8. Maintenance And Inspection

8.1 Motor Section

Simple daily checks need be carried out on the motor section. Kindly check the motor for excessive noise or for abnormal amounts of vibration. Do not disassemble the motor. If the operation of the motor is abnormal after 20000 hours of operation or five years after installation (whichever is earlier), you may need to replace the motor and the driver system, if deemed necessary. However, this time period for replacement depends on several factors such as the environmental and operating conditions which the motor is subjected to.

8.2 Driver Section

There is no need for a daily inspection of the driver unit. However, it is prudent to clean the driver unit periodically to protect it from thermal insulation and also to ensure that dust etc. will not enter inside.

8.3 Replacing The Battery For Memory Backups

The driver has a lithium battery inside which is used to backup the data and the various parameters. The life of this lithium battery is approximately about 20000 hours of operation under standard operating conditions. When the life of the battery drains, the driver emits an alarm signal. It is important to change the battery immediately or at the earliest convenience.

The replacement procedure is described herewith:

1 Backup the various parameters, programs and the cam data etc. into the Flash ROM module (built-in) [refer to **section 3.4** for details].

2 Disconnect the mains power supply.

3 Remove the two screws fastening the side plate as shown in the **Fig. 8.1** alongside.

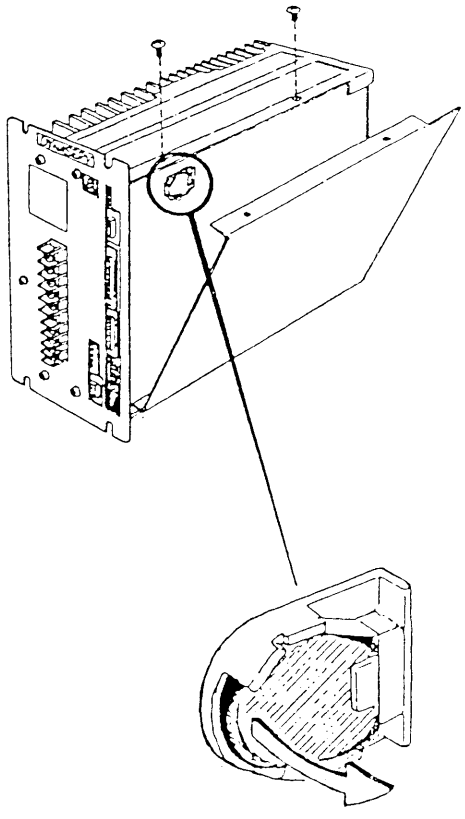
4 Keep the replacement battery alongside and then swap the battery fast (recommended time is within 10 seconds).

5 Confirm all electrical and other connections and then power on the system. If no error messages are displayed, the system is in normal state and ready for operation.

Caution 1: If the battery alarm display comes on, it is necessary to reset the battery replacement alarm system. In such a case, it may be necessary to input the various parameters once again.

Caution 2: The replacement battery is identified as <CR2032> 3V or it's equivalent type. Remember to note the polarity of the battery at the time of replacement.

Fig. 8.1 [Replacement of the Lithium Battery]



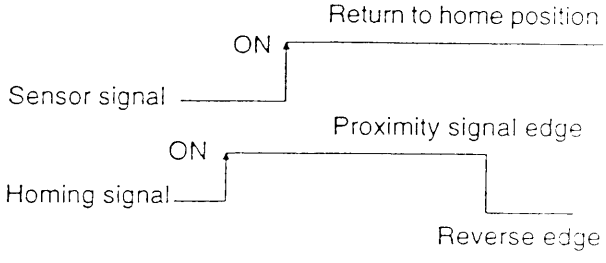
9. Trouble Shooting And Measures

9.1 Motor Problems And Measures

During the operation of this motor if any abnormality occurs, first check the LED display on the front panel of the driver. Most of the causes can be ascertained by the status of the LED display. For the following problems listed below, take appropriate measures as given below. If the driver is still not able to return to normal function despite these efforts, it may be damaged and in such a case cease operations and contact Yokogawa Precision Corporation or it's authorized dealer for remedial action.

Problem	Probable cause	Item(s) to inspect	Measures	Refer to page
Motor does not Servo lock	No AC power is being supplied	Check wiring	Switch ON the power supply	
	The servo ON (SRVON) terminal is set to H	Inspect and confirm	Set to L	
	The fc, ILIM or DC gain values are too low	Inspect and confirm	Adjust the values appropriately	
The motor does not start	Overloaded motor	Check to see that the motor operates without any load	Reduce starting load or replace the motor with one of higher torque	
	Incorrect external wiring	Inspect the wiring	Refer to the connection diagram and rewire.	
	The fc, ILIM or DC gain values are too low	Inspect and confirm	Adjust the values appropriately	
The motor rotation is unstable	Improper connections	Check the motor connections in phase A,B,C AND GND	Refer to the connection diagram and rewire	
	The motor and the driver combination is not correct	Check the serial numbers on motor and driver combination.	If the combination is incorrect, return them for the correct combination.	
The motor overheats	High ambient temperature	Check if the ambient temperature is above 45° C.	Lower the ambient temperature to below 45° C.	
	Overloaded motor	Check to see that the motor operates without any load	Reduce starting load or replace the motor with one of higher torque	
Abnormal sounds are produced	Incorrect mounting	Loose screws or not fastened properly	Tighten the screws	
	Bearing problems	Check for abnormal sound and vibration from the bearings	Motor replacement (Contact Manufacturer)	
	Mounting base vibration	Check the mounting base	Reinforce the mounting base and tighten screws	
Abnormally small motor torque	Incorrect Motor/ Driver combination	Check combination numbers on rating nameplates	If the combination is incorrect, return them for the correct combination	
	Overloaded motor	Check for OVL error signal	Ascertain proper operation Reduce operating loads	
	The fc, ILIM or DC gain values are too low	Inspect and confirm	Adjust the values appropriately	

