduce the load.</li> <li>Increase the motor or drive capacity.</li> </ul> |
| Load inertia is too heavy.   | Increase n8-55 (Load Inertia for PM).   |
| Acceleration and deceleration times are too short.   | <ul style="list-style-type: none"> <li>Increase the acceleration and deceleration times (C1-01 through C1-08).</li> <li>Increase the S-curve acceleration and deceleration times (C2-01).</li> </ul>  |
| <b>LED Operator Display</b>  | <b>Fault Name</b>   |
| UL3  | UL3   |
| <b>Cause</b>   | <b>Possible Solution</b>  |
| Parameter settings are not appropriate for the type of load.   | Check the settings of parameters L6-02 and L6-03.   |
| There is a fault on the machine side.  | Check the load for any problems.  |
| <b>LED Operator Display</b>  | <b>Fault Name</b>   |
| UL4  | UL4   |
| <b>Cause</b>   | <b>Possible Solution</b>  |
| Parameter settings are not appropriate for the type of load.   | Check the settings of parameters L6-05 and L6-06.   |
| There is a fault on the machine side.  | Check the load for any problems.  |
| <b>LED Operator Display</b>  | <b>Fault Name</b>   |
| UL5  | UL5   |
| <b>Cause</b>   | <b>Possible Solution</b>  |
| Undertorque was detected and matched the condition of mechanical loss detection operation selection (L6-08).                 | Check the load side for any problems.   |
| <b>LED Operator Display</b>  | <b>Fault Name</b>   |
| Uv1  | Uv1   |
| <b>Cause</b>   | <b>Possible Solution</b>  |
| Input power phase loss.  | <ul style="list-style-type: none"> <li>The main circuit drive input power is wired incorrectly.</li> <li>Correct the wiring.</li> </ul>   |
| One of the drive input power wiring terminals is loose.  | <ul style="list-style-type: none"> <li>Ensure there are no loose terminals.</li> <li>Apply the tightening torque specified in this manual to fasten the terminals. <i>Refer to Wire Gauges and Tightening Torque on page 51</i></li> </ul>                              |
| There is a problem with the voltage from the drive input power.  | <ul style="list-style-type: none"> <li>Check the voltage.</li> <li>Correct the voltage to within range listed in drive input power specifications.</li> </ul>   |
| The power has been interrupted.  | Correct the drive input power.  |
| Drive internal circuitry has become worn.  | <ul style="list-style-type: none"> <li>Check the maintenance time for the capacitors (U4-05).</li> <li>Replace the drive if U4-05 exceeds 90%.</li> </ul>   |
| The drive input power transformer is not large enough and voltage drops after switching on power.                            | Check the capacity of the drive input power transformer.  |
| Air inside the drive is too hot.   | Check the drive internal temperature.   |
| Problem with the CHARGE indicator.   | Replace the drive.  |
| <b>LED Operator Display</b>  | <b>Fault Name</b>   |
| Uv2  | Uv2   |
| <b>Cause</b>   | <b>Possible Solution</b>  |
| L2-02 changed from its default value in drive that is 7.5 kW or smaller without installing a Momentary Power Loss Ride-Thru. | Correct parameter L2-02 setting or install optional Momentary Power Loss Ride-Thru unit.  |
| The wiring for the control power supply is damaged.  | <ul style="list-style-type: none"> <li>Cycle power to the drive. Check if the fault reoccurs.</li> <li>Replace the drive if the fault continues to occur.</li> </ul>  |

## 6.4 Fault Detection

|  |     |   |
|--|-----|---|
| Internal circuitry is damaged.                             |     | <ul style="list-style-type: none"> <li>• Cycle power to the drive. Check if the fault reoccurs.</li> <li>• Replace the drive if the fault continues to occur.</li> </ul>  |
| <b>LED Operator Display</b>                                |     | <b>Fault Name</b>   |
| Uu3  | Uv3 | <b>Undervoltage 3 (Inrush Prevention Circuit Fault)</b>   |
|  |     | The inrush prevention circuit has failed.   |
| <b>Cause</b>   |     | <b>Possible Solution</b>  |
| The contactor on the inrush prevention circuit is damaged. |     | <ul style="list-style-type: none"> <li>• Cycle power to the drive. Check if the fault reoccurs.</li> <li>• Replace the drive if the fault continues to occur.</li> <li>• Check monitor U4-06 for the performance life of the inrush prevention circuit.</li> <li>• Replace the drive if U4-06 exceeds 90%.</li> </ul> |

## 6.5 Alarm Detection

Alarms are drive protection functions that do not operate the fault contact. The drive will return to original status when the cause of the alarm has been removed.

During an alarm condition, the Digital Operator display flashes and an alarm output is generated at the multi-function outputs (H2-01 to H2-03), if programmed.

Investigate the cause of the alarm and *Refer to Alarm Codes, Causes, and Possible Solutions on page 243* for the appropriate action.

### ◆ Alarm Codes, Causes, and Possible Solutions

Table 6.10 Alarm Codes, Causes, and Possible Solutions

| LED Operator Display   |      | Minor Fault Name  |                                       |
|--|------|---|---------------------------------------|
| bb   | bb   | Baseblock   |                                       |
| Cause  |      | Possible Solutions  |                                       |
| External baseblock signal entered via multi-function input terminal (S1 to S7).                    |      | Check external sequence and baseblock signal input timing.  | Minor Fault (H2-□□ = 10)<br>No output |
| LED Operator Display   |      | Minor Fault Name  |                                       |
| bUS  | bUS  | Option Communication Error  |                                       |
| Cause  |      | Possible Solutions  |                                       |
| Connection is broken or master controller stopped communicating.                                   |      | <ul style="list-style-type: none"> <li>• Check for faulty wiring.</li> <li>• Correct the wiring.</li> <li>• Repair ground wiring or disconnected cables.</li> </ul>   | Minor Fault (H2-□□ = 10)<br>YES       |
| Option card is damaged.  |      | If there are no problems with the wiring and the fault continues to occur, replace the option card.   | YES                                   |
| The option card is not properly connected to the drive.  |      | <ul style="list-style-type: none"> <li>• The connector pins on the option card are not properly lined up with the connector pins on the drive.</li> <li>• Reinstall the option card.</li> </ul>   | YES                                   |
| A data error occurred due to noise.  |      | <ul style="list-style-type: none"> <li>• Check options available to minimize the effects of noise.</li> <li>• Take steps to counteract noise in the control circuit wiring, main circuit lines and ground wiring.</li> <li>• Try to reduce noise on the controller side.</li> <li>• Use surge absorbers on magnetic contactors or other equipment causing the disturbance.</li> <li>• Use cables recommended by Yaskawa, or another type of shielded line. The shield should be grounded on the controller side or on the drive input power side.</li> <li>• All wiring for communications devices should be separated from drive input power lines. Install an EMC noise filter to the input side of the drive input power.</li> </ul> | YES                                   |
| LED Operator Display   |      | Minor Fault Name  |                                       |
| CALL   | CALL | Serial Communication Transmission Error   |                                       |
| Cause  |      | Possible Solutions  |                                       |
| Communications wiring is faulty, there is a short circuit, or something is not connected properly. |      | <ul style="list-style-type: none"> <li>• Check for wiring errors.</li> <li>• Correct the wiring.</li> <li>• Remove and ground shorts and reconnect loose wires.</li> </ul>  | Minor Fault (H2-□□ = 10)<br>YES       |
| Programming error on the master side.  |      | Check communications at start-up and correct programming errors.  | YES                                   |
| Communications circuitry is damaged.   |      | <ul style="list-style-type: none"> <li>• Perform a self-diagnostics check.</li> <li>• Replace the drive if the fault continues to occurs.</li> </ul>  | YES                                   |
| Terminal resistance setting is incorrect.  |      | The terminal slave drive must have the internal terminal resistance switch set correctly. Place DIP switch S2 to the ON position.   | YES                                   |
| LED Operator Display   |      | Minor Fault Name  |                                       |
| CE   | CE   | MEMOBUS/Modbus Communication Error  |                                       |
| Cause  |      | Possible Solutions  |                                       |
| A data error occurred due to noise.  |      | <ul style="list-style-type: none"> <li>• Check options available to minimize the effects of noise.</li> <li>• Counteract noise in the control circuit wiring, main circuit lines and ground wiring.</li> <li>• Reduce noise on the controller side.</li> <li>• Use surge absorbers on magnetic contactors or other equipment causing the disturbance.</li> <li>• Use cables recommended by Yaskawa or another type of shielded line. The shield should be grounded on the controller side or on the drive input power side.</li> <li>• Separate all wiring for communications devices from drive input power lines. Install an EMC noise filter to the input side of the drive input power.</li> </ul>                                  | Minor Fault (H2-□□ = 10)<br>YES       |
| Communication protocol is incompatible.  |      | <ul style="list-style-type: none"> <li>• Check the H5 parameter settings as well as the protocol setting in the controller.</li> <li>• Ensure settings are compatible.</li> </ul>   | YES                                   |

## 6.5 Alarm Detection

|  |   |  |
|--|---|--|
| The CE detection time (H5-09) is set shorter than the time required for a communication cycle to take place.   | • Check the PLC.<br>• Change the software settings in the PLC.<br>• Set a longer CE detection time (H5-09).                                 | YES                                    |
| Incompatible PLC software settings or there is a hardware problem.   | • Check the PLC.<br>• Remove the cause of the error on the controller side.   | YES                                    |
| Communications cable is disconnected or damaged.   | • Check the connector for a signal through the cable.<br>• Replace the communications cable.  | YES                                    |
| <b>LED Operator Display</b>  |   |  |
| <b>CrSf</b>  | <b>CrST</b>   | <b>Minor Fault Name</b>                |
| Can Not Reset  |   |  |
| <b>Cause</b>   | <b>Possible Solutions</b>   | <b>Minor Fault Output (H2-□□ = 10)</b> |
| Fault reset was being executed when a run command was entered.   | • Ensure that a run command cannot be entered from the external terminals or option card during fault reset.<br>• Turn off the run command. | YES                                    |
| <b>LED Operator Display</b>  |   |  |
| <b>dEv</b>   | <b>dEv</b>  | <b>Minor Fault Name</b>                |
| Speed Deviation (for Simple V/f with PG)<br>According to the pulse input (RP), the speed deviation is greater than the setting in F1-10 for a time longer than the setting in F1-11. |   |  |
| <b>Cause</b>   | <b>Possible Solutions</b>   | <b>Minor Fault Output (H2-□□ = 10)</b> |
| Load is too heavy  | Reduce the load.  | YES                                    |
| Acceleration and deceleration times are set too short.   | Increase the acceleration and deceleration times (C1-01 through C1-08).   | YES                                    |
| The load is locked up.   | Check the machine.  | YES                                    |
| Parameter settings are inappropriate.  | Check the settings of parameters F1-10 and F1-11.   | YES                                    |
| The motor brake engaged.   | Ensure the brake releases properly.   | YES                                    |
| <b>LED Operator Display</b>  |   |  |
| <b>dnE</b>   | <b>dnE</b>  | <b>Minor Fault Name</b>                |
| Drive Disabled   |   |  |
| <b>Cause</b>   | <b>Possible Solutions</b>   | <b>Minor Fault Output (H2-□□ = 10)</b> |
| "Drive Enable" is set to a multi-function contact input (H1-□□ = 6A) and that signal was switched off.   | Check the operation sequence.   | YES                                    |
| <b>LED Operator Display</b>  |   |  |
| <b>EF</b>  | <b>EF</b>   | <b>Minor Fault Name</b>                |
| Forward/Reverse Run Command Input Error<br>Both forward run and reverse run closed simultaneously for over 0.5 s.  |   |  |
| <b>Cause</b>   | <b>Possible Solutions</b>   | <b>Minor Fault Output (H2-□□ = 10)</b> |
| Sequence error   | Check the forward and reverse command sequence and correct the problem.<br>Note: When minor fault EF detected, motor ramps to stop.         | YES                                    |
| <b>LED Operator Display</b>  |   |  |
| <b>EF0</b>   | <b>EF0</b>  | <b>Minor Fault Name</b>                |
| Option Card External Fault<br>An external fault condition is present.  |   |  |
| <b>Cause</b>   | <b>Possible Solutions</b>   | <b>Minor Fault Output (H2-□□ = 10)</b> |
| An external fault was received from the PLC with F6-03 = 3 (causing the drive to continue running when an external fault occurs).  | • Remove the cause of the external fault.<br>• Remove the external fault input from the PLC.  | YES                                    |
| There is a problem with the PLC program.   | Check the PLC program and correct problems.   | YES                                    |
| <b>LED Operator Display</b>  |   |  |
| <b>EF1</b>   | <b>EF1</b>  | <b>Minor Fault Name</b>                |
| External fault (input terminal S1)<br>External fault at multi-function input terminal S1.  |   |  |
| <b>EF2</b>   | <b>EF2</b>  | <b>Minor Fault Name</b>                |
| External fault (input terminal S2)<br>External fault at multi-function input terminal S2.  |   |  |
| <b>EF3</b>   | <b>EF3</b>  | <b>Minor Fault Name</b>                |
| External fault (input terminal S3)<br>External fault at multi-function input terminal S3.  |   |  |
| <b>EF4</b>   | <b>EF4</b>  | <b>Minor Fault Name</b>                |
| External fault (input terminal S4)<br>External fault at multi-function input terminal S4.  |   |  |
| <b>EF5</b>   | <b>EF5</b>  | <b>Minor Fault Name</b>                |
| External fault (input terminal S5)<br>External fault at multi-function input terminal S5.  |   |  |
| <b>EF6</b>   | <b>EF6</b>  | <b>Minor Fault Name</b>                |
| External fault (input terminal S6)<br>External fault at multi-function input terminal S6.  |   |  |
| <b>EF7</b>   | <b>EF7</b>  | <b>Minor Fault Name</b>                |
| External fault (input terminal S7)<br>External fault at multi-function input terminal S7.  |   |  |

| Cause   | Possible Solutions  | Minor Fault Output (H2-□□ = 10)  |
|---|---|----------------------------------|
| An external device has tripped an alarm function.   | Remove the cause of the external fault and reset the multi-function input value.  | YES                              |
| Wiring is incorrect.  | <ul style="list-style-type: none"> <li>Ensure the signal lines have been connected properly to the terminals assigned for external fault detection (H1-□□ = 20 to 2F).</li> <li>Reconnect the signal line.</li> </ul>   | YES                              |
| Multi-function contact inputs are set incorrectly.  | <ul style="list-style-type: none"> <li>Check if the unused terminals have been set for H1-□□ = 20 to 2F (External Fault).</li> <li>Change the terminal settings.</li> </ul>   | YES                              |
| <b>LED Operator Display</b>   |   | <b>Minor Fault Name</b>          |
| <i>FbH</i>  | <b>FbH</b>  | <b>Excessive PID Feedback</b>    |
|   | The PID feedback input is higher than the level set in b5-36 for longer than the time set in b5-37, and b5-12 is set to 1 or 4.   |                                  |
| Cause   | Possible Solutions  | Minor Fault Output (H2-□□ = 10)  |
| Parameters settings for b5-36 and b5-37 are incorrect.  | Check parameters b5-36 and b5-37.   | YES                              |
| PID feedback wiring is faulty.  | Correct the wiring.   | YES                              |
| Feedback sensor has malfunctioned.  | Check the sensor and replace it if damaged.   | YES                              |
| Feedback input circuit is damaged.  | Replace the drive.  | YES                              |
| <b>LED Operator Display</b>   |   | <b>Minor Fault Name</b>          |
| <i>FbL</i>  | <b>FbL</b>  | <b>PID Feedback Loss</b>         |
|   | The PID feedback input is lower than the level set in b5-13 for longer than the time set in b5-14, and b5-12 is set to 1 or 4.  |                                  |
| Cause   | Possible Solutions  | Minor Fault Output (H2-□□ = 10)  |
| Parameters settings for b5-13 and b5-14 are incorrect.  | Check parameters b5-13 and b5-14.   | YES                              |
| PID feedback wiring is faulty.  | Correct the wiring.   | YES                              |
| Feedback sensor has malfunctioned.  | Check the sensor and replace it if damaged.   | YES                              |
| Feedback input circuit is damaged.  | Replace the drive.  | YES                              |
| <b>LED Operator Display</b>   |   | <b>Minor Fault Name</b>          |
| <i>Hbb</i>  | <b>Hbb</b>  | <b>Safe Disable Signal Input</b> |
|   | Both Safe Disable Input channels are open.  |                                  |
| Cause   | Possible Solutions  | Minor Fault Output (H2-□□ = 10)  |
| There is no signal at terminal H1.  | Check if external safety circuit tripped and disabled the drive. If the Safe Disable function is not utilized, check if the terminals HC, H1, and H2 are linked.  | YES                              |
| Internally, both Safe Disable channels are broken.  | Replace the drive.  | YES                              |
| <b>LED Operator Display</b>   |   | <b>Minor Fault Name</b>          |
| <i>HbbF</i>   | <b>HbbF</b>   | <b>Safe Disable Signal Input</b> |
|   | One of the Safe Disable input channels is open.   |                                  |
| Cause   | Possible Solutions  | Minor Fault Output (H2-□□ = 10)  |
| One of the Safe Disable channels is faulty.   | Replace the drive.  | YES                              |
| <b>LED Operator Display</b>   |   | <b>Minor Fault Name</b>          |
| <i>HcA</i>  | <b>HcA</b>  | <b>Current Alarm</b>             |
|   | Drive current exceeded overcurrent warning level (150% of the rated current).   |                                  |
| Cause   | Possible Solutions  | Minor Fault Output (H2-□□ = 10)  |
| Load is too heavy.  | <ul style="list-style-type: none"> <li>Measure the current flowing through the motor.</li> <li>Reduce the load or increase the capacity of the drive.</li> </ul>  | YES                              |
| Acceleration and deceleration times are too short.  | <ul style="list-style-type: none"> <li>Calculate the torque required during acceleration and for the inertia moment.</li> <li>If the torque level is not right for the load, take the following steps:</li> <li>Increase the acceleration and deceleration times (C1-01 through C1-08).</li> <li>Increase the capacity of the drive.</li> </ul> | YES                              |
| A special-purpose motor is being used, or the drive is attempting to run a motor greater than the maximum allowable capacity. | <ul style="list-style-type: none"> <li>Check the motor capacity.</li> <li>Use a motor appropriate for the drive. Ensure the motor is within the allowable capacity range.</li> </ul>  | YES                              |
| The current level increased due to Speed Search after a momentary power loss or while attempting to perform a fault restart.  | The alarm will appear only briefly. There is no need to take action to prevent the alarm from occurring in such instances.  | YES                              |
| <b>LED Operator Display</b>   |   | <b>Minor Fault Name</b>          |

Troubleshooting

## 6.5 Alarm Detection

| oH   |  | oH   |  | Heatsink Overheat  |  |
|--|--|--|--|--|--|
|  |  |  |  | The temperature exceeded the maximum allowable value.  |  |
| Cause  |  | Possible Solutions   |  | Minor Fault Output (H2-□□ = 10)  |  |
| Surrounding temperature is too high  |  | <ul style="list-style-type: none"> <li>Check the surrounding temperature.</li> <li>Improve the air circulation within the enclosure panel.</li> <li>Install a fan or air conditioner to cool surrounding area.</li> <li>Remove anything near drive that may cause extra heat.</li> </ul>   |  | YES  |  |
| Internal cooling fan has stopped.  |  | <ul style="list-style-type: none"> <li>Replace the cooling fan. Refer to <i>Cooling Fan Replacement on page 269</i>.</li> <li>After replacing the drive, reset the cooling fan maintenance parameter to (o4-03 = "0").</li> </ul>  |  | YES  |  |
| Airflow around the drive is restricted.                                      |  | <ul style="list-style-type: none"> <li>Provide proper installation space around the drive as indicated in the manual. Refer to <i>Correct Installation Orientation on page 35</i>.</li> <li>Allow for the specified space and ensure that there is sufficient circulation around the control panel.</li> </ul>   |  | YES  |  |
|  |  | <ul style="list-style-type: none"> <li>Check for dust or foreign materials clogging cooling fan.</li> <li>Clear debris caught in the fan that restricts air circulation.</li> </ul>  |  | YES  |  |
| LED Operator Display   |  |  |  | Minor Fault Name   |  |
| oH2  |  | oH2  |  | Drive Overheat Warning   |  |
|  |  |  |  | "Drive Overheat Warning" was input to a multi-function input terminal, S1 through S7 (H1-□□ = B)                           |  |
| Cause  |  | Possible Solutions   |  | Minor Fault Output (H2-□□ = 10)  |  |
| An external device triggered and overheat warning in the drive.              |  | <ul style="list-style-type: none"> <li>Search for the device that tripped the overheat warning.</li> <li>Solving the problem will clear the warning.</li> </ul>  |  | YES  |  |
| LED Operator Display   |  |  |  | Minor Fault Name   |  |
| oH3  |  | oH3  |  | Motor Overheat   |  |
|  |  |  |  | The motor overheat signal entered to a multi-function analog input terminal exceeded the alarm level (H3-02 or H3-10 = E). |  |
| Cause  |  | Possible Solutions   |  | Minor Fault Output (H2-□□ = 10)  |  |
| Motor thermostat wiring is fault (PTC input).                                |  | Repair the PTC input wiring.   |  | YES  |  |
| There is a fault on the machine side (e.g., the machine is locked up).       |  | <ul style="list-style-type: none"> <li>Check the status of the machine.</li> <li>Remove the cause of the fault.</li> </ul>   |  | YES  |  |
| Motor has overheated.  |  | <ul style="list-style-type: none"> <li>Check the load size, accel/decel times, and cycle times.</li> <li>Decrease the load.</li> <li>Increase accel and decel times (C1-01 to C1-08).</li> <li>Adjust the preset V/f pattern (E1-04 through E1-10). This will mainly involve reducing E1-08 and E1-10. Note: Do not lower E1-08 and E1-10 excessively, because this reduces load tolerance at low speeds.</li> <li>Check the motor-rated current.</li> <li>Enter motor-rated current on motor nameplate (E2-01).</li> <li>Ensure the motor cooling system is operating normally.</li> <li>Repair or replace the motor cooling system.</li> </ul> |  | YES  |  |
| LED Operator Display   |  |  |  | Minor Fault Name   |  |
| oL3  |  | oL3  |  | Overtorque 1   |  |
|  |  |  |  | Drive output current (or torque in OLV) was greater than L6-02 for longer than the time set in L6-03.                      |  |
| Cause  |  | Possible Solutions   |  | Minor Fault Output (H2-□□ = 10)  |  |
| Inappropriate parameter settings.  |  | Check parameters L6-02 and L6-03.  |  | YES  |  |
| There is a fault on the machine side (e.g., the machine is locked up).       |  | <ul style="list-style-type: none"> <li>Check the status of the machine.</li> <li>Remove the cause of the fault.</li> </ul>   |  | YES  |  |
| LED Operator Display   |  |  |  | Minor Fault Name   |  |
| oL4  |  | oL4  |  | Overtorque 2   |  |
|  |  |  |  | Drive output current (or torque in OLV) was greater than L6-05 for longer than the time set in L6-06.                      |  |
| Cause  |  | Possible Solutions   |  | Minor Fault Output (H2-□□ = 10)  |  |
| Parameter settings are not appropriate.                                      |  | Check parameters L6-05 and L6-06.  |  | YES  |  |
| There is a fault on the machine side (e.g., the machine is locked up).       |  | <ul style="list-style-type: none"> <li>Check the status of the machine being used.</li> <li>Remove the cause of the fault.</li> </ul>  |  | YES  |  |
| LED Operator Display   |  |  |  | Minor Fault Name   |  |
| oL5  |  | oL5  |  | Mechanical Weakening Detection 1   |  |
|  |  |  |  | Overtorque occurred, matching the conditions specified in L6-08.   |  |
| Cause  |  | Possible Solutions   |  | Minor Fault Output (H2-□□ = 10)  |  |
| Overtorque occurred, triggering the mechanical weakening level set to L6-08. |  | Check for the cause of mechanical weakening.   |  | YES  |  |
| LED Operator Display   |  |  |  | Minor Fault Name   |  |

|   |   |  |  |
|---|---|--|--|
| o5  | oS  | Overspeed (for Simple V/f with PG)<br>Pulse input (RP) indicates that motor speed feedback exceeded F1-08 setting.   |  |
| Cause   | Possible Solutions  | Minor Fault Output (H2-□□ = 10)  |  |
| Overshoot or undershoot is occurring.   | <ul style="list-style-type: none"> <li>Adjust the gain by using the pulse train input parameters (H6-02 through H6-05).</li> <li>Adjust the speed feedback accuracy.</li> <li>Increase the settings for C5-01 (Speed Control Proportional Gain 1) and reduce C5-02 (Speed Control Integral Time 1).</li> </ul>  | YES  |  |
| PG pulse settings are incorrect.  | Set the H6-02 (Pulse Train Input Scaling) = 100%, the number of pulses during maximum motor revolutions.  | YES  |  |
| Parameter settings are inappropriate.   | Check the setting for the overspeed detection level and the overspeed detection time (F1-08 and F1-09).   | YES  |  |
| LED Operator Display  |   | Minor Fault Name   |  |
| ou  | ov  | DC Bus Overvoltage<br>The DC bus voltage exceeded the trip point.<br>For 200 V class: approximately 410 V<br>For 400 V class: approximately 820 V (740 V when E1-01 < 400) |  |
| Cause   | Possible Solutions  | Minor Fault Output (H2-□□ = 10)  |  |
| Surge voltage present in the drive input power.   | <ul style="list-style-type: none"> <li>Install a DC reactor or an AC reactor.</li> <li>Voltage surge can result from a thyristor converter and a phase advancing capacitor operating on the same drive input power system.</li> </ul>   | YES  |  |
| <ul style="list-style-type: none"> <li>The motor is short-circuited.</li> <li>Ground current has over-charged the main circuit capacitors via the drive input power.</li> </ul> | <ul style="list-style-type: none"> <li>Check the motor power cable, relay terminals and motor terminal box for short circuits.</li> <li>Correct grounding shorts and turn the power back on.</li> </ul>   | YES  |  |
| Noise interference causes the drive to operate incorrectly.   | <ul style="list-style-type: none"> <li>Review possible solutions for handling noise interference.</li> <li>Review section on handling noise interference and check control circuit lines, main circuit lines and ground wiring.</li> <li>If the magnetic contactor is identified as a source of noise, install a surge protector to the MC coil.</li> </ul> | YES  |  |
|   | Set number of fault restarts (L5-01) to a value other than 0.   | YES  |  |
| LED Operator Display  |   | Minor Fault Name   |  |
| PASS  | PASS  | MEMOBUS/Modbus Comm. Test Mode Complete  |  |
| Cause   | Possible Solutions  | Minor Fault Output (H2-□□ = 10)  |  |
| MEMOBUS/Modbus test has finished normally.  | This verifies that the test was successful.   | No output  |  |
| LED Operator Display  |   | Minor Fault Name   |  |
| PGo   | PGo   | PG Disconnect (for Simple V/f with PG)<br>Detected when no PG pulses received for a time longer than setting in F1-14.   |  |
| Cause   | Possible Solutions  | Minor Fault Output (H2-□□ = 10)  |  |
| Pulse input (RP) is disconnected.   | Reconnect the pulse input (RP).   | YES  |  |
| Pulse input (RP) wiring is wrong.   | Correct the wiring.   | YES  |  |
| Motor brake is engaged.   | Ensure the brake releases properly  | YES  |  |
| LED Operator Display  |   | Minor Fault Name   |  |
| rUn   | rUn   | Motor Switch during Run<br>A command to switch motors was entered during run.  |  |
| Cause   | Possible Solutions  | Minor Fault Output (H2-□□ = 10)  |  |
| A motor switch command was entered during run.  | Change the operation pattern so that the motor switch command is entered while the drive is stopped.  | YES  |  |
| LED Operator Display  |   | Minor Fault Name   |  |
| SE  | SE  | MEMOBUS/Modbus Communication Test Mode Error   |  |
| Cause   | Possible Solutions  | Minor Fault Output (H2-□□ = 10)  |  |
| A digital input programmed to 67H (MEMOBUS/Modbus test) was closed while the drive was running.   | Stop the drive and run the test again.  | No output  |  |
| LED Operator Display  |   | Minor Fault Name   |  |
| UL3   | UL3   | Undertorque Detection 1<br>Drive output current (or torque in OLV) less than L6-02 for longer than L6-03 time.   |  |
| Cause   | Possible Solutions  | Minor Fault Output (H2-□□ = 10)  |  |
| Inappropriate parameter settings.   | Check parameters L6-02 and L6-03.   | YES  |  |

## 6.5 Alarm Detection

|  |     |   |  |
|--|-----|---|--|
| Load has dropped or decreased significantly.   |     | Check for broken parts in the transmission system.  | YES                                    |
| <b>LED Operator Display</b>  |     | <b>Minor Fault Name</b>   |  |
| UL 4   | UL4 | Undertorque Detection 2<br>Drive output current (or torque in OLV) less than L6-05 for longer than L6-06 time.  |  |
| <b>Cause</b>   |     | <b>Possible Solutions</b>   | <b>Minor Fault Output (H2-□□ = 10)</b> |
| Inappropriate parameter settings.  |     | Check parameters L6-05 and L6-06.   | YES                                    |
| The load has dropped or decreased significantly.   |     | Check for broken parts in the transmission system.  | YES                                    |
| <b>LED Operator Display</b>  |     | <b>Minor Fault Name</b>   |  |
| Uu   | Uv  | Undervoltage<br>One of the following conditions was true when the drive was stopped and a run command was entered:<br>• DC bus voltage dropped below the level specified in L2-05.<br>• Contactor to suppress inrush current in the drive was open.<br>• Low voltage in the control drive input power. This alarm outputs only if L2-01 is not 0 and DC bus voltage is under L2-05. |  |
| <b>Cause</b>   |     | <b>Possible Solutions</b>   | <b>Minor Fault Output (H2-□□ = 10)</b> |
| Phase loss in the drive input power.   |     | Check for wiring errors in the main circuit drive input power. Correct the wiring.  | YES                                    |
| Loose wiring in the drive input power terminals.   |     | <ul style="list-style-type: none"> <li>• Ensure the terminals have been properly tightened.</li> <li>• Apply the tightening torque specified in this manual to fasten the terminals. <i>Refer to Wire Gauges and Tightening Torque on page 51</i></li> </ul>  | YES                                    |
| There is a problem with the drive input power voltage.   |     | <ul style="list-style-type: none"> <li>• Check the voltage.</li> <li>• Lower the voltage of the drive input power so that it is within the limits listed in the specifications.</li> </ul>  | YES                                    |
| Drive internal circuitry is worn.  |     | <ul style="list-style-type: none"> <li>• Check the maintenance time for the capacitors (U4-05).</li> <li>• Replace the drive if U4-05 exceeds 90%.</li> </ul>   | YES                                    |
| The drive input power transformer is not large enough and voltage drops when the power is switched on. |     | <ul style="list-style-type: none"> <li>• Check for a tripped alarm when the magnetic contactor, line breaker and leakage breaker are turned on.</li> <li>• Check the capacity of the drive input power transformer.</li> </ul>  | YES                                    |
| Air inside the drive is too hot.   |     | • Check the temperature inside the drive.   | YES                                    |
| The CHARGE indicator light is broken or disconnected.  |     | • Replace the drive.  | YES                                    |

## 6.6 Operator Programming Errors

An Operator Programming Error (oPE) occurs when an inappropriate parameter is set or an individual parameter setting is inappropriate.

The drive will not operate until the parameter is set correctly; however, no alarm or fault outputs will occur. If an oPE occurs, investigate the cause and *Refer to oPE Codes, Causes, and Possible Solutions on page 249* for the appropriate action. When an oPE error is displayed, press the ENTER button to display U1-18 (oPE fault constant). This monitor displays the parameter causing the oPE error.

### ◆ oPE Codes, Causes, and Possible Solutions

Table 6.11 oPE Codes, Causes, and Possible Solutions

| LED Operator Display   |              | Error Name   |
|--|--------------|--|
| <b>oPE01</b>   | <b>oPE01</b> | <b>Drive Capacity Setting Fault</b>  |
| <b>Cause</b>   |              | <b>Possible Solutions</b>  |
| The drive capacity setting (o2-04) and the actual capacity of the drive are not the same.  |              | Correct the value set to o2-04.  |
| LED Operator Display   |              | Error Name   |
| <b>oPE02</b>   | <b>oPE02</b> | <b>Parameter Range Setting Error</b>   |
| <b>Cause</b>   |              | <b>Possible Solutions</b>  |
| Parameters were set outside the possible setting range.  |              | Use U1-18 to find parameters set outside the range.  |
| Note: Other errors are given precedence over oPE02 when multiple errors occur at the same time.  |              | Set parameters to the proper values.   |
| LED Operator Display   |              | Error Name   |
| <b>oPE03</b>   | <b>oPE03</b> | <b>Multi-Function Input Selection Error</b>  |
| <b>Cause</b>   |              | <b>Possible Solutions</b>  |
| <ul style="list-style-type: none"> <li>The same function is assigned to two multi-function inputs.</li> <li>Excludes "Not used" and "External Fault."</li> </ul>   |              | <ul style="list-style-type: none"> <li>Ensure all multi-function inputs are assigned to different functions.</li> <li>Re-enter the multi-function settings to ensure this does not occur.</li> </ul> |
| The Up command was set but the Down command was not, or vice versa (settings 10 vs. 11).   |              | Correctly set functions that need to be enabled in combination with other functions.   |
| The Up 2 command was set but the Down 2 command was not, or vice versa (settings 75 vs. 76).   |              |  |
| <ul style="list-style-type: none"> <li>Run/Stop command for a 2-Wire sequence was set (H1-□□ = 42), but forward/reverse command (H1-□□ = 43) was not.</li> <li>"Drive Enable" is set to multi-function input S1 or S2 (H1-01 = 6A or H1-02 = 6A).</li> </ul>   |              | Correctly set functions that need to be enabled in combination with other functions.   |
| Two of the following functions are set at the same time: <ul style="list-style-type: none"> <li>Up/Down Command (10 vs. 11)</li> <li>Up 2/Down 2 Command (75 vs. 76)</li> <li>Hold Accel/Decel Stop (A)</li> <li>Analog Frequency Reference Sample/Hold (1E)</li> <li>Offset Frequency 1, 2, 3 Calculations (44, 45, 46)</li> </ul>  |              | <ul style="list-style-type: none"> <li>Check if contradictory settings have been assigned to the multi-function input terminals at the same time.</li> <li>Correct setting errors.</li> </ul>        |
| The Up/Down command (10, 11) is enabled at the same time as PID control (b5-01).   |              | Disable control PID (b5-01 = "0") or disable the Up/Down command.  |
| Settings for NC and NO input for the following functions were selected at the same time: <ul style="list-style-type: none"> <li>External Search Command 1 and External Search Command 2 (61 vs. 62)</li> <li>Fast-Stop N.O. and Fast-Stop N.C. (15 vs. 17)</li> <li>KEB for Momentary Power Loss and High Slip Braking (65, 66, 7A, 7B vs. 68)</li> <li>Motor Switch Command and Accel/Decel Time 2 (16 vs. 1A)</li> <li>KEB Command 1 and KEB Command 2 (65, 66 vs. 7A, 7B)</li> <li>FWD Run Command (or REV) and FWD/REV Run Command (2-wire) (40, 41 vs. 42, 43)</li> <li>External DB Command and Drive Enable (60 vs. 6A)</li> <li>Motor Switch Command and Up 2/Down 2 Command (16 vs. 75, 76)</li> </ul> |              | Check for contradictory settings assigned to the multi-function input terminals at the same time. Correct setting errors.  |

## 6.6 Operator Programming Errors

|  |       |   |
|--|-------|---|
| <p>One of the following settings was entered while H1-□□ = 2 (External Reference 1/2):</p> <ul style="list-style-type: none"> <li>• b1-15 = 4 (Pulse Train Input) and H6-01 (Pulse Train Input Function Selection) not = 0 (Frequency Reference)</li> <li>• b1-15 or b1-16 set to 3 but no option card connected</li> <li>• Although b1-15 = 1 (Analog Input) and H3-02 or H3-10 are set to 0 (Frequency Bias).</li> </ul> |       | Correct the settings for the multi-function input terminal parameters.  |
| <p>H2-□□ = 38 (Drive Enabled) but H1-□□ is not set to 6A (Drive Enable).<br/>H1-□□ = 7E (Direction Detection) although H6-01 is not set to 3 (Simple V/f with PG).</p>   |       |   |
| <b>LED Operator Display</b>  |       | <b>Error Name</b>   |
| oPE04  | oPE04 | Initialization required.  |
| <b>Cause</b>   |       | <b>Possible Solutions</b>   |
| The drive, control board, or terminal board has been replaced and the parameter settings between the control board and the terminal board no longer match.   |       | To load the parameter settings to the drive that are stored in the terminal board, set A1-03 to 5550. Initialize parameters after drive replacement by setting A1-03 to 1110 or 2220.   |
| <b>LED Operator Display</b>  |       | <b>Error Name</b>   |
| oPE05  | oPE05 | Run Command/Frequency Reference Source Selection Error  |
| <b>Cause</b>   |       | <b>Possible Solutions</b>   |
| Frequency reference is assigned to an option card (b1-01 = 3) that is not connected to the drive.  |       | Reconnect the option card to the drive.   |
| The Run command is assigned to an option card (b1-02 = 3) that is not connected to the drive.  |       |   |
| Frequency reference is assigned to the pulse train input (b1-01 = 4), but terminal RP is not set for pulse train input (H6-01 > 0)   |       | Set H6-01 to "0".   |
| <b>LED Operator Display</b>  |       | <b>Error Name</b>   |
| oPE07  | oPE07 | Multi-Function Analog Input Selection Error   |
| <b>Cause</b>   |       | <b>Possible Solutions</b>   |
| H3-02 and H3-10 are set to the same value.   |       | Change the settings to H3-02 and H3-10 so that functions no longer conflict. Note: Both 0 (primary analog frequency reference) and F (Not Used) can be set to H3-02 and H3-10 at the same time.                                       |
| The following simultaneous contradictory settings: H3-02 or H3-10 = B (PID Feedback) H6-01 (Pulse Train Input) = 1 (PID Feedback)  |       | Disable one of the PID selections.  |
| The following simultaneous contradictory settings: H3-02 or H3-10 = C (PID Target Value) H6-01 = 2 (pulse train input sets the PID target value)   |       |   |
| The following simultaneous contradictory settings: H3-02 or H3-10 = C (PID Target Value) b5-18 = 1 (enables b5-19 as the target PID value)   |       |   |
| The following simultaneous contradictory settings: H6-01 or H3-10 = C (PID Target Value) b5-18 = 1 (enables b5-19 as the target PID value)   |       |   |
| <b>LED Operator Display</b>  |       | <b>Error Name</b>   |
| oPE08  | oPE08 | Parameter Selection Error   |
| <b>Cause</b>   |       | <b>Possible Solutions</b>   |
| Attempted to use a function in the V/f motor control method that is only possible in Open Loop Vector Control.   |       | Check the motor control method and the functions available.   |
| Simple V/f with PG was enabled while not in V/f Control (H6-01 = 3).   |       | To use Simple V/f with PG, ensure the motor control method has been set to V/f Control (A1-02 = "0").   |
| In Open Loop Vector Control, n2-02 is greater than n2-03   |       | Correct parameter settings so that n2-02 is less than n2-03.  |
| In Open Loop Vector Control, C4-02 is greater than C4-06   |       | Correct parameter settings so that C4-02 is less than C4-06.  |
| In PM Open Loop Vector Control, parameters E5-02 to E5-07 are set to 0.  |       | <ul style="list-style-type: none"> <li>• Set the correct motor code in accordance with the motor being used (E5-01).</li> <li>• When using a special-purpose motor, set E5-□□ in accordance with the Test Report provided.</li> </ul> |
| <p>The following conditions are true in PM Open Loop Vector Control:</p> <ul style="list-style-type: none"> <li>• E5-03 does not equal 0</li> <li>• E5-09 and E5-24 are both equal to 0, or neither equals 0</li> </ul>  |       | <ul style="list-style-type: none"> <li>• Set E5-09 or E5-24 to the correct value, and set the other to "0".</li> <li>• Set the motor-rated current for PM to "0" (E5-03).</li> </ul>  |
| Note: Use U1-18 to find which parameters are set outside the specified setting range. Other errors are given precedence over oPE08 when multiple errors occur at the same time.  |       |   |
| <b>LED Operator Display</b>  |       | <b>Error Name</b>   |
| oPE09  | oPE09 | PID Control Selection Fault   |
| <b>Cause</b>   |       | <b>Possible Solutions</b>   |
| The following simultaneous contradictory settings:   |       | <ul style="list-style-type: none"> <li>• Set b5-15 to another value besides 0.</li> <li>• Set the stopping method to coast to stop or ramp to stop (b1-03 = "0" or "1").</li> </ul>   |
| <ul style="list-style-type: none"> <li>• b5-15 not 0.0 (PID Sleep Function Operation Level)</li> <li>• The stopping method is set to either DC injection braking or coast to stop with a timer (b1-03 = 2 or 3).</li> </ul>  |       |   |
| <b>LED Operator Display</b>  |       | <b>Error Name</b>   |

## 6.6 Operator Programming Errors

|  |       |  |
|--|-------|--|
| <i>oPE 10</i>  | oPE10 | <b>V/f Data Setting Error</b><br>The following setting errors have occurred where: E1-04 is greater than or equal to E1-06 is greater than or equal to E1-07 is greater than or equal to E1-09.<br>Or the following setting errors have occurred: E3-04 is greater than or equal to E3-06 is greater than or equal to E3-07 is greater than or equal to E3-09. |
| <b>Cause</b>   |       | <b>Possible Solutions</b>  |
| —  |       | Correct the settings for E1-04, -06, -07 and -09 (or E1-04, -06, -07, -09 for motor 2).  |
| <b>LED Operator Display</b>  |       | <b>Error Name</b>  |
| <i>oPE 11</i>  | oPE11 | <b>Carrier Frequency Setting Error</b><br>Correct the setting for the carrier frequency.   |
| <b>Cause</b>   |       | <b>Possible Solutions</b>  |
| The following simultaneous contradictory settings: C6-05 is greater than 6 and C6-04 is greater than C6-03 (carrier frequency lower limit is greater than the upper limit). If C6-05 is less than or equal to 6, the drive operates at C6-03.<br>Upper and lower limits between C6-02 and C6-05 contradict each other. |       | Correct the parameter settings.  |
| <b>LED Operator Display</b>  |       | <b>Error Name</b>  |
| <i>oPE 13</i>  | oPE13 | <b>Pulse Monitor Selection Error</b><br>Incorrect setting of monitor selection for Pulse Train (H6-06).  |
| <b>Cause</b>   |       | <b>Possible Solutions</b>  |
| Scaling for the Pulse Train monitor is set to 0 (H6-07 = 0) while H6-06 is not set to 101, 102, 105, or 116.   |       | Change scaling for the Pulse Train monitor or set H6-06 to 101, 102, 105, or 116.  |

## 6.7 Auto-Tuning Fault Detection

Auto-Tuning faults are shown below. When the following faults are detected, the fault is displayed on the Digital Operator and the motor coasts to a stop. No fault or alarm outputs will occur

### ◆ Auto-Tuning Codes, Causes, and Possible Solutions

Table 6.12 Auto-Tuning Codes, Causes, and Possible Solutions

| LED Operator Display  |       | Error Name   |
|---|-------|--|
| End1  | End1  | Excessive V/f Setting. Detected only during Rotational Auto-Tuning, and displayed after Auto-Tuning is complete.   |
| Cause   |       | Possible Solutions   |
| The torque reference exceeded 20% during Auto-Tuning.   |       | <ul style="list-style-type: none"> <li>Before Auto-Tuning the drive, verify the information written on the motor nameplate and enter that data to T1-03 through T1-05.</li> <li>Enter proper information to parameters T1-03 to T1-05 and repeat Auto-Tuning.</li> <li>If possible, disconnect the motor from the load and perform Auto-Tuning.</li> </ul>                         |
| The results from Auto-Tuning the no-load current exceeded 80%.  |       |  |
| LED Operator Display  |       | Error Name   |
| End2  | End2  | Motor Iron-Core Saturation Coefficient. Detected only during Rotational Auto-Tuning and displayed after Auto-Tuning is complete.   |
| Cause   |       | Possible Solutions   |
| Motor data entered during Auto-Tuning was incorrect.  |       | <ul style="list-style-type: none"> <li>Motor data entered to the T1 parameters does not match the information written on the motor nameplate.</li> <li>Restart Auto-Tuning and enter the correct information.</li> <li>Check and correct faulty motor wiring.</li> <li>Disconnect the motor from machine and perform Rotational Auto-Tuning.</li> </ul>                            |
| Auto-Tuning calculated values outside the parameter setting range, assigning the iron-core saturation coefficient (E2-07, -08) a temporary value.   |       |  |
| LED Operator Display  |       | Error Name   |
| End3  | End3  | Rated Current Setting Alarm (displayed after Auto-Tuning is complete)  |
| Cause   |       | Possible Solutions   |
| <ul style="list-style-type: none"> <li>The motor line-to-line resistance and the motor-rated current are not consistent with one another.</li> <li>The correct current rating printed on the nameplate was not entered into T1-04.</li> </ul> |       | <ul style="list-style-type: none"> <li>Check the setting of parameter T1-04.</li> <li>Check the motor data and repeat Auto-Tuning.</li> </ul>  |
| LED Operator Display  |       | Error Name   |
| Er-01   | Er-01 | Motor Data Error   |
| Cause   |       | Possible Solutions   |
| Motor data or data entered during Auto-Tuning was incorrect.  |       | <ul style="list-style-type: none"> <li>Check that the motor data entered to T1 parameters matches motor nameplate input before Auto-Tuning.</li> <li>Start Auto-Tuning over again and enter the correct information.</li> <li>Check the drive and motor capacities.</li> <li>Correct the settings of parameters T1-02 and T1-04.</li> </ul>  |
| Motor output and motor-rated current settings (T1-02 and T1-04) do not match.   |       |  |
| Motor output and no-load current settings (T1-04 and E2-03) do not match. Data required when Auto-Tuning for OLV Control or Stationary Auto-Tuning.   |       | <ul style="list-style-type: none"> <li>Check the motor-rated current and no-load current.</li> <li>Correct the settings of parameters T1-04 and E2-03.</li> </ul>  |
| Base frequency and base motor rotations (T1-05 and T1-07) do not match.   |       | Set T1-05 and T1-07 to the correct value.  |
| LED Operator Display  |       | Error Name   |
| Er-02   | Er-02 | Minor Fault  |
| Cause   |       | Possible Solutions   |
| Incorrect motor data entered during Auto-Tuning.  |       | <ul style="list-style-type: none"> <li>Motor data entered to the T1 parameters does not match the information written on the motor nameplate. Enter the correct data.</li> <li>Start Auto-Tuning over again and enter the correct information.</li> <li>Check the wiring and correct defective connections.</li> <li>Check around the machine.</li> <li>Check the load.</li> </ul> |
| The wiring is faulty.   |       |  |
| Load is too heavy.  |       |  |
| LED Operator Display  |       | Error Name   |
| Er-03   | Er-03 | STOP Button Input  |
| Cause   |       | Possible Solutions   |
| Auto-Tuning canceled by pressing STOP button.   |       | Auto-Tuning did not complete properly and will have to be performed again.   |
| LED Operator Display  |       | Error Name   |
| Er-04   | Er-04 | Line-to-Line Resistance Error  |
| Cause   |       | Possible Solutions   |
| Motor data entered during Auto-Tuning was incorrect.  |       | <ul style="list-style-type: none"> <li>Motor data entered to T1 parameters does not match motor nameplate. Enter the correct data.</li> <li>Start Auto-Tuning over again and enter the correct information.</li> <li>Check and correct faulty motor wiring.</li> <li>Disconnect the motor from machine and perform Rotational Auto-Tuning.</li> </ul>                              |
| Auto-Tuning did not complete within designated time frame.  |       |  |
| Drive-calculated values outside parameter setting range.  |       |  |

| LED Operator Display   |       | Error Name  |
|--|-------|---|
| Er-05  | Er-05 | No-Load Current Error   |
| Cause  |       | Possible Solutions  |
| Motor data entered during Auto-Tuning was incorrect.                               |       | <ul style="list-style-type: none"> <li>Motor data entered to T1 parameters does not match motor nameplate. Enter the correct data.</li> <li>Restart Auto-Tuning and enter the correct information.</li> </ul>   |
| Auto-Tuning did not complete within designated time frame.                         |       | <ul style="list-style-type: none"> <li>Check and correct faulty motor wiring.</li> <li>Disconnect the motor from machine and perform Rotational Auto-Tuning.</li> </ul>   |
| Drive-calculated values outside parameter setting range.                           |       |   |
| LED Operator Display   |       | Error Name  |
| Er-08  | Er-08 | Rated Slip Error  |
| Cause  |       | Possible Solutions  |
| Motor data entered during Auto-Tuning was incorrect.                               |       | <ul style="list-style-type: none"> <li>Motor data entered to T1 parameters does not match motor nameplate. Enter the correct data.</li> <li>Restart Auto-Tuning and enter the correct information.</li> </ul>   |
| Auto-Tuning did not complete within designated time frame.                         |       | <ul style="list-style-type: none"> <li>Check and correct faulty motor wiring.</li> <li>Disconnect the motor from machine and perform Auto-Tuning.</li> </ul>  |
| Values calculated by the drive are outside the allowable parameter setting ranges. |       |   |
| LED Operator Display   |       | Error Name  |
| Er-09  | Er-09 | Acceleration Error (detected only during Rotational Auto-Tuning)  |
| Cause  |       | Possible Solutions  |
| The motor did not accelerate for the specified acceleration time.                  |       | <ul style="list-style-type: none"> <li>Increase the acceleration time (C1-01).</li> <li>Check if it is possible to disconnect the machine from the motor.</li> </ul>  |
| Torque limit when motoring is too low (L7-01 and L7-02).                           |       | <ul style="list-style-type: none"> <li>Check the settings of parameters L7-01 and L7-02.</li> <li>Increase the setting.</li> </ul>  |
| LED Operator Display   |       | Error Name  |
| Er-11  | Er-11 | Motor Speed Fault (detected only when Auto-Tuning is enabled)   |
| Cause  |       | Possible Solutions  |
| Torque reference is too high. (Enabled in OLV only.)                               |       | <ul style="list-style-type: none"> <li>Increase the acceleration time (C1-01).</li> <li>Disconnect the machine from the motor, if possible.</li> </ul>  |
| LED Operator Display   |       | Error Name  |
| Er-12  | Er-12 | Current Detection Error   |
| Cause  |       | Possible Solutions  |
| One of the motor phases is missing (U/T1, V/T2, W/T3).                             |       | Check motor wiring and correct problems.  |
| Current exceeded the current rating of the drive.                                  |       | <ul style="list-style-type: none"> <li>Check the motor wiring for a short between motor lines.</li> <li>If a magnetic contactor is used between motors, ensure it is on.</li> <li>Replace the drive.</li> </ul> |
| The current is too low.  |       |   |
| Attempted Auto-Tuning without motor connected to the drive.                        |       | Connect the motor and perform Auto-Tuning.  |
| Current detection signal error.  |       | Replace the drive.  |

## 6.8 Diagnosing and Resetting Faults

### 6.8 Diagnosing and Resetting Faults

When a fault occurs and the drive stops, follow the instructions below to remove whatever conditions triggered the fault, then restart the drive.

#### ◆ Fault Occurs Simultaneously with Power Loss

**WARNING! Electrical Shock Hazard.** Ensure there are no short circuits between the main circuit terminals (R/L1, S/L2, and T/L3) or between the ground and main circuit terminals before restarting the drive. Failure to comply may result in serious injury or death and will cause damage to equipment.

1. Turn on the drive input power.
2. Use monitor parameters U2-□□ to display data on the operating status of the drive just before the fault occurred.
3. Remove the cause of the fault and reset.

**Note:** To find out what faults were triggered, check U2-02 (Fault History). Information on drive status when the fault occurred such as the frequency, current and voltage, can be found in U2-03 through U2-17. Refer to *Viewing Fault Trace Data After Fault* on page 254 for information on how to view fault trace data.

**Note:** When the fault continues to be displayed after cycling power, remove the cause of the fault and reset.

#### ◆ If the Drive Still has Power After a Fault Occurs

1. Look at the LED operator for information on the fault that occurred.
2. Refer to *Fault Displays, Causes, and Possible Solutions* on page 232
3. Reset the fault. Refer to *Fault Reset Methods* on page 254.

#### ◆ Viewing Fault Trace Data After Fault

| Step  | Display/Result |
|---|----------------|
| 1. Turn on the drive input power. The first screen displays.                |                |
| 2. Press <b>▲</b> until the monitor screen is displayed.                    |                |
| 3. Press <b>ENTER</b> to display the parameter setting screen.              |                |
| 4. Press <b>▲</b> and <b>&gt;</b> until U2-02 (Fault History) is displayed. |                |
| 5. Press <b>ENTER</b> to view most recent fault (here, oC).                 |                |
| 6. Press <b>▲</b> to view drive status information when fault occurred.     |                |
| 7. Parameters U2-03 through U2-17 help determine cause of fault.            |                |

#### ◆ Fault Reset Methods

| After the Fault Occurs  | Procedure   |  |
|---|---|--|
| Fix the cause of the fault, restart the drive, and reset the fault  | Press <b>RESET</b> on the digital operator.   |  |
| Resetting via Fault Reset Digital Input S4  | Close then open the fault signal digital input via terminal S4. S4 is set fault reset as default (H1-04 = 12) |  |
| If the above methods do not reset the fault, turn off the drive main power supply. Reapply power after LED operator display is out. |   |  |

## 6.9 Troubleshooting without Fault Display

This section describes troubleshooting problems that do not trip an alarm or fault.

### ◆ Cannot Change Parameter Settings

| Cause   | Possible Solutions   |
|---|--|
| The drive is running the motor (i.e., the Run command is present).  | <ul style="list-style-type: none"> <li>Stop the drive and switch over to the Programming Mode.</li> <li>Most parameters cannot be edited during run.</li> </ul>  |
| The Access Level is set to restrict access to parameter settings.   | <ul style="list-style-type: none"> <li>Set the Access Level to allow parameters to be edited (A1-01 = 2).</li> </ul>   |
| The operator is not in the Parameter Setup Mode (the LED screen will display "PAR").                              | <ul style="list-style-type: none"> <li>See what mode the LED parameter is current set for.</li> <li>Parameters cannot be edited when in the Setup Mode ("STUP"). Switch modes so that "PAR" appears on the screen.</li> </ul>  |
| A multi-function contact input terminal is set to allow or restrict parameter editing (H1-01 through H1-07 = 1B). | <ul style="list-style-type: none"> <li>When the terminal is open, parameters cannot be edited.</li> <li>Turn on the multi-function contact input set to 1B.</li> </ul>   |
| The wrong password was entered.   | <ul style="list-style-type: none"> <li>If the password entered to A1-04 does not match the password saved to A1-05, then drive settings cannot be changed.</li> <li>Reset the password.</li> <li>If you cannot remember the password: <ul style="list-style-type: none"> <li>Display parameter A1-04. Press the  button while pressing  at the same time. Parameter A1-05 will appear.</li> <li>Set a new password to parameter A1-05.</li> </ul> </li> </ul> |
| Undervoltage was detected.  | <ul style="list-style-type: none"> <li>Check the drive input power voltage by looking at the DC bus voltage (U1-07).</li> <li>Check all main circuit wiring.</li> </ul>  |

### ◆ Motor Does Not Rotate Properly after Pressing RUN Button or after Entering External Run Command

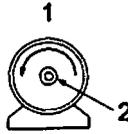
#### ■ Motor Does Not Rotate

| Cause  | Possible Solutions  |
|--|---|
| The drive is not in the Drive Mode.  | <ul style="list-style-type: none"> <li>Check if the DRV light on the LED operator is lit.</li> <li>Enter the Drive Mode to begin operating the motor. Refer to <i>The Drive and Programming Modes on page 74</i>.</li> </ul>  |
| The  button was pushed. | <p>Stop the drive and check if the correct frequency reference source is selected. If the operator keypad shall be the source, the LO/RE button LED must be on, if the source is REMOTE, it must be off. Take the following steps to solve the problem:</p> <ul style="list-style-type: none"> <li>Push the  button.</li> <li>If o2-01 is set to 0, then the LO/RE button will be disabled.</li> </ul> |
| Auto-Tuning has just completed.  | <ul style="list-style-type: none"> <li>When Auto-Tuning has completed, the drive is switched back to the Programming Mode. The Run command will not be accepted unless the drive is in the Drive Mode.</li> <li>Use the LED operator to enter the Drive Mode. Refer to <i>The Drive and Programming Modes on page 74</i>.</li> </ul>  |
| A Fast-Stop was executed and has not yet been reset.   | Reset the Fast-Stop command.  |
| Settings are incorrect for the source that provides the run command.                                       | <p>Check parameter b1-02 (Run Command Selection). Set b1-02 so that it corresponds with the correct run command source.</p> <p>0: LED/LCD operator<br/> 1: Control circuit terminal (default setting)<br/> 2: MEMOBUS/Modbus communications<br/> 3: Option card</p>   |
| One of the Safety Inputs is open.  | <ul style="list-style-type: none"> <li>Check for a short-circuit between terminals H1 and HC.</li> <li>See if one of the Safety Inputs is open.</li> <li>Correct any faulty wiring.</li> </ul>  |
| There is faulty wiring in the control circuit terminals.   | <ul style="list-style-type: none"> <li>Check the wiring for the control terminal.</li> <li>Correct wiring mistakes.</li> <li>Check the input terminal status monitor (U1-10).</li> </ul>  |
| The drive has been set to accept the frequency reference from the incorrect source.                        | <p>Check parameter b1-01 (Frequency Reference Selection 1). Set b1-01 to the correct source of the frequency reference.</p> <p>0: LED operator<br/> 1: Control circuit terminal (default setting)<br/> 2: MEMOBUS/Modbus communications<br/> 3: Option card<br/> 4: Pulse train input (RP)</p>  |
| The terminal set to accept the main speed reference is set to the incorrect voltage and/or current.        | If the frequency reference is set at terminal A1, check parameter H3-01 for the correct signal level selection. If terminal A2 is used, check DIP switch S1. Then select the correct input level for terminal A2 in parameter H3-08. Refer to <i>DIP Switch S1 Analog Input Signal Selection on page 62</i> .   |
| Selection for the sink/source mode is incorrect.   | Check DIP switch S3. Refer to <i>Sinking/Sourcing Mode Switch on page 60</i> .  |
| Frequency reference is too low.  | <ul style="list-style-type: none"> <li>Check the frequency reference monitor (U1-01).</li> <li>Increase the frequency by changing the maximum output frequency (E1-09).</li> </ul>  |

## 6.9 Troubleshooting without Fault Display

| Cause   | Possible Solutions   |
|---|--|
| Multi-function analog input is set up to accept gain for the frequency reference, but no voltage (current) has been provided.                             | <ul style="list-style-type: none"> <li>Check the multi-function analog input settings.</li> <li>Check if analog input A1 or A2 is set for frequency reference gain (H3-02/10 = 1). If so, check if the correct signal is applied to the terminal. The gain and the frequency reference will be 0 if no signal is applied to the gain input.</li> <li>Check if H3-02 and H3-10 have been set to the proper values.</li> <li>Check if the analog input value has been set properly.</li> </ul>   |
| The  button was pressed when the drive was started from a REMOTE source. | <ul style="list-style-type: none"> <li>When the  button is pressed, the drive will decelerate to stop.</li> <li>Switch off the run command and then re-enter a run command.</li> <li>The  button is disabled when a2-02 is set to 0.</li> </ul>  |
| Motor is not producing enough torque in the V/f motor control method.   | <ul style="list-style-type: none"> <li>Ensure the selected V/f pattern corresponds with the characteristics of the motor being used.</li> <li>Set the correct V/f pattern to E1-03.</li> <li>When E1-03 = F, increase both the minimum and mid output frequency voltages (E1-08, E1-10).</li> </ul> <p>Increase the frequency reference so that it is higher than the minimum frequency reference (E1-09).</p> <p>Perform Line-to-Line Resistance Auto-Tuning when using particularly long motor cables.</p> <p>Increase the torque compensation gain (C4-01).</p> |
| Motor is not producing enough torque in Open Loop Vector Control.   | <ul style="list-style-type: none"> <li>Execute Rotational Auto-Tuning.</li> <li>If the motor cables are replaced with longer cables after Rotational Auto-Tuning was performed, Auto-Tuning may need to be repeated due to voltage drop across the line.</li> <li>Check if the torque limit parameters have been set too low (L7-01 through L7-04).</li> <li>Reset the torque limit back to its default setting (200%).</li> </ul> <p>Increase both the minimum and mid output frequency voltages (E1-08 and E1-10).</p>   |
| The drive is set for both 2-Wire and 3-Wire sequence at the same time.  | <ul style="list-style-type: none"> <li>The drive is set for a 3-Wire sequence when one of parameters H1-03 through H1-07 is set to 0.</li> <li>If the drive is supposed to be set up for a 2-Wire sequence, then ensure parameters H1-03 through H1-07 are not set to 0.</li> <li>If the drive is supposed to be set up for a 3-Wire sequence, then H1-□□ must be set to 0.</li> </ul>   |

### ■ Motor Rotates in the Opposite Direction from the Run Command

| Cause   | Possible Solutions  |
|---|---|
| Phase wiring between the drive and motor is incorrect.  | <ul style="list-style-type: none"> <li>Check the motor wiring.</li> <li>Switch two motor cables (U, V, and W) to reverse motor direction.</li> <li>Connect drive output terminals U/T1, V/T2 and W/T3 in the right order to the corresponding motor terminals U, V, and W.</li> <li>Change the setting of parameter b1-14.</li> </ul>             |
| The forward direction for the motor is setup incorrectly.   | <p>Typically, forward is designated as being counterclockwise when looking from the motor shaft (refer to the figure below).</p> <div style="text-align: center;">  </div> <p>1. Forward Rotating Motor (looking down the motor shaft)<br/>2. Motor Shaft</p> |
| The motor is running at almost 0 Hz and the Speed Search estimated the speed to be in the opposite direction. | <ul style="list-style-type: none"> <li>Disable bi-directional search (b3-14 = "0") so that Speed Search is performed only in the specified direction.</li> </ul>  |

Note: Check the motor specifications for the forward and reverse directions. The motor specifications will vary depending on the manufacturer of the motor.

### ■ Motor Rotates in One Direction Only

| Cause  | Possible Solutions  |
|--|---|
| The drive prohibits reverse rotation.  | <ul style="list-style-type: none"> <li>Check parameter b1-04.</li> <li>Set the drive to allow the motor to rotate in reverse (b1-04 = "0").</li> </ul>      |
| A Reverse run signal has not been entered, although 3-Wire sequence is selected. | <ul style="list-style-type: none"> <li>Make sure that one of the input terminals S3 to S7 used for the 3-Wire sequence has been set for reverse.</li> </ul> |

### ■ Motor is Too Hot

| Cause   | Possible Solutions  |
|---|---|
| The load is too heavy.  | <p>If the load is too heavy for the motor, the motor will overheat as it exceeds its rated torque value for an extended period of time. Keep in mind that the motor also has a short-term overload rating in addition to the possible solutions provided below:</p> <ul style="list-style-type: none"> <li>Reduce the load.</li> <li>Increase the acceleration and deceleration times.</li> <li>Check the values set for the motor protection (L1-01, L1-02) as well as the motor rated current (E2-01).</li> <li>Increase motor capacity.</li> </ul> |
| The air around the motor is too hot.  | <ul style="list-style-type: none"> <li>Check the ambient temperature.</li> <li>Cool the area until it is within the specified temperature range.</li> </ul>   |
| The drive is operating in a vector control mode but Auto-Tuning has not yet been performed. | <ul style="list-style-type: none"> <li>Perform Auto-Tuning.</li> <li>Calculate the motor value and reset the motor parameters.</li> <li>Change the motor control method to V/f Control (A1-02 = "0").</li> </ul>  |

| Cause   | Possible Solutions   |
|---|--|
| Insufficient voltage insulation between motor phases. | When the motor is connected to terminals U/T1, V/T2, and W/T3, voltage surges occur between the motor coils and drive switching. Normally, surges can reach up to three times the drive input power supply voltage (600 V for 200 V class, and 1200 V for 400 V class). <ul style="list-style-type: none"> <li>• Use a motor with voltage tolerance higher than the max voltage surge.</li> <li>• Use a motor designed to work specifically with a drive when using a 400 V class unit.</li> <li>• Install an AC reactor on the output side of the drive.</li> </ul> |
| The motor fan has stopped or is clogged.              | Check the motor fan.   |

■ Drive Does Not Allow Selection of Rotational Auto-Tuning

| Cause  | Possible Solutions  |
|--|---|
| The drive is in the incorrect motor control method for Rotational Auto-Tuning. | <ul style="list-style-type: none"> <li>• Check if the drive is set to V/f Control by accident (A1-02 = 0).</li> <li>• Change the motor control method to Open Loop Vector Control (A1-02 = "2").</li> </ul> |

■ Motor Hunting Occurs at Low Speeds

| Cause   | Possible Solutions  |
|---|---|
| Excessive load inertia in Open Loop Vector Control. | <ul style="list-style-type: none"> <li>• Excess load inertia can cause motor hunting in Open Loop Vector Control due to slow motor response.</li> <li>• Increase the speed feedback detection control time constant (n2-02) from its default value of 50 ms to an appropriate level between 200 and 1000 ms. Adjust this setting in combination with n2-03 (Feedback Detection Control Time Constant 2).</li> </ul> |

■ Overvoltage Occurs When Running at a Constant Speed

| Cause   | Possible Solutions   |
|---|--|
| Excessive load inertia in Open Loop Vector Control. | <ul style="list-style-type: none"> <li>• Loads with a lot of inertia (fans, etc.) can trigger an overvoltage fault when operating in Open Loop Vector Control.</li> <li>• Switch to the V/f motor control method.</li> <li>• Adjust the values set for the speed feedback detection control time constant (n2-02, n2-03).</li> </ul> |

■ Motor Stalls During Acceleration or With Large Loads

| Cause              | Possible Solutions   |
|--------------------|--|
| Load is too heavy. | Take the following steps to resolve the problem: <ul style="list-style-type: none"> <li>• Reduce the load.</li> <li>• Increase the acceleration time.</li> <li>• Increase motor capacity.</li> <li>• Although the drive has a Stall Prevention function and a Torque Compensation Limit function, accelerating too quickly or trying to drive an excessively large load can exceed the capabilities of the motor.</li> </ul> |

■ Motor Will Not Accelerate or the Acceleration Time is Too Long

| Cause  | Possible Solutions   |
|--|--|
| Frequency reference is too low.  | <ul style="list-style-type: none"> <li>• Check the maximum output frequency (E1-04).</li> <li>• Increase E1-04 if it is set too low.</li> </ul> Check U1-01 for proper frequency reference.<br>Check if a frequency reference signal switch has been set to one of the multi-function input terminals.<br>Check for low gain level set to terminals A1 or A2 (H3-03, H3-11).   |
| Load is too heavy.   | <ul style="list-style-type: none"> <li>• Reduce the load so that the output current remains within the motor-rated current.</li> <li>• In extruder and mixer applications, the load will sometimes increase as the temperature drops.</li> </ul> Check if the mechanical brake is fully releasing as it should.  |
| The torque limit function is operating in Open Loop Vector Control.                                  | <ul style="list-style-type: none"> <li>• Check the torque limit setting. It may be too low. (L7-01 through L7-04).</li> <li>• Reset the torque limit to its default value (200%).</li> </ul>   |
| Acceleration time has been set too long.   | Check if the acceleration time parameters have been set too long (C1-01, -03, -05, -07).   |
| Motor characteristics and drive parameter settings are incompatible with one another in V/f Control. | <ul style="list-style-type: none"> <li>• Set the correct V/f pattern so that it matches the characteristics of the motor being used.</li> <li>• Check E1-03 (V/f Pattern Selection).</li> </ul>  |
| The right combination of motor characteristics have not been set in Open Loop Vector Control.        | Execute Rotational Auto-Tuning.  |
| Incorrect frequency reference setting.   | <ul style="list-style-type: none"> <li>• Check the multi-function analog input settings.</li> <li>• Check if multi-function analog input terminal A1 or A2 is set for frequency gain (H3-02 or H3-10 = "1"). If so, the frequency reference will be 0 if there is no voltage (current) input provided.</li> <li>• Ensure H3-02 and H3-10 are set to the proper values.</li> <li>• Ensure the analog input value is set to the right value (U1-13, U1-14).</li> </ul> |
| The Stall Prevention level during acceleration and deceleration set too low.                         | <ul style="list-style-type: none"> <li>• Check the Stall Prevention level during acceleration (L3-02).</li> <li>• If L3-02 is set too low, acceleration will take a fair amount of time.</li> <li>• Increase L3-02.</li> </ul>   |

## 6.9 Troubleshooting without Fault Display

| Cause   | Possible Solutions   |
|---|--|
| The Stall Prevention level during run has been set too low.   | <ul style="list-style-type: none"> <li>• Check the Stall Prevention level during run (L3-06).</li> <li>• If L3-06 is set too low, speed will drop as the drive outputs torque.</li> <li>• Increase the setting value.</li> </ul>   |
| Although the drive is operating in Open Loop Vector motor control method, Auto-Tuning has not been performed. | <ul style="list-style-type: none"> <li>• Perform Auto-Tuning.</li> <li>• Calculate motor data and reset motor parameters.</li> <li>• Switch to the V/f motor control method (A1-02 = "0").</li> </ul>  |
| Drive reached the limitations of the V/f motor control method.  | <ul style="list-style-type: none"> <li>• The motor cable may be long enough (over 50 m) to require Auto-Tuning for line-to-line resistance.</li> <li>• Be aware that V/f Control is comparatively limited when it comes to producing torque at low speeds.</li> <li>• Consider switching to Open Loop Vector Control.</li> </ul> |

### ■ Drive Frequency Reference Differs from the Controller Frequency Reference Command

| Cause   | Possible Solutions  |
|---|---|
| The analog input frequency gain and bias are set to incorrect values.         | <ul style="list-style-type: none"> <li>• Check the main speed frequency reference terminal input gain level assigned to terminals A1 and A2, as well as the frequency reference input bias to terminals A1 and A2 (parameters H3-03, H3-04, and H3-12).</li> <li>• Set these parameters to the appropriate values.</li> </ul>   |
| A frequency bias signal is being entered via analog input terminals A1 or A2. | <ul style="list-style-type: none"> <li>• If multi-function analog input terminals A1 and A2 are set for frequency reference (H3-02 = 0 and H3-10 = 0), the addition of both signals builds the frequency reference.</li> <li>• Ensure that H3-02 and H3-10 are set appropriately.</li> <li>• Check the input level set for terminals A1 and A2 (U1-13, U1-14).</li> </ul> |

### ■ Poor Speed Control Accuracy

| Cause   | Possible Solutions  |
|---|---|
| Drive reached the slip compensation limit.                          | <ul style="list-style-type: none"> <li>• Check the slip compensation limit (C3-03).</li> <li>• Increase the value set to C3-03.</li> </ul>  |
| Motor-rated voltage is set too high in Open Loop Vector Control.    | <ul style="list-style-type: none"> <li>• The input voltage for the drive determines the maximum output voltage. A drive with an input of 200 Vac can only output a maximum of 200 Vac. Open Loop Vector Control sometimes calculates an output voltage reference value that exceeds the maximum drive output voltage level, resulting in a loss of speed control accuracy.</li> <li>• Use a motor with a lower voltage rating (a vector control motor).</li> <li>• Increase the input power voltage.</li> </ul> |
| Auto-Tuning did not complete properly for Open Loop Vector Control. | <ul style="list-style-type: none"> <li>• Perform Auto-Tuning again.</li> </ul>  |

### ■ Deceleration Takes Longer Than Expected with Dynamic Braking Enabled

| Cause  | Possible Solutions   |
|--|--|
| L3-04 is set incorrectly.  | <ul style="list-style-type: none"> <li>• Check the Stall Prevention Level during deceleration (L3-04).</li> <li>• If a braking resistor option has been installed, disable Stall Prevention during deceleration (L3-04 = "0").</li> </ul>  |
| The deceleration time is set too long.   | Set deceleration to more appropriate time (C1-02, C1-04, C1-06, C1-08).  |
| Insufficient motor torque.   | <ul style="list-style-type: none"> <li>• Assuming parameter settings are normal and that no overvoltage occurs when there is insufficient torque, it is likely that the demand on the motor has exceeded the motor capacity.</li> <li>• Use a larger motor.</li> </ul>   |
| Reaching the torque limit.   | <ul style="list-style-type: none"> <li>• Check the settings for the torque limit (L7-01 through L7-04).</li> <li>• If the torque limit is enabled, deceleration might take longer than expected because the drive cannot output more torque than the limit setting. Ensure the torque limit is set to a large enough value.</li> <li>• Increase the torque limit setting.</li> <li>• If multi-function analog input terminal A1 or A2 is set to torque limit (H3-02 or H3-10 equals 10, 11, 12, or 15), ensure that the analog input levels are set to the correct levels.</li> <li>• Ensure H3-02 and H3-10 are set to the right levels.</li> <li>• Ensure the analog input is set to the correct value.</li> </ul> |
| Load exceeded the internal torque limit determined by the drive rated current. | Switch to a larger capacity drive.   |

### ■ Motor Hunting Occurs When Operating With a Light Load

| Cause   | Possible Solutions   |
|---|--|
| Carrier frequency is too high.  | Lower the carrier frequency setting C6-02.   |
| Large V/f setting value at low speeds triggers overexcitation.  | <ul style="list-style-type: none"> <li>• Select the proper V/f pattern (E1-03).</li> <li>• Use parameters E1-04 through E1-10 to set the V/f pattern in relation to the load characteristics.</li> </ul>         |
| The maximum output frequency and the base frequency reference are not set properly in relationship to each other. | Set the proper values for the maximum output frequency and base frequency (E1-04, E1-06).  |
| Hunting Prevention is disabled (V/f control only).  | <ul style="list-style-type: none"> <li>• Enable Hunting Prevention by setting n1-01 = "1".</li> <li>• (OLV only) Increase the speed feedback detection control gain and time constant (n2-01, n2-02).</li> </ul> |

### ■ Load Falls When Brake is Applied (Hoist-Type Applications)

| Cause  | Possible Solutions   |
|--|--|
| The timing for the brake to close and release is not set properly. | Use frequency reference detection for closing and releasing the brake. <ul style="list-style-type: none"> <li>• At start: Release the brake after creating enough torque.</li> <li>• At stop: Close the brake when the motor still produces torque.</li> </ul> Make the following setting changes to hold the brake: <ul style="list-style-type: none"> <li>• Set the frequency detection inactive during baseblock (L4-07 = 0).</li> <li>• Multi-function contact output terminal will switch on when the output frequency is greater than the frequency detection level set in L4-01. Set L4-01 between 1.0 and 3.0 Hz.</li> <li>• Slipping may occur when stopping because hysteresis is used in Frequency Reference 2 (where the frequency agree setting in L4-02 is 2.0 Hz). To prevent this, change the setting to 0.1 Hz.</li> <li>• Do not use the multi-function contact output setting "During Run" (H2-01 = 0) for the brake signal.</li> </ul> |
| Insufficient DC Injection Braking.                                 | Increase the amount of DC Injection Braking (b2-02).   |

### ■ Noise From Drive or Output Lines When the Drive is Powered On

| Cause   | Possible Solutions   |
|---|--|
| Relay switching in the drive generates excessive noise. | <ul style="list-style-type: none"> <li>• Lower the carrier frequency (C6-02).</li> <li>• Install a noise filter on the input side of drive input power.</li> <li>• Install a noise filter on the output side of the drive.</li> <li>• Place the wiring inside a metal conduit to shield it from switching noise.</li> <li>• Ground the drive and motor properly.</li> <li>• Separate the main circuit wiring and the control lines.</li> </ul> |

### ■ Ground Fault Circuit Interrupter (GFCI) Trips During Run

| Cause                                 | Possible Solutions   |
|---------------------------------------|--|
| Excessive leakage current trips MCCB. | <ul style="list-style-type: none"> <li>• Increase the GFCI sensitivity or use GFCI with a higher threshold.</li> <li>• Lower the carrier frequency (C6-02).</li> <li>• Reduce the length of the cable used between the drive and the motor.</li> <li>• Install a noise filter or reactor on the output side of the drive.</li> </ul> |

### ■ Connected Machinery Vibrates When Motor Rotates

#### Excessive Motor Oscillation and Erratic Rotation

| Cause                              | Possible Solutions   |
|------------------------------------|--|
| Poor balance between motor phases. | Check drive input power voltage to ensure that it provides stable power. |

#### Unexpected Noise from Connected Machinery

| Cause  | Possible Solutions  |
|--|---|
| The carrier frequency is at the resonant frequency of the connected machinery.               | Adjust the carrier frequency using parameters C6-02 through C6-05.  |
| The drive output frequency is the same as the resonant frequency of the connected machinery. | <ul style="list-style-type: none"> <li>• Adjust the parameters used for the Jump Frequency function (d3-01 through d3-04) to skip the problem-causing bandwidth.</li> <li>• Place the motor on a rubber pad to reduce vibration.</li> </ul> |

Note: The drive may have trouble assessing the status of the load due to white noise generated when using Swing PWM (C6-02 = 7 to A).

### ■ Oscillation or Hunting

| Cause  | Possible Solutions   |
|--|--|
| Insufficient tuning in Open Loop Vector Control                                    | Adjust the following parameters in the order listed. <ul style="list-style-type: none"> <li>• An increase in gain should be followed with an increase in the primary delay time constant.</li> <li>• C4-02 (Torque Compensation Primary Delay Time)</li> <li>• n2-01 (Speed Feedback Detection Control [AFR] Time Constant 1)</li> <li>• C3-02 (Slip Compensation Primary Delay Time)</li> </ul> The response for torque compensation and slip compensation will drop as the time constant is increased. |
| Auto-Tuning has not yet been performed (required for Open Loop Vector Control).    | Perform Auto-Tuning.<br>Set motor parameters after calculating the proper values.<br>Change the motor control method to V/f Control (A1-02 = "0").   |
| Insufficient tuning in V/f Control.  | Reduce the gain. <ul style="list-style-type: none"> <li>• n1-02 (Hunting Prevention Gain Setting)</li> <li>• n1-03 (Hunting Prevention Time Constant Setting)</li> </ul>   |
| Gain is too low when using PID control.  | Check the period of oscillation and adjust P, I, and D settings accordingly.   |
| The frequency reference is assigned to an external source and the signal is noisy. | <ul style="list-style-type: none"> <li>• Ensure that noise is not affecting the signal lines.</li> <li>• Separate main circuit wiring and control circuit wiring.</li> <li>• Use twisted-pair cables or shielded wiring for the control circuit.</li> <li>• Increase the analog input time filter constant (H3-13).</li> </ul>   |
| The cable between the drive and motor is too long.                                 | <ul style="list-style-type: none"> <li>• Perform Auto-Tuning.</li> <li>• Reduce the length of the cable.</li> </ul>  |

## 6.9 Troubleshooting without Fault Display

### ■ PID output fault

| Cause   | Possible Solutions  |
|---|---|
| No PID feedback input.  | <ul style="list-style-type: none"> <li>Check the multi-function analog input terminal settings.</li> <li>Set multi-function analog input terminal A1 or A2 for PID feedback (H3-02 or H3-10 = "B").</li> <li>A signal input to the terminal selection for PID feedback is necessary.</li> <li>Check the connection of the feedback signal.</li> <li>Check the various PID-related parameter settings.</li> <li>No PID feedback input to the terminal causes the value detected to be 0, causing a PID fault and the drive to operate at max frequency.</li> </ul> |
| The level of detection and the target value do not correspond with each other.  | <ul style="list-style-type: none"> <li>PID control keeps the difference between target and detection values at 0. Set the input level for the values relative to one another.</li> <li>Use analog input gains H3-03/11 to adjust PID target and feedback signal scaling.</li> </ul>   |
| Reverse drive output frequency and speed detection. When output frequency rises, the sensor detects a speed decrease. | Set PID output for reverse characteristics (b5-09 = "1").   |

### ■ Insufficient Motor Torque

| Cause  | Possible Solutions              |
|--|---------------------------------|
| Auto-Tuning has not yet been performed (required for OLV Control). | Perform Auto-Tuning.            |
| The control mode was changed after performing Auto-Tuning.         | Perform Auto-Tuning again.      |
| Only Line-to-Line Resistance Auto-Tuning was performed.            | Perform Rotational Auto-Tuning. |

### ■ Motor Rotates After the Drive Output Is Shut Off

| Cause  | Possible Solutions  |
|--|---|
| Low DC Injection Braking and the drive cannot decelerate properly. | <ul style="list-style-type: none"> <li>Adjust the DC Injection braking settings.</li> <li>Increase the value of b2-02 (DC Injection Braking Current).</li> <li>Increase the b2-04 (DC Injection Braking Time at Stop).</li> </ul> |

### ■ ov or Speed Loss Occurs When Starting into a Rotating Load

| Cause  | Possible Solutions  |
|--|---|
| The load is already rotating when the drive is trying to start it. | <ul style="list-style-type: none"> <li>Stop the motor using DC Injection braking. Restart the motor.</li> <li>Increase the value of b2-03 (DC Injection Braking Time at start).</li> <li>Enable Speed Search at start (b3-01 = "1").</li> <li>Set a multi-function input terminal for external Speed Search command (H1-□□="61" or "62" during restart).</li> </ul> |

### ■ Output Frequency is not as High as Frequency Reference

| Cause   | Possible Solutions   |
|---|--|
| Frequency reference is set within the range of the Jump Frequency.  | <ul style="list-style-type: none"> <li>Adjust the parameters used for the Jump Frequency function (d3-01, d3-02, d3-03).</li> <li>Enabling the Jump Frequency prevents the drive from outputting the frequencies specified in the Jump Frequency range.</li> </ul>                                       |
| Upper limit for the frequency reference has been exceeded.          | <ul style="list-style-type: none"> <li>Set the maximum output frequency and the upper limit for the frequency reference to more appropriate values (E1-04, d2-01).</li> <li>The following calculation yields the upper value for the output frequency = <math>E1-04 \times d2-01 / 100</math></li> </ul> |
| Large load triggered Stall Prevention function during acceleration. | <ul style="list-style-type: none"> <li>Reduce the load.</li> <li>Adjust the Stall Prevention level during acceleration (L3-02).</li> </ul>   |

### ■ Buzzing Sound from Motor at 2 kHz

| Cause   | Possible Solutions   |
|---|--|
| Exceeded 110% of the rated output current of the drive while operating at low speeds. | <ul style="list-style-type: none"> <li>If the output current rises too high at low speeds, the carrier frequency automatically reduces and causes a whining or buzzing sound.</li> <li>If the sound is coming from the motor, disable carrier frequency derating (L8-38 = "0").</li> <li>Disabling the automatic carrier frequency derating increases the chances of an overload fault (oL2). Switch to a larger capacity motor if oL2 faults occur too frequently.</li> </ul> |

### ■ Unstable Motor Speed when Using PM or IPM

| Cause   | Possible Solutions   |
|---|--|
| The motor code for PM (E5-01) is set incorrectly. (Yaskawa motors only) | Set parameter E5-01 in accordance with the motor being used.   |
| The drive is operating at less than 10% of the speed reference.         | Consult with Yaskawa about using a different type of motor when attempting to operate at 10% of the speed reference.   |
| Motor hunting occurs.   | Set and carefully adjust the following parameters in the order listed: <ul style="list-style-type: none"> <li>n8-45 (Speed Feedback Detection Suppression Gain)</li> <li>n8-55 (Load Inertia for PM Motors)</li> <li>C4-02 (Torque Compensation Primary Delay Time)</li> </ul> |
| Hunting occurs at start.  | Increase the S-curve time at the start of acceleration (C2-01).  |

| Cause  | Possible Solutions  |
|--|---|
| Too much current is flowing through the drive. | <ul style="list-style-type: none"> <li>• If using a PM motor, set the correct motor code to E5-01.</li> <li>• If using a specialized motor, set parameter E5-xx to the correct value according to the Motor Test Report.</li> </ul> |

■ Motor Does Not Operate When the RUN Button on the Digital Operator is Pressed

| Cause   | Possible Solutions  |
|---|---|
| The LOCAL/REMOTE mode is not selected properly. | Press the LOCAL/REMOTE button to switch. The LO/RE LED should be on for LOCAL mode.   |
| The drive is not in drive mode.                 | A run command will not be issued. Exit to the drive mode and cycle the run command.   |
| The frequency reference is too low.             | <ul style="list-style-type: none"> <li>• If the frequency reference is set below the frequency set in E1-09 (Minimum Output Frequency), the drive will not operate.</li> <li>• Raise the frequency reference to at least the minimum output frequency.</li> </ul> |

■ Motor Does Not Operate When an External Run Command is Input

| Cause   | Possible Solutions  |
|---|---|
| The LOCAL/REMOTE mode is not selected properly. | Press the LOCAL/REMOTE button to switch. The LO/RE LED should be off for REMOTE mode.   |
| The drive is not in Drive Mode.                 | A run command will not be issued. Exit to the Drive mode and cycle the run command.   |
| The frequency reference is too low.             | <ul style="list-style-type: none"> <li>• If the frequency reference is set below the frequency set in E1-09 (Minimum Output Frequency), the drive will not operate.</li> <li>• Raise the frequency reference to at least the minimum output frequency.</li> </ul> |

■ Motor Stops During Acceleration or When a Load is Connected

| Cause  | Possible Solution  |
|--|--|
| <ul style="list-style-type: none"> <li>• The load is too heavy.</li> <li>• The limit of motor response may be reached during rapid acceleration. This may be a result of improper stall prevention or automatic torque boost function adjustment.</li> </ul> | Increase the acceleration time (C1-01) or reduce the motor load. Also, consider increasing the motor size and/or drive size. |

■ Motor Rotates in One Direction Only

| Cause  | Possible Solution                               |
|--|---|
| "Reverse run prohibited" is selected. If b1-04 (Reverse Prohibit Operation) is set to 1 (reverse run prohibited), the drive will not accept a reverse run command. | Set b1-04 = "0" to allow reverse run operation. |

■ Motor Operates at a Higher Speed than the Speed Command

| Cause  | Possible Solution   |
|--|---|
| PID is enabled. If the PID mode is enabled (b5-01 = 1 to 4), the drive output frequency will change to regulate the process variable to the target setpoint. The PID can command a speed up to maximum output frequency (E1-04). | If PID operation is not target, disable PID by setting b5-01 = "0". |

■ Poor Speed Control Accuracy Above Base Speed in Open Loop Vector Motor Control Method

| Cause   | Possible Solution   |
|---|---|
| The maximum output voltage of the drive is determined by its input voltage. Vector control uses voltage to control the currents within the motor. If the vector control voltage reference value exceeds the drive output voltage capability, the speed control accuracy will decrease because the motor currents cannot be properly controlled. | Use a motor with a lower rated voltage compared to the input voltage. |

■ Peripheral Devices Affected by Drive Operation

| Cause   | Possible Solutions  |
|---|---|
| Radio frequency interference may be generated by drive output PWM waveform. | <ul style="list-style-type: none"> <li>• Change the Carrier Frequency Selection (C6-02) to lower the carrier frequency. This will help to reduce the amount of transistor switching noise.</li> <li>• Install an Input Noise Filter at the input power terminals.</li> <li>• Install an Output Noise Filter at the motor terminals.</li> <li>• Use conduit. Metal can shield electrical noise.</li> <li>• Ground the drive and motor.</li> <li>• Separate main circuit wiring from control wiring.</li> </ul> |

## 6.9 Troubleshooting without Fault Display

### ■ Ground Fault Interrupter Activates When Drive is Running

| Cause  | Possible Solutions   |
|--|--|
| The output of the drive is a series of high frequency pulses (PWM), so there is a certain amount of leakage current. This may cause the ground fault interrupter to operate and cut off the drive input power. | <ul style="list-style-type: none"><li>• Change to a ground fault interrupter with a higher leakage current detection level (such as, a sensitivity current of 200 mA or greater per Unit, with an operating time of 0.1 s or more), or one that incorporates high-frequency corrective actions.</li><li>• Change the Carrier Frequency Selection (C6-02) to lower the carrier frequency.</li></ul> <p>Note: Leakage current increases in proportion to cable length.</p> |



## Troubleshooting

|  |             |
|--|-------------|
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## 9.1 Alarm Displays

The following sections describe troubleshooting in response to alarm displays.

The alarm name, alarm meaning, alarm stopping method, and alarm reset capability are listed in order of the alarm numbers in *9.1.1 List of Alarms*.

The causes of alarms and troubleshooting methods are provided in *9.1.2 Troubleshooting of Alarms*.

### 9.1.1 List of Alarms

This section provides list of alarms.

#### ■ Servomotor Stopping Method

If an alarm occurs, the servomotor can be stopped by doing either of the following operations.

**Gr.1:** The servomotor is stopped according to the setting in Pn001.0 if an alarm occurs. Pn001.0 is factory-set to stop the servomotor by applying the DB.

**Gr.2:** The servomotor is stopped according to the setting in Pn00B.1 if an alarm occurs. Pn00B.1 is factory-set to stop the servomotor by setting the speed reference to "0." The servomotor under torque control will always use the Gr.1 method to stop. By setting Pn00B.1 to 1, the servomotor stops using the same method as Gr.1. When coordinating a number of servomotors, use this stopping method to prevent machine damage that may result due to differences in the stop method.

#### ■ Alarm Reset

**Available:** Removing the cause of alarm and then executing the alarm reset can clear the alarm.

**N/A:** Executing the alarm reset cannot clear the alarm.

| Alarm Number | Alarm Name  | Meaning   | Servo-motor Stopping Method | Alarm Reset |
|--------------|---|---|-----------------------------|-------------|
| A-020        | Parameter Checksum Error 1                                    | The data of the parameter in the SERVOPACK is incorrect.  | Gr.1                        | N/A         |
| A-021        | Parameter Format Error 1                                      | The data of the parameter in the SERVOPACK is incorrect.  | Gr.1                        | N/A         |
| A-022        | System Checksum Error 1                                       | The data of the parameter in the SERVOPACK is incorrect.  | Gr.1                        | N/A         |
| A-030        | Main Circuit Detector Error                                   | Detection data for main circuit is incorrect.   | Gr.1                        | Available   |
| A-040        | Parameter Setting Error 1                                     | The parameter setting is outside the setting range.   | Gr.1                        | N/A         |
| A-041        | Encoder Output Pulse Setting Error                            | The encoder output pulse (Pn212) is outside the setting range or does not satisfy the setting conditions.                               | Gr.1                        | N/A         |
| A-042        | Parameter Combination Error                                   | Combination of some parameters exceeds the setting range.   | Gr.1                        | N/A         |
| A-044        | Semi-closed/Fully-closed Loop Control Parameter Setting Error | The settings of the option module and Pn00B.3, Pn002.3 do not match.  | Gr.1                        | N/A         |
| A-04A        | Parameter Setting Error 2                                     | Bank member/bank data setting is incorrect.   | Gr.1                        | N/A         |
| A-050        | Combination Error   | The SERVOPACK and the servomotor capacities do not match each other.  | Gr.1                        | Available   |
| A-051        | Unsupported Device Alarm                                      | The device unsupported was connected.   | Gr.1                        | N/A         |
| A-050        | Cancelled Servo ON Command Alarm                              | After executing the utility function to turn ON the power to the motor, the servo ON command (SV_ON) was sent from the host controller. | Gr.1                        | Available   |
| A-100        | Overcurrent or Heat Sink Overheated                           | An overcurrent flowed through the IGBT or the heat sink of the SERVOPACK was overheated.  | Gr.1                        | N/A         |
| A-300        | Regeneration Error  | Regenerative circuit or regenerative resistor is faulty.  | Gr.1                        | Available   |

(cont'd)

| Alarm Number   | Alarm Name                               | Meaning   | Servo-motor Stopping Method | Alarm Reset |
|----------------|--|---|-----------------------------|-------------|
| A-320          | Regenerative Overload                    | Regenerative energy exceeds regenerative resistor capacity.   | Gr.2                        | Available   |
| A-330          | Main Circuit Power Supply Wiring Error   | <ul style="list-style-type: none"> <li>Setting of AC input/DC input is incorrect.</li> <li>Power supply wiring is incorrect.</li> </ul> | Gr.1                        | Available   |
| A-400          | Overvoltage                              | Main circuit DC voltage is excessively high.  | Gr.1                        | Available   |
| A-410          | Undervoltage                             | Main circuit DC voltage is excessively low.   | Gr.2                        | Available   |
| A-450          | Main-Circuit Capacitor Overvoltage       | The capacitor of the main circuit has deteriorated or is faulty.  | Gr.1                        | N/A         |
| A-510          | Overspeed                                | The servomotor speed is above the maximum rotational speed.   | Gr.1                        | Available   |
| A-511          | Overspeed of Encoder Output Pulse Rate   | The pulse output speed upper limit of the set encoder output pulse (Pn212) is exceeded.   | Gr.1                        | Available   |
| A-520          | Vibration Alarm                          | Incorrect vibration at the motor speed was detected.  | Gr.1                        | Available   |
| A-521          | Autotuning Alarm                         | Vibration was detected while performing tuning-less function.   | Gr.1                        | Available   |
| A-710          | Overload: High Load                      | The motor was operating for several seconds to several tens of seconds under a torque largely exceeding ratings.                        | Gr.2                        | Available   |
| A-720          | Overload: Low Load                       | The motor was operating continuously under a torque exceeding ratings.  | Gr.1                        | Available   |
| A-730<br>A-731 | Dynamic Brake Overload                   | When the dynamic brake was applied, rotational energy exceeded the capacity of dynamic brake resistor.                                  | Gr.1                        | Available   |
| A-740          | Overload of Surge Current Limit Resistor | The main circuit power was frequently turned ON and OFF.  | Gr.1                        | Available   |
| A-7A0          | Heat Sink Overheated                     | The heat sink of the SERVOPACK exceeded 100°C.  | Gr.2                        | Available   |
| A-7AB          | Built-in Fan in SERVOPACK Stopped        | The fan inside the SERVOPACK stopped.   | Gr.1                        | Available   |
| A-810          | Encoder Backup Error                     | The power supplies to the encoder all failed and position data was lost.  | Gr.1                        | N/A         |
| A-820          | Encoder Checksum Error                   | The checksum results of encoder memory is incorrect.  | Gr.1                        | N/A         |
| A-830          | Absolute Encoder Battery Error           | The battery voltage was lower than the specified value after the control power supply was turned ON.                                    | Gr.1                        | Available   |
| A-840          | Encoder Data Error                       | Data in the encoder is incorrect.   | Gr.1                        | N/A         |
| A-850          | Encoder Overspeed                        | The encoder was rotating at high speed when the power was turned ON.  | Gr.1                        | N/A         |
| A-860          | Encoder Overheated                       | The internal temperature of encoder is too high.  | Gr.1                        | N/A         |
| A-8A0*         | External Encoder Error                   | External encoder is faulty.   | Gr.1                        | Available   |
| A-8A1*         | External Encoder Error of Module         | Serial converter unit is faulty.  | Gr.1                        | Available   |
| A-8A2*         | External Encoder Error of Sensor         | External encoder is faulty.   | Gr.1                        | Available   |
| A-8A3*         | External Encoder Error of Position       | The position data of external encoder is faulty.  | Gr.1                        | Available   |
| A-8A5*         | External Encoder Overspeed               | The overspeed from the external encoder occurred.   | Gr.1                        | Available   |
| A-8A6*         | External Encoder Overheated              | The overheat from the external encoder occurred.  | Gr.1                        | Available   |
| A-831          | Current Detection Error 1                | The current detection circuit for phase U is faulty.  | Gr.1                        | N/A         |

\* The alarm that may occur in a SERVOPACK with option module for fully-closed loop control.

(cont'd)

| Alarm Number | Alarm Name   | Meaning   | Servo-motor Stopping Method | Alarm Reset |
|--------------|--|---|-----------------------------|-------------|
| A.b32        | Current Detection Error 2                                      | The current detection circuit for phase V is faulty.  | Gr.1                        | N/A         |
| A.b33        | Current Detection Error 3                                      | The detection circuit for the current is faulty.  | Gr.1                        | N/A         |
| A.b6A        | MECHATROLINK Communications ASIC Error 1                       | ASIC error occurred in the MECHATROLINK communications.   | Gr.1                        | N/A         |
| A.bF0        | System Alarm 0   | "Internal program error 0" of the SERVOPACK occurred.   | Gr.1                        | N/A         |
| A.bF1        | System Alarm 1   | "Internal program error 1" of the SERVOPACK occurred.   | Gr.1                        | N/A         |
| A.bF2        | System Alarm 2   | "Internal program error 2" of the SERVOPACK occurred.   | Gr.1                        | N/A         |
| A.bF3        | System Alarm 3   | "Internal program error 3" of the SERVOPACK occurred.   | Gr.1                        | N/A         |
| A.bF4        | System Alarm 4   | "Internal program error 4" of the SERVOPACK occurred.   | Gr.1                        | N/A         |
| A.C10        | Servo Overrun Detected   | The servomotor ran out of control.  | Gr.1                        | Available   |
| A.C80        | Absolute Encoder Clear Error and Multiturn Limit Setting Error | The multiturn for the absolute encoder was not properly cleared or set.   | Gr.1                        | N/A         |
| A.C90        | Encoder Communications Error                                   | Communications between the SERVOPACK and the encoder is not possible.   | Gr.1                        | N/A         |
| A.C91        | Encoder Communications Position Data Error                     | An encoder position data calculation error occurred.  | Gr.1                        | N/A         |
| A.C92        | Encoder Communications Timer Error                             | An error occurs in the communications timer between the encoder and the SERVOPACK.  | Gr.1                        | N/A         |
| A.CA0        | Encoder Parameter Error  | Encoder parameters are faulty.  | Gr.1                        | N/A         |
| A.C50        | Encoder Echoback Error   | Contents of communications with encoder are incorrect.  | Gr.1                        | N/A         |
| A.CC0        | Multiturn Limit Disagreement                                   | Different multiturn limits have been set in the encoder and the SERVOPACK.  | Gr.1                        | N/A         |
| A.CF1*       | Feedback Option Module Communications Error (Reception error)  | Reception from the Feedback Option Module is faulty.  | Gr.1                        | N/A         |
| A.CF2*       | Feedback Option Module Communications Error (Timer stop)       | Timer for communications with the Feedback Option Module is faulty.   | Gr.1                        | N/A         |
| A.d00        | Position Error Overflow  | Position errors exceeded parameter Pn520.   | Gr.1                        | Available   |
| A.d01        | Position Error Overflow Alarm at Servo ON                      | This alarm occurs if the SV_ON command is received when the position error is greater than the set value of Pn526 while the servomotor power is OFF.  | Gr.1                        | Available   |
| A.d02        | Position Error Overflow Alarm by Speed Limit at Servo ON       | When the position error remain in the error counter, Pn529 limits the speed if the SV_ON command is received. If Pn529 limits the speed in such a state, this alarm occurs when position references are input and the number of position errors exceeds the value set for the excessive position error alarm level (Pn520). | Gr.2                        | Available   |
| A.d10*       | Motor-load Position Error Overflow                             | During fully-closed loop control, the position error between motor and load is excessive.   | Gr.2                        | Available   |
| A.E02        | MECHATROLINK-II Internal Synchronization Error 1               | Synchronization error during MECHATROLINK-II communications with the SERVOPACK.   | Gr.1                        | Available   |

\* The alarm that may occur in a SERVOPACK with Fully-closed Module.

(cont'd)

| Alarm Number | Alarm Name  | Meaning  | Servo-motor Stopping Method | Alarm Reset |
|--------------|---|--|-----------------------------|-------------|
| A.E40        | MECHATROLINK-II Transmission Cycle Setting Error                          | The setting of the MECHATROLINK-II transmission cycle is out of the allowable range.         | Gr.2                        | Available   |
| A.E50        | MECHATROLINK-II Synchronization Error                                     | A synchronization error occurs during MECHATROLINK-II communications.                        | Gr.2                        | Available   |
| A.E51        | MECHATROLINK-II Synchronization Failed                                    | A synchronization failure occurs in MECHATROLINK-II communications.                          | Gr.2                        | Available   |
| A.E60        | MECHATROLINK-II Communications Error (Reception error)                    | A communications error occurs continuously during MECHATROLINK-II communications.            | Gr.2                        | Available   |
| A.E61        | MECHATROLINK-II Transmission Cycle Error (Synchronization interval error) | The transmission cycle fluctuates during MECHATROLINK-II communications.                     | Gr.2                        | Available   |
| A.E72*       | Feedback Option Module Detection Failure                                  | Detection of the Feedback Option Module failed.  | Gr.1                        | N/A         |
| A.EA2        | DRV Alarm 2 (SERVOPACK WDT error)   | A SERVOPACK DRV alarm 0 occurs.  | Gr.2                        | Available   |
| A.E61        | Safety Function Signal Input Timing Error                                 | The safety function signal input timing is faulty.   | Gr.1                        | N/A         |
| A.ED1        | Command Execution Timeout   | A timeout error occurred when using a MECHATROLINK command.                                  | Gr.2                        | Available   |
| A.F10        | Main Circuit Cable Open Phase   | With the main power supply ON, voltage was low for more than 1 second in phase R, S, or T.   | Gr.2                        | Available   |
| CPF00        | Digital Operator Transmission Error 1                                     | Digital operator (JUSP-OP05A-1-E) fails to communicate with the SERVOPACK (e.g., CPU error). | -                           | N/A         |
| CPF01        | Digital Operator Transmission Error 2                                     |  | -                           | N/A         |
| A.---        | Not an error  | Normal operation status  | -                           | -           |

\* The alarm that may occur in a SERVOPACK with Fully-closed Module.

### 9.1.2 Troubleshooting of Alarms

If an error occurs in servo drives, an alarm display such as A.□□□ and CPF□□ will appear on the panel display.

Refer to the following table to identify the cause of an alarm and the action to be taken. Contact your Yaskawa representative if the problem cannot be solved by the described corrective action.

| Alarm Number:<br>Alarm Name<br>(Alarm Description)  | Cause  | Investigative Actions   | Corrective Actions  |
|---|--|---|---|
| A.020:<br>Parameter Checksum<br>Error 1<br>(The parameter data in the SERVOPACK is incorrect.)  | The power supply voltage suddenly dropped.   | Measure the power supply voltage.   | Set the power supply voltage within the specified range, and set Fn005 to initialize the parameter.                                   |
|   | The power supply went OFF while changing a parameter setting.  | Check the circumstances when the power supply went OFF.   | Set Fn005 to initialize the parameter and then set the parameter again.   |
|   | The number of times that parameters were written exceeded the limit.                                   | Check to see if the parameters were frequently changed through the host controller.                           | The SERVOPACK may be faulty. Replace the SERVOPACK. Reconsider the method of writing parameters.                                      |
|   | Malfunction caused by noise from the AC power supply or grounding line, static electricity noise, etc. | Turn the power supply ON and OFF several times. If the alarm still occurs, there may be noise interference.   | Take countermeasures against noise.   |
|   | Gas, water drops, or cutting oil entered the SERVOPACK and caused failure of the internal components.  | Check the installation conditions.  | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
|   | A SERVOPACK fault occurred.  | Turn the power supply ON and OFF several times. If the alarm still occurs, the SERVOPACK may be faulty.       | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.021:<br>Parameter Format<br>Error 1<br>(The parameter data in the SERVOPACK is incorrect.)    | The software version of SERVOPACK that caused the alarm is older than that of the written parameter.   | Check Fn012 to see if the set software version agrees with that of the SERVOPACK. If not, an alarm may occur. | Write the parameter of another SERVOPACK of the same model with the same software version. Then turn the power OFF and then ON again. |
|   | A SERVOPACK fault occurred.  | -   | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.022:<br>System Checksum<br>Error 1<br>(The parameter data in the SERVOPACK is incorrect.)     | The power supply voltage suddenly dropped.   | Measure the power supply voltage.   | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
|   | The power supply went OFF while setting an utility function.   | Check the circumstances when the power supply went OFF.   | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
|   | A SERVOPACK fault occurred.  | Turn the power supply ON and OFF several times. If the alarm still occurs, the SERVOPACK may be faulty.       | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.030:<br>Main Circuit Detector<br>Error  | A SERVOPACK fault occurred.  | -   | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.040:<br>Parameter Setting<br>Error 1<br>(The parameter setting was out of the setting range.) | The SERVOPACK and servomotor capacities do not match each other.                                       | Check the combination of SERVOPACK and servomotor capacities.   | Select the proper combination of SERVOPACK and servomotor capacities.   |
|   | A SERVOPACK fault occurred.  | -   | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
|   | The parameter setting is out of the setting range.   | Check the setting ranges of the parameters that have been changed.  | Set the parameter to a value within the setting range.  |
|   | The electronic gear ratio is out of the setting range.   | Check the electronic gear ratio. The ratio must satisfy:<br>$0.001 < (Pn20E/Pn210) < 4000$ .                  | Set the electronic gear ratio in the range: $0.001 < (Pn20E/Pn210) < 4000$ .  |

(cont'd)

| Alarm Number<br>Alarm Name<br>(Alarm Description)   | Cause  | Investigative Actions  | Corrective Actions   |
|---|--|--|--|
| A.041:<br>Encoder Output Pulse<br>Setting Error   | The encoder output pulse (Pn212) is out of the setting range and does not satisfy the setting conditions.  | Check the parameter Pn212.   | Set Pn212 to a correct value.  |
| A.042:<br>Parameter<br>Combination Error  | The speed of program JOG operation (Fn004) is lower than the setting range after having changed the electronic gear ratio (Pn20E/Pn210) or the servomotor. | Check that the detection conditions*1 are satisfied.   | Decrease the setting of the electronic gear ratio (Pn20E/Pn210).                   |
|   | The speed of program JOG operation (Fn004) is lower than the setting range after having changed the setting of the program JOG movement speed (Pn533).     | Check that the detection conditions*1 are satisfied.   | Increase the setting of the program JOG movement speed (Pn533).                    |
|   | The moving speed of advanced autotuning is lower than the setting range after having changed the electronic gear ratio (Pn20E/Pn210) or the servomotor.    | Check that the detection conditions*1 are satisfied.   | Decrease the setting of the electronic gear ratio (Pn20E/Pn210).                   |
| A.044:<br>Semi-closed/Fully-<br>closed Loop Control<br>Parameter Setting<br>Error                 | The setting of the fully-closed module does not match with that of Pn002.3.  | Check the settings of Pn002.3.   | The setting of fully-closed module must be compatible with the setting of Pn002.3. |
| A.04A:<br>Parameter Setting<br>Error 2  | For a 4-byte parameter bank, no registration in two consecutive bytes for two bank members.  | -  | Change the number of bytes for bank members to an appropriate value.               |
|   | The total amount of bank data exceeds 64. (Pn900 × Pn901 > 64)   | -  | Reduce the total amount of bank data to 64 or less.                                |
| A.050:<br>Combination Error<br>(The SERVOPACK and<br>servomotor capacities do<br>not correspond.) | The SERVOPACK and servomotor capacities do not match each other.   | Check the capacities to see if they satisfy the following condition:<br>Servomotor capacity<br>$1/4 \leq \text{SERVOPACK capacity} \leq 4$ | Select the proper combination of SERVOPACK and servomotor capacities.              |
|   | An encoder fault occurred.   | Replace the servomotor and see if the alarm occurs again.  | Replace the servomotor (encoder).  |
|   | A SERVOPACK fault occurred.  | -  | The SERVOPACK may be faulty. Replace the SERVOPACK.                                |
| A.051:<br>Unsupported Device<br>Alarm   | An unsupported serial converter unit, encoder, or external encoder is connected to the SERVOPACK.  | Check the product specifications, and select the correct model.  | Select the correct combination of units.   |
| A.0b0:<br>Cancelled Servo ON<br>Command Alarm   | After executing the utility function to turn ON the power to the motor, the servo ON command (SV_ON) was sent from the host controller.                    | -  | Turn the SERVOPACK power supply OFF and then ON again or execute a software reset. |

$$*1. Pn533 [\text{min}^{-1}] \times \frac{2 (\text{encoder resolution})}{6 \times 10^5} \leq \frac{Pn20E}{Pn210}$$

(cont'd)

| Alarm Number-<br>Alarm Name<br>(Alarm Description)  | Cause   | Investigative Actions  | Corrective Actions  |
|---|---|--|---|
| A.100:<br>Overcurrent or Heat Sink Overheated<br>(An overcurrent flowed through the IGBT or heat sink of SERVOPACK overheated.) | Incorrect wiring or contact fault of main circuit cable or servomotor main circuit cable.                                       | Check the wiring. Refer to 3.1 <i>Main Circuit Wiring</i> .  | Correct the wiring.   |
|   | Short-circuit or ground fault of main circuit cable or servomotor main circuit cable.   | Check for short-circuits across the servomotor terminal phases U, V, and W, or between the grounding and servomotor terminal phases U, V, or W. Refer to 3.1 <i>Main Circuit Wiring</i> .            | The cable may be short-circuited. Replace the cable.  |
|   | Short-circuit or ground fault inside the servomotor.  | Check for short-circuits across the servomotor terminal phases U, V, and W, or between the grounding and servomotor terminal phases U, V, or W. Refer to 3.1 <i>Main Circuit Wiring</i> .            | The servomotor may be faulty. Replace the servomotor.   |
|   | Short-circuit or ground fault inside the SERVOPACK.   | Check for short-circuits across the servomotor connection terminals U, V, and W on the SERVOPACK, or between the grounding and terminal U, V, or W. Refer to 3.1 <i>Main Circuit Wiring</i> .        | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
|   | Incorrect wiring or contact fault of the regenerative resistor.   | Check the wiring. Refer to 3.7 <i>Connecting Regenerative Resistors</i> .  | Correct the wiring.   |
|   | The dynamic brake (DB: Emergency stop executed from the SERVOPACK) was frequently activated, or the DB overload alarm occurred. | Check the power consumed by DB resistance (Un00B) to see how many times the DB has been used. Or, check the alarm history display Fn000 to see if the DB overload alarm A.730 or A.731 was reported. | Change the SERVOPACK model, operating conditions, or the mechanism so that the DB does not need to be used so frequently.                 |
|   | The generated regenerative resistor value exceeded the SERVOPACK regenerative energy processing capacity.                       | Check the regenerative load ratio (Un00A) to see how many times the regenerative resistor has been used.   | Check the operating condition including overload, and reconsider the regenerative resistor value.   |
|   | The SERVOPACK regenerative resistance is too small.   | Check the regenerative load ratio (Un00A) to see how many times the regenerative resistor has been used.   | Change the regenerative resistance value to a value larger than the SERVOPACK minimum allowable resistance value.                         |
|   | A heavy load was applied while the servomotor was stopped or running at a low speed.  | Check to see if the operating conditions are outside servo drive specifications.   | Reduce the load applied to the servomotor or increase the operating speed.  |
|   | Malfunction caused by noise interference.   | Improve the wiring or installation environment, such as by reducing noise, and check to see if the alarm recurs.   | Take countermeasures for noise, such as correct wiring of the FG. Use an FG wire size equivalent to the SERVOPACK main circuit wire size. |
| A SERVOPACK fault occurred.   | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.  |   |

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| Alarm Number<br>Alarm Name<br>(Alarm Description)   | Cause   | Investigative Actions  | Corrective Actions   |
|---|---|--|--|
| A.300:<br>Regeneration Error  | <ul style="list-style-type: none"> <li>Regenerative resistor capacity (Pn600) is set to a value other than 0 for a SGD V-R70, -R90, -1R6, -2R1, or -2R8 SERVOPACK, and an external regenerative resistor is not connected.</li> <li>An external regenerative resistor is not connected to the SGD V-470, SGD V-550, SGD V-590, SGD V-780, SGD V-210, SGD V-260, SGD V-280, or SGD V-370 SERVOPACK.</li> </ul> | Check the external regenerative resistor connection and the value of the Pn600.                            | Connect the external regenerative resistor, or set Pn600 to 0 if no regenerative resistor is required.   |
|   | The jumper between the power supply terminals B2 and B3 is removed.   | Confirm that a jumper is mounted between the power supply terminals B2 and B3.                             | Correctly mount a jumper.  |
|   | The external regenerative resistor is incorrectly wired, or is removed or disconnected.   | Check the external regenerative resistor connection.   | Correctly connect the external regenerative resistor.  |
|   | A SERVOPACK fault occurred.   | -  | While the main circuit power supply is OFF, turn the control power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.            |
| A.320:<br>Regenerative Overload   | The power supply voltage exceeds the specified limit.   | Measure the power supply voltage.  | Set the power supply voltage within the specified range.   |
|   | Insufficient external regenerative resistance, regenerative resistor capacity, or SERVOPACK capacity.<br>Or, regenerative power has been continuously flowing back.   | Check the operating condition or the capacity using the capacity selection Software SigmaJunma-Size+, etc. | Change the regenerative resistance, regenerative resistor capacity, or SERVOPACK capacity. Reconsider the operating conditions using the capacity selection software SigmaJunmaSize+, etc. |
|   | Regenerative power continuously flowed back because negative load was continuously applied.   | Check the load applied to the servomotor during operation.   | Reconsider the system including servo, machine, and operating conditions.  |
|   | The setting of parameter Pn600 is smaller than the external regenerative resistor's capacity.   | Check the external regenerative resistor connection and the value of the Pn600.                            | Set the Pn600 to a correct value.  |
|   | The external regenerative resistance is too high.   | Check the regenerative resistance.   | Change the regenerative resistance to a correct value or use an external regenerative resistor of appropriate capacity.  |
|   | A SERVOPACK fault occurred.   | -  | The SERVOPACK may be faulty. Replace the SERVOPACK.  |
| A.330:<br>Main Circuit Power Supply Wiring Error<br>(Detected when the power to the main circuit is turned ON.) | The regenerative resistor disconnected when the SERVOPACK power supply voltage was high.  | Measure the resistance of the regenerative resistor using a measuring instrument.                          | When using a regenerative resistor built in the SERVOPACK: Replace the SERVOPACK.<br>When using an external regenerative resistor: Replace the external regenerative resistor.             |
|   | In the AC power input mode, DC power was supplied.  | Check the power supply to see if it is a DC power supply.  | Correct the settings to match the actual power supply specifications.  |
|   | In the DC power input mode, AC power was supplied.  | Check the power supply to see if it is an AC power supply.   | Correct the settings to match the actual power supply specifications.  |
|   | Regenerative resistor capacity (Pn600) is not set to 0 even though the regenerative resistor is disconnected.   | Check if regenerative resistor is connected and check the regenerative resistor capacity.                  | Set Pn600 to 0.  |
|   | A SERVOPACK fault occurred.   | -  | The SERVOPACK may be faulty. Replace the SERVOPACK.  |

(cont'd)

| Alarm Number<br>Alarm Name<br>(Alarm Description)                                       | Cause   | Investigative Actions   | Corrective Actions  |
|---|---|---|---|
| A.400:<br>Overvoltage<br>(Detected in the SERVOPACK main circuit power supply section.) | <ul style="list-style-type: none"> <li>• For 100-VAC SERVOPACKs:<br/>The AC power supply voltage exceeded 145 V.</li> <li>• For 200-VAC SERVOPACKs:<br/>The AC power supply voltage exceeded 290 V.</li> <li>• For 400-VAC SERVOPACKs:<br/>The AC power supply voltage exceeded 580 V.</li> <li>• For 200-VAC SERVOPACKs:<br/>with DC power supply input:<br/>The DC power supply voltage exceeded 410 V.</li> <li>• For 400-VAC SERVOPACKs:<br/>The DC power supply voltage exceeded 820 V.</li> </ul> | Measure the power supply voltage.   | Set AC/DC power supply voltage within the specified range.  |
|   | The power supply is unstable, or was influenced by a lightning surge.   | Measure the power supply voltage.   | Improve the power supply conditions by installing a surge absorber, etc. Then, turn the power supply OFF and ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK. |
|   | Acceleration/deceleration was executed under the following conditions. <ul style="list-style-type: none"> <li>• The AC power supply voltage of 100-VAC SERVOPACK was in the range between 115 V and 135 V.</li> <li>• The AC power supply voltage of 200-VAC SERVOPACK was in the range between 230 V and 270 V.</li> <li>• The AC power supply voltage of 400-VAC SERVOPACK was in the range between 480 V and 560 V.</li> </ul>   | Check the power supply voltage and the speed and torque during operation. | Set AC power supply voltage within the specified range.   |
|   | The external regenerative resistance is too high for the actual operating conditions.   | Check the operating conditions and the regenerative resistance.           | Select a regenerative resistance value appropriate for the operating conditions and load.   |
|   | The moment of inertia ratio exceeded the allowable value.   | Confirm that the moment of inertia ratio is within the allowable range.   | Increase the deceleration time, or reduce the load.   |
|   | A SERVOPACK fault occurred.   | -   | Turn the control power OFF and then ON again while the main circuit power supply is OFF. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.                               |

(cont'd)

| Alarm Number<br>Alarm Name<br>(Alarm Description)   | Cause  | Investigative Actions  | Corrective Actions   |
|---|--|--|--|
| A.410:<br>Undervoltage<br>(Detected in the SERVOPACK main circuit power supply section.)  | <ul style="list-style-type: none"> <li>• For 100-VAC SERVOPACKS:<br/>The AC power supply voltage is 49 V or less.</li> <li>• For 200-VAC SERVOPACKS:<br/>The AC power supply voltage is 120 V or less.</li> <li>• For 400-VAC SERVOPACKS:<br/>The AC power supply voltage is 240 V or less.</li> </ul> | Measure the power supply voltage.  | Set the power supply voltage within the specified range.   |
|   | The power supply voltage dropped during operation.   | Measure the power supply voltage.  | Increase the power supply capacity.  |
|   | Occurrence of instantaneous power interruption.  | Measure the power supply voltage.  | When the instantaneous power cut hold time (Pn509) is set, decrease the setting.   |
|   | The SERVOPACK fuse is blown out.   | –  | Replace the SERVOPACK, connect a reactor, and run the SERVOPACK.   |
|   | A SERVOPACK fault occurred.  | –  | The SERVOPACK may be faulty. Replace the SERVOPACK.  |
| A.450:<br>Main-Circuit Capacitor Overvoltage  | A SERVOPACK fault occurred.  | –  | Replace the SERVOPACK.   |
| A.510:<br>Overspeed<br>(The servomotor rotational speed exceeds the maximum.)   | The order of phases U, V, and W in the servomotor wiring is incorrect.   | Check the servomotor wiring.   | Confirm that the servomotor is correctly wired.  |
|   | A reference value exceeding the overspeed detection level was input.   | Check the input value.   | Reduce the reference value or adjust the gain.   |
|   | The motor speed exceeded the maximum.  | Check the servomotor speed waveform.   | Reduce the speed reference input gain, adjust the servo gain, or reconsider the operating conditions.  |
|   | A SERVOPACK fault occurred.  | –  | The SERVOPACK may be faulty. Replace the SERVOPACK.  |
| A.511:<br>Overspeed of Encoder Output Pulse Rate  | The encoder output pulse frequency exceeded the limit.   | Check the encoder output pulse setting.  | Decrease the setting of the encoder output pulse (Pn212).  |
|   | The encoder output pulse output frequency exceeded the limit because the servomotor speed was too high.  | Check the encoder output pulse output setting and servomotor speed.                                      | Decrease the servomotor speed.   |
| A.520:<br>Vibration Alarm   | Abnormal vibration was detected at the servomotor speed.   | Check for abnormal noise from the servomotor, and check the speed and torque waveforms during operation. | Reduce the servomotor speed or reduce the speed loop gain (Pn100).   |
|   | The moment of inertia ratio (Pn103) value is greater than the actual value or is greatly changed.  | Check the moment of inertia ratio.   | Set the moment of inertia ratio (Pn103) to an appropriate value.   |
| A.521:<br>Autotuning Alarm<br>(Vibration was detected while executing the advanced autotuning, one-parameter tuning, EasyFFT, or tuning-less function.) | The servomotor vibrated considerably while performing tuning-less function (factory setting).  | Check the servomotor speed waveform.   | Reduce the load so that the moment of inertia ratio falls within the allowable value, or raise the tuning level using the tuning-less levels setting (Fn200) or reduce the load level. |
|   | The servomotor vibrated considerably during advanced autotuning, one-parameter tuning, or EasyFFT.   | Check the servomotor speed waveform.   | Check the operation procedure of corresponding function and take a corrective action.  |

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| Alarm Number:<br>Alarm Name<br>(Alarm Description)   | Cause  | Investigative Actions  | Corrective Actions  |
|--|--|--|---|
| A.710:<br>A.720:<br>Overload<br>A.710: High Load<br>A.720: Low Load  | Incorrect wiring or contact fault of servomotor and encoder.   | Check the wiring.  | Confirm that the servomotor and encoder are correctly wired.  |
|  | Operation beyond the overload protection characteristics.  | Check the servomotor overload characteristics and executed run command.  | Reconsider the load conditions and operating conditions. Or, increase the servomotor capacity.  |
|  | Excessive load was applied during operation because the servomotor was not driven due to mechanical problems.                        | Check the executed operation reference and servomotor speed.   | Remove the mechanical problems.   |
|  | A SERVOPACK fault occurred.  | -  | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.730:<br>A.731:<br>Dynamic Brake<br>Overload<br>(An excessive power consumption of dynamic brake was detected.)   | The servomotor rotates because of external force.  | Check the operation status.  | Take measures to ensure the servomotor will not rotate because of external force.   |
|  | The rotating energy at a DB stop exceeds the DB resistance capacity.   | Check the power consumed by DB resistance (Un00B) to see how many times the DB has been used.  | Reconsider the following: <ul style="list-style-type: none"> <li>• Reduce the servomotor reference speed.</li> <li>• Reduce the moment of inertia ratio.</li> <li>• Reduce the number of times of the DB stop operation.</li> </ul> |
|  | A SERVOPACK fault occurred.  | -  | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.740:<br>Overload of Surge<br>Current Limit Resistor<br>(The main circuit power is turned ON/OFF too frequently.) | The inrush current limit resistor operation frequency at the main circuit power supply ON/OFF operation exceeds the allowable range. | -  | Reduce the frequency of turning the main circuit power supply ON/OFF.   |
|  | A SERVOPACK fault occurred.  | -  | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.7A0:<br>Heat Sink Overheated<br>(Detected when the heat sink temperature exceeds 100°C.)                         | The surrounding air temperature is too high.   | Check the surrounding air temperature using a thermostat.  | Decrease the surrounding air temperature by improving the SERVOPACK installation conditions.  |
|  | The overload alarm has been reset by turning OFF the power too many times.   | Check the alarm history display (Fn000) to see if the overload alarm was reported.   | Change the method for resetting the alarm.  |
|  | Excessive load or operation beyond the regenerative energy processing capacity.  | Check the accumulated load ratio (Un009) to see the load during operation, and the regenerative load ratio (Un00A) to see the regenerative energy processing capacity. | Reconsider the load and operating conditions.   |
|  | Incorrect SERVOPACK installation orientation or/and insufficient space around the SERVOPACK.   | Check the SERVOPACK installation conditions.   | Install the SERVOPACK correctly as specified.   |
|  | A SERVOPACK fault occurred.  | -  | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.7AB:<br>Built-In Fan in<br>SERVOPACK<br>Stopped  | The fan inside the SERVOPACK stopped.  | Check for foreign matter or debris inside the SERVOPACK.   | Remove foreign matter or debris from the SERVOPACK. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.  |

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| Alarm Number:<br>Alarm Name<br>(Alarm Description)  | Cause  | Investigative Actions   | Corrective Actions  |
|---|--|---|---|
| A.810:<br>Encoder Backup Error<br>(Only when an absolute encoder is connected.)<br>(Detected on the encoder side.)        | Alarm occurred when the power to the absolute encoder was initially turned ON.   | Check to see if the power was turned ON initially.  | Set up the encoder (Fn008).   |
|   | The encoder cable disconnected, and connected again.   | Check to see if the power was turned ON initially.  | Confirm the connection and set up the encoder (Fn008).  |
|   | The power from both the control power supply (+5 V) from the SERVOPACK and the battery power supply is not being supplied. | Check the encoder connector battery or the connector contact status.                                | Replace the battery or take similar measures to supply power to the encoder, and set up the encoder (Fn008).  |
|   | An absolute encoder fault occurred.  | -   | If the alarm cannot be reset by setting up the encoder again, replace the servomotor.   |
|   | A SERVOPACK fault occurred.  | -   | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.820:<br>Encoder Checksum Error<br>(Detected on the encoder side.)   | An encoder fault occurred.   | -   | Set up the encoder again using Fn008. If the alarm still occurs, the servomotor may be faulty. Replace the servomotor.                                      |
|   | A SERVOPACK fault occurred.  | -   | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.830:<br>Absolute Encoder Battery Error<br>(The absolute encoder battery voltage is lower than the specified value.)     | The battery connection is incorrect.   | Check the battery connection.   | Reconnect the battery.  |
|   | The battery voltage is lower than the specified value 2.7 V.   | Measure the battery voltage.  | Replace the battery.  |
|   | A SERVOPACK fault occurred.  | -   | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.840:<br>Encoder Data Error<br>(Detected on the encoder side.)   | The encoder malfunctioned.   | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the servomotor may be faulty. Replace the servomotor.                               |
|   | Malfunction of encoder because of noise interference, etc.   | -   | Correct the wiring around the encoder by separating the encoder cable from the servomotor main circuit cable or by checking the grounding and other wiring. |
| A.850:<br>Encoder Overspeed<br>(Detected when the control power supply was turned ON.)<br>(Detected on the encoder side.) | The servomotor was running at 200 min <sup>-1</sup> or higher when the control power supply was turned ON.                 | Check the motor rotating speed (Un000) to confirm the servomotor speed when the power is turned ON. | Reduce the servomotor speed to a value less than 200 min <sup>-1</sup> , and turn ON the control power supply.  |
|   | An encoder fault occurred.   | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the servomotor may be faulty. Replace the servomotor.                               |
|   | A SERVOPACK fault occurred.  | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.                                 |

(cont'd)

| Alarm Number:<br>Alarm Name<br>(Alarm Description)   | Cause   | Investigative Actions   | Corrective Actions  |
|--|---|---|---|
| A.860:<br>Encoder Overheated<br>(Only when an absolute<br>encoder is connected.)<br>(Detected on the encoder<br>side.) | The ambient operating temperature around the servomotor is too high.                                | Measure the ambient operating temperature around the servomotor.  | The ambient operating temperature must be 40°C or less.   |
|  | The servomotor load is greater than the rated load.   | Check the accumulated load ratio (Un009) to see the load.   | The servomotor load must be within the specified range.   |
|  | An encoder fault occurred.  | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the servomotor may be faulty. Replace the servomotor. |
|  | A SERVOPACK fault occurred.   | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.8A0*2:<br>External Encoder<br>Error  | Setting the zero point position of external absolute encoder failed because the servomotor rotated. | Before setting the zero point position, use the fully-closed feedback pulse counter (Un00E) to confirm that the servomotor is not rotating. | The servomotor must be stopped while setting the zero point position.   |
|  | An external encoder fault occurred.   | -   | Replace the external encoder.   |
| A.8A1*2:<br>External Encoder<br>Error of Module  | An external encoder fault occurred.   | -   | Replace the external encoder.   |
|  | A serial converter unit fault occurred.   | -   | Replace the serial converter unit.  |
| A.8A2*2:<br>External Encoder<br>Error of Sensor<br>(Incremental)   | An external encoder fault occurred.   | -   | Replace the external encoder.   |
| A.8A3*2:<br>External Encoder<br>Error of Position<br>(Absolute)  | An external absolute encoder fault occurred.  | -   | The external absolute encoder may be faulty. Refer to the encoder manufacturer's instruction manual for corrective actions.   |
| A.8A5*2:<br>External Encoder<br>Overspeed  | The overspeed from the external encoder occurred.   | Check the maximum speed of the external encoder.  | Keep the external encoder below its maximum speed.  |
| A.8A6*2:<br>External Encoder<br>Overheated   | The overheat from the external encoder occurred.  | -   | Replace the external encoder.   |
| A.b31:<br>Current Detection<br>Error 1   | The current detection circuit for phase U is faulty.  | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.b32:<br>Current Detection<br>Error 2   | The current detection circuit for phase V is faulty.  | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.b33:<br>Current Detection<br>Error 3   | The detection circuit for the current is faulty.  | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.   |
|  | The servomotor main circuit cable is disconnected.  | Check for disconnection of the servomotor main circuit cable.   | Correct the servomotor wiring.  |
| A.b6A:<br>MECHATROLINK<br>Communications ASIC<br>Error 1   | SERVOPACK MECHATROLINK communication section fault.   | -   | Replace the SERVOPACK.  |

\*2. The alarm that may occur in a SERVOPACK with Fully-closed Module.

(cont'd)

| Alarm Number<br>Alarm Name<br>(Alarm Description)                                  | Cause  | Investigative Actions        | Corrective Actions  |
|--|--|------------------------------|---|
| A.bF0:<br>System Alarm 0   | A SERVOPACK fault occurred.  | -                            | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.bF1:<br>System Alarm 1   | A SERVOPACK fault occurred.  | -                            | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.bF2:<br>System Alarm 2   | A SERVOPACK fault occurred.  | -                            | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.bF3:<br>System Alarm 3   | A SERVOPACK fault occurred.  | -                            | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.bF4:<br>System Alarm 4   | A SERVOPACK fault occurred.  | -                            | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.C10:<br>Servo Overrun<br>Detected<br>(Detected when the servomotor power is ON.) | The order of phases U, V, and W in the servomotor wiring is incorrect. | Check the servomotor wiring. | Confirm that the servomotor is correctly wired.   |
|  | An encoder fault occurred.   | -                            | If the alarm still occurs after turning the power OFF and then ON again, even though the servomotor is correctly wired, the servomotor may be faulty. Replace the servomotor. |
|  | A SERVOPACK fault occurred.  | -                            | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.C80:<br>Absolute Encoder<br>Clear Error and Multi-<br>turn Limit Setting Error   | An encoder fault occurred.   | -                            | Turn the power supply OFF and then ON again. If the alarm still occurs, the servomotor may be faulty. Replace the servomotor.   |
|  | A SERVOPACK fault occurred.  | -                            | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.   |

(cont'd)

| Alarm Number,<br>Alarm Name<br>(Alarm Description)         | Cause  | Investigative Actions                       | Corrective Actions   |
|--|--|---|--|
| A.C90:<br>Encoder<br>Communications Error                  | Contact fault of encoder connector or incorrect encoder wiring.  | Check the encoder connector contact status. | Re-insert the encoder connector and confirm that the encoder is correctly wired.   |
|  | Encoder cable disconnection or short-circuit.<br>Or, incorrect cable impedance.  | Check the encoder cable.                    | Use the encoder cable with the specified rating.   |
|  | Corrosion caused by improper temperature, humidity, or gas, short-circuit caused by intrusion of water drops or cutting oil, or connector contact fault caused by vibration. | Check the operating environment.            | Improve the operating environmental conditions, and replace the cable. If the alarm still occurs, replace the SERVOPACK.                                       |
|  | Malfunction caused by noise interference.  | -   | Correct the wiring around the encoder to avoid noise interference (Separate the encoder cable from the servomotor main circuit cable, improve grounding, etc.) |
|  | A SERVOPACK fault occurred.  | -   | Connect the servomotor to another SERVOPACK, and turn ON the control power. If no alarm occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.            |
| A.C91:<br>Encoder<br>Communications<br>Position Data Error | The noise interference occurred on the I/O signal line because the encoder cable is bent and the sheath is damaged.  | Check the encoder cable and connector.      | Confirm that there is no problem with the encoder cable layout.  |
|  | The encoder cable is bundled with a high-current line or near a high-current line.   | Check the encoder cable layout.             | Confirm that there is no surge voltage on the encoder cable.   |
|  | The FG potential varies because of influence from machines on the servomotor side, such as the welder.   | Check the encoder cable layout.             | Properly ground the machines to separate from the encoder FG.  |
| A.C92:<br>Encoder<br>Communications<br>Timer Error         | Noise interference occurred on the I/O signal line from the encoder.   | -   | Take countermeasures against noise for the encoder wiring.   |
|  | Excessive vibration and shocks were applied to the encoder.  | Check the operating environment.            | Reduce the machine vibration or correctly install the servomotor.  |
|  | An encoder fault occurred.   | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the servomotor may be faulty. Replace the servomotor.                                  |
|  | A SERVOPACK fault occurred.  | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.                                    |
| A.CA0:<br>Encoder Parameter<br>Error                       | An encoder fault occurred.   | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the servomotor may be faulty. Replace the servomotor.                                  |
|  | A SERVOPACK fault occurred.  | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.                                    |

(cont'd)

| Alarm Number:<br>Alarm Name<br>(Alarm Description)  | Cause  | Investigative Actions                               | Corrective Actions  |
|---|--|---|---|
| A.Cb0:<br>Encoder Echoback<br>Error   | The encoder wiring and contact are incorrect.  | Check the encoder wiring.                           | Correct the encoder wiring.   |
|   | Noise interference occurred due to incorrect encoder cable specifications.   | -   | Use tinned annealed copper shielded twisted-pair or screened unshielded twisted-pair cable with a core of at least 0.12 mm <sup>2</sup> . |
|   | Noise interference occurred because the wiring distance for the encoder cable is too long.   | -   | The wiring distance must be 50 m max.   |
|   | The FG potential varies because of influence from machines on the servomotor side, such as the welder.   | Check the encoder cable layout.                     | Properly ground the machines to separate from encoder FG.   |
|   | Excessive vibration and shocks were applied to the encoder.  | Check the operating environment.                    | Reduce the machine vibration or correctly install the servomotor.   |
|   | An encoder fault occurred.   | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the servomotor may be faulty. Replace the servomotor.             |
|   | A SERVOPACK fault occurred.  | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.               |
| A.CC0:<br>Multiturn Limit<br>Disagreement   | When using a direct drive (DD) servomotor, the multiturn limit value (Pn205) is different from that of the encoder.                                | Check the value of the Pn205.                       | Correct the setting of Pn205 (0 to 65535).  |
|   | The multiturn limit value of the encoder is different from that of the SERVOPACK. Or, the multiturn limit value of the SERVOPACK has been changed. | Check the value of the Pn205 of the SERVOPACK.      | Execute Fn013 at the occurrence of alarm.   |
|   | A SERVOPACK fault occurred.  | -   | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.               |
| A.CF1 <sup>*2</sup> :<br>Feedback Option<br>Module<br>Communications Error<br>(Reception error) | Wiring of cable between serial converter unit and SERVOPACK is incorrect or contact is faulty.   | Check the external encoder wiring.                  | Correct the cable wiring.   |
|   | The specified cable is not used between serial converter unit and SERVOPACK.   | Confirm the external encoder wiring specifications. | Use the specified cable.  |
|   | Cable between serial converter unit and SERVOPACK is too long.   | Measure the length of this cable.                   | Use 20-m cable max.   |
|   | Sheath of cable between serial converter unit and SERVOPACK is broken.   | Check the cable for damage.                         | Replace the cable.  |
| A.CF2 <sup>*2</sup> :<br>Feedback Option<br>Module<br>Communications Error<br>(Timer stop)      | Noise interferes with the cable between serial converter unit and SERVOPACK.   | -   | Correct the wiring around serial converter unit, e.g., separating I/O signal line from main circuit cable or grounding.                   |
|   | A serial converter unit fault occurred.  | -   | Replace the serial converter unit.  |
|   | A SERVOPACK fault occurred.  | -   | Replace the SERVOPACK.  |

\*2. The alarm that may occur in a SERVOPACK with Fully-closed Module.

(cont'd)

| Alarm Number<br>Alarm Name<br>(Alarm Description)   | Cause  | Investigative Actions  | Corrective Actions  |
|---|--|--|---|
| A.d00:<br>Position Error<br>Overflow<br>(Position error exceeded<br>the value set in the<br>excessive position error<br>alarm level (Pn520).) | The servomotor U, V, and W wir-<br>ings is faulty.   | Check the servomotor main circuit<br>cable connection.   | Confirm that there is no contact<br>fault in the motor wiring or encoder<br>wiring.   |
|   | The position reference speed is<br>too high.   | Reduce the reference speed, and<br>operate the SERVOPACK.                                      | Reduce the position reference speed<br>or acceleration of position refer-<br>ence. Or, reconsider the electronic<br>gear ratio.   |
|   | The position reference accelera-<br>tion is too fast.  | Reduce the reference acceleration,<br>and operate the SERVOPACK.                               | Reduce the reference acceleration of<br>the position reference using a<br>MECHATROLINK command, or<br>smooth the acceleration of the posi-<br>tion reference by selecting the posi-<br>tion reference filter (ACCFIL)<br>using a MECHATROLINK com-<br>mand. |
|   | Setting of the excessive position<br>error alarm level (Pn520) is low<br>against the operating condition.  | Check the alarm level (Pn520) to<br>see if it is set to an appropriate<br>value.               | Set the Pn520 to proper value.  |
|   | A SERVOPACK fault occurred.  | -  | Turn the power supply OFF and<br>then ON again. If the alarm still<br>occurs, the SERVOPACK may be<br>faulty. Replace the SERVOPACK.  |
| A.d01:<br>Position Error<br>Overflow Alarm at<br>Servo ON   | This alarm occurs if the SV_ON<br>command is received when the<br>position error is greater than the<br>set value of Pn526 while the ser-<br>vomotor power is OFF.   | Check the position error amount<br>(Un008) while the servomotor<br>power is OFF.               | Correct the excessive position error<br>alarm level at servo ON (Pn526).  |
| A.d02:<br>Position Error<br>Overflow Alarm by<br>Speed Limit at Servo<br>ON   | When the position error remain in<br>the error counter, Pn529 limits<br>the speed if the SV_ON com-<br>mand is received. If Pn529 limits<br>the speed in such a state, this<br>alarm occurs when position refer-<br>ences are input and the number of<br>position errors exceeds the value<br>set for the excessive position<br>error alarm level (Pn520). | -  | Correct the excessive position error<br>alarm level (Pn520).<br>Or, adjust the speed limit level at<br>servo ON (Pn529).  |
| A.d10*2:<br>Motor-load Position<br>Error Overflow   | Motor rotation direction and<br>external encoder installation<br>direction are opposite.   | Check the servomotor rotation<br>direction and the external encoder<br>installation direction. | Install the external encoder in the<br>opposite direction, or change the<br>setting of the external encoder<br>usage method (Pn002.3) to reverse<br>the direction.  |
|   | Mounting of the load (e.g., stage)<br>and external encoder joint instal-<br>lation are incorrect.  | Check the external encoder<br>mechanical connection.   | Check the mechanical joints.  |
| A.E02:<br>MECHATROLINK-II<br>Internal<br>Synchronization<br>Error 1   | A parameter was changed by the<br>digital operator or the personal<br>computer during MECHA-<br>TROLINK-II communications.   | Confirm the way the parameters are<br>edited.  | Stop changing parameters using<br>digital operator or personal com-<br>puter during MECHATROLINK-II<br>communications.  |
|   | MECHATROLINK-II transmis-<br>sion cycle fluctuated.  | -  | Remove the cause of transmission<br>cycle fluctuation at host controller.   |
|   | A SERVOPACK fault occurred.  | -  | Turn the power supply OFF and<br>then ON again. If the alarm still<br>occurs, the SERVOPACK may be<br>faulty. Replace the SERVOPACK.  |
| A.E40:<br>MECHATROLINK-II<br>Transmission Cycle<br>Setting Error  | Setting of MECHATROLINK-II<br>transmission cycle is out of speci-<br>fications range.  | Check the MECHATROLINK-II<br>transmission cycle setting.                                       | Set the transmission cycle to the<br>proper value.  |

\*2. The alarm that may occur in a SERVOPACK with Fully-closed Module.

(cont'd)

| Alarm Number<br>Alarm Name<br>(Alarm Description)   | Cause  | Investigative Actions  | Corrective Actions   |
|---|--|--|--|
| A.E50:<br>MECHATROLINK-II<br>Synchronization Error  | WDT data of host controller was not updated correctly.   | Check the WDT data updating for the host controller.                       | Update the WDT data at the host controller correctly.  |
|   | A SERVOPACK fault occurred.  | -  | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.  |
| A.E51:<br>MECHATROLINK-II<br>Synchronization<br>Failed  | WDT data of host controller was not updated correctly at the synchronization communications start, and synchronization communications could not start. | Check the WDT data updating for the host controller.                       | Update the WDT data at the host controller correctly.  |
|   | A SERVOPACK fault occurred.  | -  | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.  |
| A.E60:<br>MECHATROLINK-II<br>Communications error<br>(Reception error)                          | MECHATROLINK-II wiring is incorrect.   | Check the MECHATROLINK-II wirings.   | Correct the MECHATROLINK-II wiring.<br>Connect the terminator correctly.   |
|   | MECHATROLINK-II data reception error occurred due to noise interference.   | -  | Take measures against noise. Check the MECHATROLINK-II communications cable and FG wiring and take measures such as adding ferrite core on the MECHATROLINK-II communications cable. |
|   | A SERVOPACK fault occurred.  | -  | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.  |
| A.E61:<br>MECHATROLINK-II<br>Transmission Cycle<br>Error<br>(Synchronization<br>interval error) | MECHATROLINK-II transmission cycle fluctuated.   | Check the MECHATROLINK-II transmission cycle setting.                      | Remove the cause of transmission cycle fluctuation at host controller.   |
|   | A SERVOPACK fault occurred.  | -  | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.  |
| A.E72 <sup>*2</sup> :<br>Feedback Option<br>Module Detection<br>Failure                         | The connection between the SERVOPACK and the Feedback Option Module is Faulty.   | Check the connection between the SERVOPACK and the Feedback Option Module. | Correctly connect the Feedback Option Module.  |
|   | The Feedback Option Module was disconnected.   | -  | Execute resetting configuration error in option modules (Fn014) and turn the power supply OFF and then ON again.   |
|   | A Feedback Option Module fault occurred.   | -  | Replace the Feedback Option Module.  |
|   | A SERVOPACK fault occurred.  | -  | Replace the SERVOPACK.   |
| A.EA2:<br>DRV Alarm 2<br>(SERVOPACK WDC<br>error)   | A parameter was changed by the digital operator or the personal computer during MECHATROLINK-II communications.  | Confirm the way the parameters are edited.                                 | Stop changing parameters using digital operator or personal computer during MECHATROLINK-II communications.  |
|   | MECHATROLINK-II transmission cycle fluctuated.   | Check the MECHATROLINK-II transmission cycle setting.                      | Remove the cause of transmission cycle fluctuation at host controller.   |
|   | A SERVOPACK fault occurred.  | -  | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.  |

\*2. The alarm that may occur in a SERVOPACK with Fully-closed Module.

(cont'd)

| Alarm Number<br>Alarm Name<br>(Alarm Description)   | Cause   | Investigative Actions  | Corrective Actions  |
|---|---|--|---|
| A.Eb1:<br>Safety Function Signal<br>Input Timing Error  | The lag between activations of the input signals /HWBB1 and /HWBB2 for the HWBB function is ten second or more.                         | Measure the time lag between the /HWBB1 and /HWBB2 signals.        | The output signal circuits or devices for /HWBB1 and /HWBB2 or the SERVOPACK input signal circuits may be faulty. Alternatively, the input signal cables may be disconnected. Check if any of these items are faulty or have been disconnected. |
| A.ED1:<br>Command Execution<br>Timeout  | A timeout error occurred when using an MECHATROLINK command.  | Check the motor status when the command is executed.               | Execute the SV_ON or SENS_ON command only when the motor is not running.  |
|   |   | Check the external encoder status when the command is executed.    | Execute the SENS_ON command only when an external scale is connected.   |
| A.F10:<br>Main Circuit Cable<br>Open Phase<br>(With the main power supply ON, voltage was low for more than 1 second in an R, S, or T phase.)<br>(Detected when the main power supply was turned ON.) | The three-phase power supply wiring is incorrect.   | Check the power supply wiring.                                     | Confirm that the power supply is correctly wired.   |
|   | The three-phase power supply is unbalanced.   | Measure the voltage at each phase of the three-phase power supply. | Balance the power supply by changing phases.  |
|   | A single-phase power is input without setting Pn00B.2 (power supply method for three-phase SERVOPACK) to 1 (single-phase power supply). | Check the power supply and the parameter setting.                  | Match the parameter setting to the power supply.  |
|   | A SERVOPACK fault occurred.   | -  | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.   |
| CPF00:<br>Digital Operator<br>Transmission Error 1  | The contact between the digital operator and the SERVOPACK is faulty.   | Check the connector contact.                                       | Insert securely the connector or replace the cable.   |
|   | Malfunction caused by noise interference.   | -  | Keep the digital operator or the cable away from noise sources.   |
| CPF01:<br>Digital Operator<br>Transmission Error 2  | A digital operator fault occurred.  | -  | Disconnect the digital operator and then re-connect it. If the alarm still occurs, the digital operator may be faulty. Replace the digital operator.  |
|   | A SERVOPACK fault occurred.   | -  | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.   |

## 9.2 Warning Displays

The following sections describe troubleshooting in response to warning displays.

The warning name and warning meaning are listed in order of the warning numbers in 9.2.1 *List of Warnings*.

The causes of warnings and troubleshooting methods are provided in 9.2.2 *Troubleshooting of Warnings*.

### 9.2.1 List of Warnings

This section provides list of warnings.

| Warning Number | Warning Name                                    | Meaning  |
|----------------|---|--|
| A.900          | Position Error Overflow                         | Position error exceeded the parameter setting (Pn520×Pn51E/100).   |
| A.901          | Position Error Overflow Alarm at Servo ON       | When the servomotor power turns ON, the position error exceeded the parameter setting (Pn526×Pn528/100).   |
| A.910          | Overload  | This warning occurs before the overload alarms (A.710 or A.720) occur. If the warning is ignored and operation continues, an overload alarm may occur.                             |
| A.911          | Vibration                                       | Abnormal vibration at the motor speed was detected. The detection level is the same as A.520. Set whether to output an alarm or warning by the vibration detection switch (Pn310). |
| A.920          | Regenerative Overload                           | This warning occurs before the regenerative overload alarm (A.320) occurs. If the warning is ignored and operation continues, a regenerative overload alarm may occur.             |
| A.921          | Dynamic Brake Overload                          | This warning occurs before dynamic brake overload alarm (A.731) occurs. If the warning is ignored and operation continues, a dynamic brake overload alarm may occur.               |
| A.930          | Absolute Encoder Battery Error                  | This warning occurs when the voltage of absolute encoder's battery is lowered.   |
| A.94A          | Data Setting Warning 1 (Parameter Number Error) | Incorrect command parameter number was set.  |
| A.94B          | Data Setting Warning 2 (Out of Range)           | Command input data is out of range.  |
| A.94C          | Data Setting Warning 3 (Calculation Error)      | Calculation error was detected.  |
| A.94D          | Data Setting Warning 4 (Parameter Size)         | Data size does not match.  |
| A.94E          | Data Setting Warning 5 (Latch Mode Error)       | Latch mode error is detected.  |
| A.95A          | Command Warning 1 (Unsatisfying Command)        | Command was sent although the conditions for sending a command were not satisfied.   |
| A.95B          | Command Warning 2 (Non-supported Command)       | Unsupported command was sent.  |
| A.95D          | Command Warning 4 (Command Interference)        | Command, especially latch command, interferes.   |
| A.95E          | Command Warning 5 (Subcommand Disable)          | Subcommand and main command interfere.   |
| A.95F          | Command Warning 6 (Undefined Command)           | Undefined command was sent.  |
| A.960          | MECHATROLINK Communications Warning             | Communications error occurred during MECHATROLINK communications.  |
| A.971          | Undervoltage                                    | This warning occurs before undervoltage alarm (A.410) occurs. If the warning is ignored and operation continues, an undervoltage alarm may occur.                                  |
| A.9A0          | Overtravel                                      | Overtravel is detected while the servomotor power is ON.   |

Note: If Pn008.2 = 1 (does not detect warning) is selected, no warnings will be detected except for an undervoltage warning (A.971).

## 9.2.2 Troubleshooting of Warnings

Refer to the following table to identify the cause of a warning and the action to be taken. Contact your Yaskawa representative if the problem cannot be solved by the described corrective action.

| Warning Number<br>Warning Name<br>(Warning Description)                  | Cause   | Investigative Actions  | Corrective Actions  |
|--|---|--|---|
| A.900:<br>Position Error<br>Overflow                                     | The servomotor U, V, and W wirings is faulty.   | Check the servomotor main circuit cable connection.  | Confirm that there is no contact fault in the motor wiring or encoder wiring.   |
|  | The SERVOPACK gain is too low.  | Check the SERVOPACK gain.  | Increase the servo gain by using the function such as advanced autotuning.  |
|  | The position reference acceleration is too fast.  | Reduce the reference acceleration, and operate the SERVOPACK.  | Apply the smoothing function, such as using the position reference acceleration/deceleration time constant (Pn216).         |
|  | Setting of the excessive position error alarm level (Pn520) is low against the operating condition.           | Check the alarm level (Pn520) to see if it is set to an appropriate value.                               | Set the Pn520 to proper value.  |
|  | A SERVOPACK fault occurred.   | -  | Turn the power supply OFF and then ON again. If the alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK. |
| A.901:<br>Position Error<br>Overflow Alarm<br>at Servo ON                | When the servomotor power turns ON, the position error exceeded the parameter setting (Pn526×Pn528/100).      | -  | Correct the excessive position error warning level at servo ON (Pn528).   |
| A.910:<br>Overload<br>(Warning before<br>alarm A.710 or<br>A.720 occurs) | Incorrect wiring or contact fault of servomotor and encoder.  | Check the wiring.  | Confirm that the servomotor and encoder are correctly wired.  |
|  | Operation beyond the overload protection characteristics.   | Check the servomotor overload characteristics and executed run command.                                  | Reconsider the load conditions and operating conditions. Or, increase the servomotor capacity.                              |
|  | Excessive load was applied during operation because the servomotor was not driven due to mechanical problems. | Check the executed operation reference and servomotor speed.   | Remove the mechanical problems.   |
|  | A SERVOPACK fault occurred.   | -  | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.911:<br>Vibration  | Abnormal vibration was detected while the servomotor is rotating.   | Check for abnormal noise from the servomotor, and check the speed and torque waveforms during operation. | Reduce the servomotor speed or reduce the servo gain by using the function such as one-parameter tuning.                    |
|  | The moment of inertia ratio (Pn103) value is greater than the actual value or is greatly changed.             | Check the moment of inertia ratio.   | Set the moment of inertia ratio (Pn103) to an appropriate value.  |

(cont'd)

| Warning Number<br>Warning Name<br>(Warning Description)  | Cause   | Investigative Actions   | Corrective Actions  |
|--|---|---|---|
| A.920:<br>Regenerative<br>Overload<br>(Warning before<br>the alarm A.320<br>occurs)  | The power supply voltage exceeds the specified limit.   | Measure the power supply voltage.   | Set the power supply voltage within the specified range.  |
|  | Insufficient external regenerative resistance, regenerative resistor capacity, or SERVOPACK capacity.<br>Or, regenerative power has been continuously flowing back. | Check the operating condition or the capacity using the capacity selection Software SigmaJunmaSize+, etc. | Change the regenerative resistance, regenerative resistor capacity, or SERVOPACK capacity. Reconsider the operating conditions using the capacity selection software SigmaJunmaSize+, etc.  |
|  | Regenerative power continuously flowed back because negative load was continuously applied.   | Check the load to the servomotor during operation.  | Reconsider the system including servo, machine, and operating conditions.   |
| A.921:<br>Dynamic Brake<br>Overload<br>(Warning before<br>the alarm A.731<br>occurs)   | The servomotor rotates because of external force.   | Check the operation status.   | Take measures to ensure the servomotor will not rotate because of external force.   |
|  | The rotating energy at a DB stop exceeds the DB resistance capacity.  | Check the power consumed by DB resistance (Un00B) to see how many times the DB has been used.             | Reconsider the following: <ul style="list-style-type: none"> <li>• Reduce the servomotor reference speed.</li> <li>• Reduce the moment of inertia ratio.</li> <li>• Reduce the number of times of the DB stop operation.</li> </ul> |
|  | A SERVOPACK fault occurred.   | —   | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.930:<br>Absolute<br>Encoder Battery<br>Error<br>(The absolute<br>encoder battery<br>voltage is lower<br>than the specified<br>value.)<br>* Only when an<br>absolute encoder<br>is connected. | The battery connection is incorrect.  | Check the battery connection.   | Reconnect the battery.  |
|  | The battery voltage is lower than the specified value 2.7 V.  | Measure the battery voltage.  | Replace the battery.  |
|  | A SERVOPACK fault occurred.   | —   | The SERVOPACK may be faulty. Replace the SERVOPACK.   |
| A.94A<br>Data Setting<br>Warning 1<br>(Parameter Number Error)   | Disabled parameter number was used.   | —   | Use the correct parameter number.   |
| A.94B<br>Data Setting<br>Warning 2<br>(Out of Range)   | Attempted to send values outside the range to the command data.   | —   | Set the value of the parameter within the allowable range.  |
| A.94C<br>Data Setting<br>Warning 3<br>(Calculation Error)  | Calculation result of set value is incorrect.   | —   | Set the value of the parameter within the allowable range.  |

(cont'd)

| Warning Number<br>Warning Name<br>(Warning Description)  | Cause  | Investigative Actions                | Corrective Actions   |
|--|--|--------------------------------------|--|
| A.94D<br>Data Setting<br>Warning 4<br>(Parameter Size)   | Parameter size set in command is incorrect.                              | -                                    | Use the correct parameter size.  |
| A.94E<br>Data Setting<br>Warning 5<br>(Latch mode error) | Latch mode error is detected.  | -                                    | Change the setting value of Pn850 or the LT_MOD data for the LTMOD_ON command sent by the host controller to the proper value.   |
| A.95A<br>Command<br>Warning 1<br>(Unsatisfying Command)  | Command sending condition is not satisfied.                              | -                                    | Send a command after command sending condition is satisfied.   |
| A.95B<br>Command<br>Warning 2<br>(Non-supported Command) | SERVOPACK received unsupported command.                                  | -                                    | Do not sent an unsupported command.  |
| A.95D<br>Command<br>Warning 4<br>(Command Interference)  | Command sending condition for latch-related commands is not satisfied.   | -                                    | Send a command after command sending condition is satisfied.   |
| A.95E<br>Command<br>Warning 5<br>(Subcommand Disable)    | Subcommand sending condition is not satisfied.                           | -                                    | Send a command after command sending condition is satisfied.   |
| A.95F<br>Command<br>Warning 6<br>(Undefined Command)     | Undefined command was sent.  | -                                    | Do not use an undefined command.   |
| A.960<br>MECHATROLINK<br>Communications<br>Warning       | MECHATROLINK-II wiring is incorrect.                                     | Confirm the wiring.                  | Correct the MECHATROLINK-II wiring.<br>Or, connect a terminal to the terminal station.   |
|  | MECHATROLINK-II data reception error occurred due to noise interference. | Confirm the installation conditions. | Take measures against noise. Check the MECHATROLINK-II communications cable and FG wiring and take measures such as adding ferrite core on the MECHATROLINK-II communications cable. |
|  | A SERVOPACK fault occurred.  | -                                    | A fault occurred in the SERVOPACK. Replace the SERVOPACK.  |

(cont'd)

| Warning Number<br>Warning Name<br>(Warning Description)  | Cause  | Investigative Actions   | Corrective Actions   |
|--|--|---|--|
| A.971:<br>Undervoltage                                   | <ul style="list-style-type: none"> <li>• For 100 VAC SERVOPACKs:<br/>The AC power supply voltage is 60 V or less.</li> <li>• For 200-VAC SERVOPACKs:<br/>The AC power supply voltage is 140 V or less.</li> <li>• For 400-VAC SERVOPACKs:<br/>The AC power supply voltage is 280 V or less.</li> </ul> | Measure the power supply voltage.   | Set the power supply voltage within the specified range.   |
|  | The power supply voltage dropped during operation.   | Measure the power supply voltage.   | Increase the power supply capacity.  |
|  | Occurrence of instantaneous power interruption.  | Measure the power supply voltage.   | When the instantaneous power cut hold time (Pn509) is set, decrease the setting.   |
|  | The SERVOPACK fuse is blown out.   | -   | Replace the SERVOPACK and connect a reactor to the SERVOPACK.  |
| A.9A0:<br>Overtravel<br>(Overtravel status is detected.) | When the servomotor power is ON, overtravel status is detected.  | Check the input signal monitor (Un005) to check the status of the overtravel signals. | <p>Refer to 9.3 <i>Troubleshooting Malfunction Based on Operation and Conditions of the Servomotor</i>. Even if overtravel signals were not shown by the input signal monitor (Un005), momentary overtravel may have been detected. Do the following.</p> <ul style="list-style-type: none"> <li>• Do not specify movements that would cause overtravel from the host controller.</li> <li>• Check the wiring of the overtravel signals.</li> <li>• Take countermeasures for noise.</li> </ul> |

### 9.3 Troubleshooting Malfunction Based on Operation and Conditions of the Servomotor

Troubleshooting for the malfunctions based on the operation and conditions of the servomotor is provided in this section.

Be sure to turn OFF the servo system before troubleshooting items shown in bold lines in the table.

| Problem   | Probable Cause  | Investigative Actions  | Corrective Actions   |
|---|---|--|--|
| Servomotor Does Not Start                               | The control power supply is not ON.   | Check voltage between control power terminals.   | Correct the wiring.  |
|   | The main circuit power supply is not ON.  | Check the voltage between main circuit power terminals.  | Correct the wiring.  |
|   | Wiring of I/O signal connector CN1 faulty or disconnected.  | Check if the connector CN1 is properly inserted and connected.   | Correct the connector CN1 connection.                                    |
|   | Servomotor or encoder wiring disconnected.  | Check the wiring.  | Correct the wiring.  |
|   | Overloaded  | Run under no load and check the load status.   | Reduce load or replace with larger capacity servomotor.                  |
|   | Settings for the input signal selections (Pn50A, Pn50B and Pn511) is incorrect.                   | Check the settings for parameters Pn50A, Pn50B, and Pn511.   | Correct the settings for parameter Pn50A, Pn50B, and Pn511.              |
|   | Encoder type differs from parameter setting (Pn002.2).  | Check the settings for parameter Pn002.2.  | Set parameter Pn002.2 to the encoder type being used.                    |
|   | SV_ON command is not sent.  | Check the command sent from the host controller.   | Send the SV_ON command.  |
|   | SENS_ON command is not sent.  | Check the command sent from the host controller.   | Send the command in the correct SERVOPACK sequence.                      |
|   | The forward run prohibited (P-OT) and reverse run prohibited (N-OT) input signals are turned OFF. | Check P-OT or N-OT input signal.   | Turn P-OT or N-OT input signal ON.                                       |
| The safety input signal (/HWBB1 or /HWBB2) remains OFF. | Check the /HWBB1 and /HWBB2 input signal.   | Set the /HWBB1 and /HWBB2 input signal to ON.<br>When not using the safety function, mount the safety function jumper connector (provided as an accessory) on the CN8. |  |
| A SERVOPACK fault occurred.                             | –   | Replace the SERVOPACK.   |  |
| Servomotor Moves Instantaneously, and then Stops        | Servomotor wiring is incorrect.   | Check the servomotor wiring.   | Correct the wiring.  |
|   | Encoder wiring is incorrect.  | Check the encoder wiring.  | Correct the wiring.  |
| Servomotor Speed Unstable                               | Wiring connection to servomotor is defective.   | Check connections of power line (phases U, V, and W) and encoder connectors.   | Tighten any loose terminals or connectors and correct the wiring.        |
| Servomotor Rotates Without Reference Input              | A SERVOPACK fault occurred.   | –  | Replace the SERVOPACK.   |
| Dynamic Brake Does Not Operate                          | Improper Pn001.0 setting  | Check the setting for parameter Pn001.0.   | Correct the setting for parameter Pn001.0.                               |
|   | DB resistor disconnected  | Check if excessive moment of inertia, motor overspeed, or DB frequently activated occurred.  | Replace the SERVOPACK, and reduce the load.                              |
|   | DB drive circuit fault  | –  | There is a defective component in the DB circuit. Replace the SERVOPACK. |

(cont'd)

| Problem                        | Probable Cause   | Investigative Actions  | Corrective Actions   |
|--------------------------------|--|--|--|
| Abnormal Noise from Servomotor | The servomotor largely vibrated during execution of tuning-less function.                              | Check the servomotor speed waveform.   | Reduce the load so that the moment of inertia ratio becomes within the allowable value, or increase the load level or lower the rigidity level for the tuning-less levels setting (Fn200). |
|                                | Mounting is not secured.   | Check if there are any loose mounting screws.  | Tighten the mounting screws.   |
|                                |  | Check if there is misalignment of couplings.   | Align the couplings.   |
|                                |  | Check if there are unbalanced couplings.   | Balance the couplings.   |
|                                | Bearings are defective.  | Check for noise and vibration around the bearings.   | Replace the servomotor.  |
|                                | Vibration source at the driven machine.  | Check for any foreign matter, damage, or deformations on the machinery's movable parts.  | Contact the machine manufacturer.  |
|                                | Noise interference due to incorrect I/O signal cable specifications.                                   | The I/O signal cable must be tinned annealed copper shielded twisted-pair or screened unshielded twisted-pair cable with a core of 0.12 mm <sup>2</sup> min. | Use the specified I/O signal cable.  |
|                                | Noise interference due to length of I/O signal cable.  | Check the length of the I/O signal cable.  | The I/O signal cable length must be no more than 3 m.  |
|                                | Noise interference due to incorrect encoder cable specifications.                                      | The encoder cable must be tinned annealed copper shielded twisted-pair or screened unshielded twisted-pair cable with a core of 0.12 mm <sup>2</sup> min.    | Use the specified encoder cable.   |
|                                | Noise interference due to length of encoder cable.   | Check the length of the encoder cable.   | The encoder cable must be no more than 50 m.   |
|                                | Noise interference due to damaged encoder cable.   | Check if the encoder cable is bent and the sheath is damaged.  | Replace the encoder cable and modify the encoder cable layout.   |
|                                | Excessive noise to the encoder cable.  | Check if the encoder cable is bundled with a high-current line or near a high-current line.  | Correct the encoder cable layout so that no surge is applied.  |
|                                | The FG potential varies because of influence from machines on the servomotor side, such as the welder. | Check if the machines are correctly grounded.  | Properly ground the machines to separate from the encoder FG.  |
|                                | SERVOPACK pulse counting error due to noise interference   | Check if there is noise interference on the I/O signal line from the encoder.  | Take measures against noise in the encoder wiring.   |
|                                | Excessive vibration and shock to the encoder   | Check if vibration from the machine occurred or servomotor installation is incorrect (mounting surface accuracy, fixing, alignment, etc.).                   | Reduce vibration from the machine, or secure the servomotor installation.  |
| An encoder fault occurred.     | -  | Replace the servomotor.  |  |

(cont'd)

| Problem  | Probable Cause  | Investigative Actions  | Corrective Actions  |
|--|---|--|---|
| Servomotor Vibrates at Frequency of Approx. 200 to 400 Hz.   | Unbalanced servo gains  | Check to see if the servo gains have been correctly adjusted.  | Execute the advanced autotuning.  |
|  | Speed loop gain value (Pn100) too high.   | Check the speed loop gain (Pn100).<br>Factory setting: $K_v = 40.0$ Hz   | Reduce the speed loop gain (Pn100).   |
|  | Position loop gain value (Pn102) too high.  | Check the position loop gain (Pn102).<br>Factory setting: $K_p = 40.0/s$   | Reduce the position loop gain (Pn102).  |
|  | Incorrect speed loop integral time constant (Pn101)                                     | Check the speed loop integral time constant (Pn101).<br>Factory setting: $T_i = 20.0$ ms   | Correct the speed loop integral time constant (Pn101).                          |
|  | Incorrect moment of inertia ratio (Pn103)   | Check the moment of inertia ratio (Pn103).   | Correct the moment of inertia ratio (Pn103).                                    |
| High Motor Speed Overshoot on Starting and Stopping  | Unbalanced servo gains  | Check to see if the servo gains have been correctly adjusted.  | Execute the advanced autotuning.  |
|  | Speed loop gain value (Pn100) too high  | Check the speed loop gain (Pn100).<br>Factory setting: $K_v = 40.0$ Hz   | Reduce the speed loop gain (Pn100).   |
|  | Position loop gain value (Pn102) too high   | Check the position loop gain (Pn102).<br>Factory setting: $K_p = 40.0/s$   | Reduce the position loop gain (Pn102).  |
|  | Incorrect speed loop integral time constant (Pn101)                                     | Check the speed loop integral time constant (Pn101).<br>Factory setting: $T_i = 20.0$ ms   | Correct the speed loop integral time constant (Pn101).                          |
|  | Incorrect moment of inertia ratio data (Pn103)  | Check the moment of inertia ratio (Pn103).   | Correct the moment of inertia ratio (Pn103).                                    |
| Absolute Encoder Position Difference Error (The position saved in the host controller when the power was turned OFF is different from the position when the power was next turned ON.) | Noise interference due to improper encoder cable specifications                         | The encoder cable must be tinned annealed copper shielded twisted-pair or screened unshielded twisted-pair cable with a core of $0.12 \text{ mm}^2$ min. | Use the specified encoder cable.  |
|  | Noise interference due to length of encoder cable.                                      | Check the encoder cable length.  | The encoder cable length must be no more than 50 m.                             |
|  | Noise interference due to damaged encoder cable   | Check if the encoder cable is bent or if its sheath is damaged.  | Replace the encoder cable and correct the encoder cable layout.                 |
|  | Excessive noise interference at the encoder cable                                       | Check if the encoder cable is bundled with a high-current line or near high-current line.  | Change the encoder cable layout so that no surge is applied.                    |
|  | FG potential varies because of influence of machines such as welders at the servomotor. | Check if the machines are correctly grounded.  | Ground machines correctly, and prevent diversion to the FG on the encoder side. |
|  | SERVOPACK pulse counting error due to noise interference                                | Check if there is noise interference on the I/O signal line from the encoder.  | Take measures against noise in the encoder wiring.                              |
|  | Excessive vibration and shock to the encoder  | Check if vibration from the machine occurred or servomotor installation is incorrect (mounting surface accuracy, fixing, alignment, etc.).               | Reduce vibration from the machine, or secure the servomotor installation.       |
|  | An encoder fault occurred.  | -  | Replace the servomotor.   |
|  | A SERVOPACK fault occurred. (The pulse count does not change.)                          | -  | Replace the SERVOPACK.  |
|  | Host controller multiturn data reading error  | Check the error detection section of the host controller.  | Correct the error detection section of the host controller.                     |
| Check if the host controller is executing data parity checks.  |   | Execute a multiturn data parity check.   |   |
| Check noise in the cable between the SERVOPACK and the host controller.  |   | Take measures against noise, and again execute a multiturn data parity check.  |   |

(cont'd)

| Problem   | Probable Cause  | Investigative Actions   | Corrective Actions   |
|---|---|---|--|
| Overtravel (OT)   | Forward or reverse run prohibited signal is input.  | Check the external power supply (+24 V) voltage for the input signal.                               | Correct the external power supply (+24 V) voltage.               |
|   |   | Check if the overtravel limit switch operates properly.   | Correct the overtravel limit switch.                             |
|   |   | Check if the overtravel limit switch is wired correctly.  | Correct the overtravel limit switch wiring.                      |
|   |   | Check the settings for parameters Pn50A and Pn50B.  | Correct the settings for parameters Pn50A and Pn50B.             |
|   | Forward or reverse run prohibited signal malfunctioning.  | Check the fluctuation of the external power supply (+24 V) voltage for the input signal.            | Stabilize the external power supply (+24 V) voltage.             |
|   |   | Check if the overtravel limit switch operates correctly.  | Correct the overtravel limit switch.                             |
|   |   | Check if the overtravel limit switch wiring is correct. (check for damaged cables or loose screws.) | Correct the overtravel limit switch wiring.                      |
|   | Incorrect forward or reverse run prohibited signal (P-OT/N-OT) allocation (parameters Pn50A.3, Pn50B.0) | Check if the P-OT signal is allocated in Pn50A.3.   | If another signal is allocated in Pn50A.3, allocate P-OT.        |
|   |   | Check if the N-OT signal is allocated in Pn50B.0.   | If another signal is allocated in Pn50B.0, allocate N-OT.        |
|   | Incorrect servomotor stop method selection  | Check the settings for parameters Pn001.0 and Pn001.1 when the servomotor power is OFF.             | Select a servomotor stop method other than "coast to stop."      |
| Check the settings for parameters Pn001.0 and Pn001.1 when in torque control. |   | Select a servomotor stop method other than "coast to stop."   |  |
| Improper Stop Position by Overtravel (OT) Signal                              | Improper limit switch position and dog length   | -   | Install the limit switch at the appropriate position.            |
|   | The overtravel limit switch position is too short for the coasting distance.                            | -   | Install the overtravel limit switch at the appropriate position. |

(cont'd)

| Problem                           | Probable Cause  | Investigative Actions  | Corrective Actions   |
|-----------------------------------|---|--|--|
| Position Error<br>(Without Alarm) | Noise interference due to incorrect encoder cable specifications                                      | The encoder cable must be tinned annealed copper shielded twisted-pair or screened unshielded twisted-pair cable with a core of 0.12 mm <sup>2</sup> min.    | Use the specified encoder cable.   |
|                                   | Noise interference due to length of encoder cable.  | Check the length of the encoder cable.   | The encoder cable must be no more than 50 m.   |
|                                   | Noise influence due to damaged encoder cable.   | Check if the encoder cable is bent and its sheath is damaged.  | Replace the encoder cable and modify the encoder cable layout.                       |
|                                   | Excessive noise to encoder cable.   | Check if the encoder cable is bundled with a high-current line or near a high-current line.  | Change the encoder cable layout so that no surge is applied.                         |
|                                   | The FG potential varies because of influence from machines on the servomotor side such as the welder. | Check if the machines are correctly grounded.  | Properly ground the machines encoder FG  |
|                                   | SERVOPACK pulse count error due to noise  | Check if the I/O signal line from the encoder is influenced by noise.  | Take measures against noise in the encoder wiring.                                   |
|                                   | Excessive vibration and shock to the encoder  | Check if vibration from the machine occurred or servomotor installation is incorrect (mounting surface accuracy, fixing, alignment, etc.).                   | Reduce the machine vibration or mount the servomotor securely.                       |
|                                   | Unsecured coupling between machine and servomotor   | Check if a position error occurs at the coupling between machine and servomotor.   | Secure the coupling between the machine and servomotor.                              |
|                                   | Noise interference due to improper I/O signal cable specifications                                    | The I/O signal cable must be tinned annealed copper shielded twisted-pair or screened unshielded twisted-pair cable with a core of 0.12 mm <sup>2</sup> min. | Use input signal cable with the specified specifications.                            |
|                                   | Noise interference due to length of I/O signal cable  | Check the I/O signal cable length.   | The I/O signal cable length must be no more than 3 m.                                |
|                                   | An encoder fault occurred. (The pulse count does not change.)   | -  | Replace the servomotor.  |
|                                   | A SERVOPACK fault occurred.   | -  | Replace the SERVOPACK.   |
| Servomotor Overheated             | Ambient operating temperature too high  | Measure the servomotor ambient operating temperature.  | Reduce the ambient operating temperature to 40°C or less.                            |
|                                   | Servomotor surface dirty  | Visually check the surface.  | Clean dust and oil from the surface.   |
|                                   | Servomotor overloaded   | Check the load status with monitor.  | If overloaded, reduce load or replace with larger capacity SERVOPACK and servomotor. |

## Troubleshooting and remedial actions

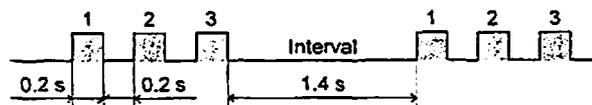
During motor operation, the motor or driver may fail to function properly due to an improper speed setting or wiring. When the motor cannot be operated correctly, refer to the contents provided in this section and take appropriate action. If the problem persists, contact your nearest office.

### 1 Driver alarm

When an alarm generates, the OP LED (red) will blink. At the same time, the ALM signal output will turn OFF and bit 0 (ALM) of the status field will change to 1.

If a warning is detected, the OP LED will remain a steady green light and the ALM signal output will not turn OFF. Only bit 1 (WARNG) of the status field will change to 1 and the operation will continue.

Example:  
An alarm that cuts off the main power is detected (Number of OP LED blinks: 3)



#### ■ Priority

If an alarm generates whose priority is higher than that of the present alarm, the current alarm code will be overwritten by the new alarm code of the higher priority. Alarms of the same or lower priority than the present alarm will be ignored. Alarms of priority 1 are not saved in the alarm history.

### 2 Limit switch pull-out sequence

If a  $\pm$ LS detection error or soft limit detection error alarm generates, follow the procedure below to pull out from the limit:

1. Reset the alarm by sending the alarm/warning clear command (ALM\_CLR: 06h) via MECHATROLINK communication with ALM\_CLR\_MOD=0.  
Use bit 0 (ALM) (=0) to check if the alarm has been cleared.
2. Pull out from the limit using one of the following methods:
  - Operate the motor in the direction in which it can be pulled out, using a motion command (INTERPOLATE, POSING, FEED, LATCH, EX\_POSING or ZRET).  
Use bit 0 (+LS)/bit 1 (-LS) (=0) of the I/O monitor field or bit 12 (P\_SOT)/bit 13 (N\_SOT) (=0) of the status field to check if the motor has pulled out. If the motor was operated in the direction in which it cannot be pulled out, an alarm will generate again.
  - Turn off the motor excitation using the servo off command (SV\_OFF: 32h) and move the motor in the direction in which it can be pulled out manually.  
If an electromagnetic brake is equipped, release the electromagnetic brake beforehand using the brake release request command (BRK\_OFF).

### 3 Alarm code list

| Number of OP LED blinks | COM LED  | Alarm code | Phenomenon   | Cause  |
|-------------------------|--|------------|--|--|
| Green solid             | Red solid  | 01h        | MECHATROLINK communication error                               | The executed command is not implemented.   |
|                         |  | 02h        |  | <ul style="list-style-type: none"> <li>The received command does not match the communication phase.</li> <li>The execution condition of the command is not satisfied.</li> </ul>   |
|                         |  | 03h        |  | Invalid command data due to one of the following reasons: <ul style="list-style-type: none"> <li>Outside the setting range</li> <li>Outside the allowable range</li> <li>Not supported</li> </ul>  |
| Red Two blinks          | Green solid (phase 2, 3) or OFF  | B1h        | Overheat   | The driver's heat-sink temperature reached approx. 85 °C (185 °F).   |
| Red 3 blinks            |  | C0h        | Overload   | A cumulative load exceeding the maximum torque has been applied for the duration over the overload detection time.   |
|                         |  | C1h        | Overspeed  | The motor speed exceeded 5500 r/min.   |
|                         |  | B2h        | Overvoltage  | The DC voltage of the main circuit is too high.  |
| Red 4 blinks            |  | B3h        | Main power supply cut off detection                            | The main power was cut off.  |
| Red 5 blinks            |  | A0h        | Excessive position deviation                                   | The deviation between the command position and the actual position exceeded the set value of the overflow rotation amount of the motor output shaft.   |
| Red 6 blinks            | Red solid  | B0h        | Overcurrent  | The motor cable was shorted.   |
|                         |  | 04h        | MECHATROLINK communication error                               | Synchronous communication error<br>The watchdog timer is not refreshed correctly.  |
|                         |  | 05h        |  | Transmission period setting error<br>The transmission period set by the master is not supported.   |
| 06h                     | MECHATROLINK communication error<br>A CRC error or other communication error generated at least twice consecutively. |            |  |  |
| Red 7 blinks            | Green solid (phase 2, 3) or OFF  | B7h        | Insufficient ABS battery voltage (absolute specification only) | The ABS backup battery voltage dropped to, or below, the specified value.  |
|                         |  | C3h        | Absolute position loss (absolute specification only)           | <ul style="list-style-type: none"> <li>Power was turned on for the first time after the battery was connected.</li> <li>Battery is not connected or has been consumed.</li> <li>The motor cable was disconnected when the main power was OFF.</li> <li>The battery cable became open or a fuse was blown.</li> <li>The multi-rotation operation range was exceeded.</li> </ul> |
|                         |  | F0h        | ±LS signals logic error  | Both the +LS and -LS sensors were detected in the ±LS signals enable mode.   |
|                         |  | F1h        | ±LS signals reverse connection error                           | The LS signal on the side opposite to the operating direction was detected during a return-to-home operation in the 3-sensor mode or 2-sensor mode when the return-to-home operation selection bit was set to 1.   |
|                         |  | F2h        | Return-to-home operation error                                 | The return-to-home sequence did not end properly.  |

How to reset the alarm    A: Cycle the main power and control power supply. (MECHATROLINK communication will cut off.)  
 B: Reset the alarm using the MECHATROLINK communication command's "ALM\_CLR".  
 C: Reset the warning using the MECHATROLINK communication command's "ALM\_CLR".

| Remedial action   | Motor action  | Status field     | Alarm reset | Priority |
|---|---|------------------|-------------|----------|
| Check the command that has been sent.   | Continue the operation.<br>(The received command is ignored.) | Bit1:<br>WARNG=1 | C           | 1        |
| Check the send condition of the command that has been sent.   |   |                  |             |          |
| Check the data that has been sent.  |   |                  |             |          |
| Check the ventilation condition inside the enclosure.   | Cut off the motor current.                                    | Bit0: ALM=1      | B           | 3        |
| Reduce the load or increase the acceleration/deceleration rate.   |   |                  |             |          |
| Check the command speed or electronic gear.   |   |                  |             |          |
| <ul style="list-style-type: none"> <li>• Check the power supply voltage.</li> <li>• For a lifting device, reduce the load.</li> </ul>   |   |                  |             |          |
| Check to see if the main power is input correctly.  |   |                  |             |          |
| Reduce the load or decrease the acceleration/deceleration rate.   |   |                  |             |          |
| Check the motor cable and its connection to the driver.   |   |                  | A           | 4        |
| Check if the watchdog timer is refreshed.   |   |                  |             |          |
| Set an appropriate transmission period within a range of 0.5 to 3.0 ms (in 0.5-ms increment).   | Stop the motor.   | Bit0: ALM=1      | B           | 3        |
| <ul style="list-style-type: none"> <li>• Connect the MECHATROLINK communication cable correctly.</li> <li>• Connect a termination resistor correctly</li> <li>• Implement the noise elimination measures.</li> <li>• The driver may be damaged. Call our branch or sales office.</li> </ul>                       |   |                  |             |          |
| Charge the battery. It takes approx. 48 hours to fully charge the battery at an ambient temperature of 20 °C (68 °F).   | Stop the motor.   |                  |             | 2        |
| <ul style="list-style-type: none"> <li>• Reset the alarm using the absolute position loss error reset parameter (1005h).</li> <li>• If the alarm still generates after charging the battery, a consumed battery, open cable or blown fuse may be the cause. Purchase a replacement battery (PAEZ-BT2).</li> </ul> | Stop the motor.   |                  | D           | 2        |
| Check the logic setting of the ±LS signals.   | Stop the motor.   |                  | B           | 2        |
| Check the ±LS signals wiring.   |   |                  |             |          |
| <ul style="list-style-type: none"> <li>• Check the installing/wiring the HOMELS signal and latch signal as well as return-to-home operation data.</li> <li>• An unanticipated load may have been applied during the return-to-home operation. Check the load.</li> </ul>  |   |                  |             |          |

Troubleshooting and remedial actions

| Number of OP LED blinks  | COM LED -                       | Alarm code | Phenomenon                                  | Cause   |
|--|---------------------------------|------------|---|---|
| Red 7 blinks   | Green solid (phase 2, 3) or OFF | F3h        | HOMELS signal non-detection error           | The HOMELS signal was not detected at a position between +LS signal and -LS signal.                       |
|  |                                 | F4h        | Latch signal non-detection error            | The latch signal was not detected at a position between +LS signal and -LS signal.                        |
|  |                                 | F6h        | ±LS signals detection error                 | The +LS or -LS signal was detected in the ±LS signal-enable mode.   |
|  |                                 | F7h        | Soft limit detection error                  | The motor reached a soft limit position.  |
|  |                                 | FAh        | Return-to-home final travel operation error | The ±LS signal was detected during operation over the final travel distance for return-to-home operation. |
| Red 8 blinks   | Green solid (phase 2, 3) or OFF | B8h        | Sensor error                                | A sensor error was detected during operation.   |
|  |                                 | D2h        | Sensor error                                | A sensor error occurred when the power was turned on (motor cable not connected, etc.).                   |
|  |                                 | D3h        | Rotor rotation at initialization            | Initialization failed because the motor was rotating when the power was turned on.                        |
| Red 9 blinks   |                                 | 82h        | MECHATROLINK communication ASIC error       | An error occurred with the MECHATROLINK communication ASIC.   |
|  |                                 | B9h        | ABS backup system error                     | An error was occurred with ABS backup system.   |
|  |                                 | D1h        | Nonvolatile memory error                    | Stored data for the driver was damaged.   |
| Rewrite life of the NV memory (approx. 100,000 times) was reached. |                                 |            |   |   |

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| Remedial action  | Motor action               | Status field | Alarm reset | Priority |
|--|----------------------------|--------------|-------------|----------|
| <ul style="list-style-type: none"> <li>• Set a HOMELS signal between the +LS signal and -LS signal.</li> <li>• Check the starting direction of return-to-home operation.</li> </ul>  | Stop the motor.            |              | B           | 2        |
| <ul style="list-style-type: none"> <li>• Position the sensors so that the latch signal will be detected after the HOMELS signal is detected.</li> <li>• Check the starting direction of return-to-home operation.</li> </ul> |                            |              |             |          |
| After resetting the alarm, pull out from the sensor position by referring to "12.2 Limit switch pull-out sequence" on p.67.  |                            |              |             |          |
| Check the command position exceeds the soft limits.  |                            |              |             |          |
| <ul style="list-style-type: none"> <li>• Check the final travel distance for return-to-home operation.</li> <li>• Check the ±LS signals installation position.</li> </ul>  | Cut off the motor current. | Bit0: ALM=1  | A           | 4        |
| Turn off the power and check the motor cable and its connection to the driver  |                            |              |             |          |
| Turn off the power and check the motor cable and its connection to the driver  |                            |              |             |          |
| Prevent the motor output shaft from rotating due to an external force when the power is turned on.   |                            |              |             |          |
| The communication IC may be damaged. Call our branch or sales office.  |                            |              |             |          |
| Cycle the power.   |                            |              |             |          |
| Initialize the parameter.  |                            |              |             |          |
| The NV memory may be damaged. Call our branch or sales office.   |                            |              |             |          |