9.1 Motor Problems And Measures *(continued from page 86)*

Problem	Probable cause	Item(s) to inspect	Measures	Refer to page
Motor runs of control	Incorrect motor/driver combination	Check the combination numbers of the motor and driver	If the combination is incorrect, return them for the correct combination.	
	Improper connections	Check the motor/encoder connection	Refer to the connection Diagram and rewire	
The motor does not return to it's home position accurately.	The location of the proximity sensor is not correct	Display the proximity sensor signal and the home signal on an oscilloscope and ensure that these signals do not overlap.		
	Chattering phenomenon	Check to ensure that the homing signal does not "chatter". Increasing the homing velocity will decrease the chattering effect. If even this does not seem feasible, change the position of the proximity sensor and try again. **NOTE:** If the rear portion of this signal appears first, it may lead to confusion with the mark sense edge part.  		

9.2 LED Display List

A 7 - segment LED is mounted on the front panel of the driver to display the normal/ abnormal status of the motor and the driver. The details of this display are listed as below in the Fig. 9.2

Fig. 9.2

LED Display		Status	Display when the TEST.Switch is ON (Hex, 4 character display)	Comments
Servo OFF	Servo ON			
0	0.	Normal display	No detailed listing	
1	1.	Over speed	No detailed listing	
2		RAM error	Irregular	Cannot be rectified
6		Over count, shut down	Irregular	
7		ROM error	ROM checksum code 4 characters	Cannot be rectified
8		Low voltage (Main power supply)	No detailed listing	
8.		Driver under reset status	No detailed listing	Reset system to fix
		Power supply error	No detailed listing	Cannot be rectified
9		CPU error	0000: Watch dog timer (WDT) error	Cannot be rectified
A		Amp error	0001: Over voltage (OVV) signal ON	
			0003: Over current (FAULT) signal ON	
c	c.	Over load error	No detailed listing	

NOTE: Kindly contact Yokogawa Precision Corporation or it's authorized dealer for the errors marked "Cannot be rectified".

9.2.1 Controller Error

★ Outline

Listing the error codes and the error reset procedures.

★ Operation

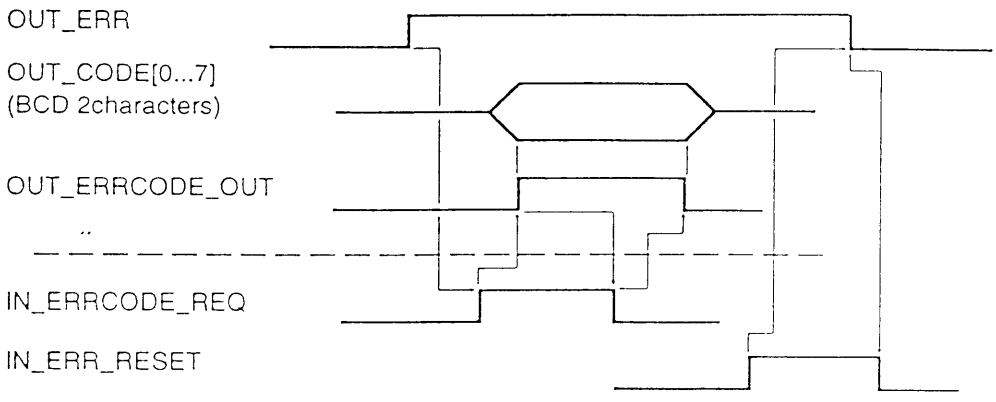
☆ PLC operation

◆ Reading error codes:

① <OUR_ERR> in the CN2 is output.
② <IN_ERRCODE_REQ> in the CN2 turns ON.
③ When the <OUT_ERRCODE_OUT> in the CN2 is output, simultaneously the <OUT_CODE [0...7]> outputs the error codes.
④ The <IN_ERRCODE_REQ> turns OFF.
⑤ The <OUT_ERRCODE_OUT> and the <OUT_CODE [0...7]> in the CN2 turns OFF.

◆ Error reset procedure:

① Turn ON the <IN_ERR_RESET> in the CN2.
② This will turn OFF the <OUT_ERR> in the CN2.



NOTE: The alarm codes are not output

☆ RS232C operation (computer)

◆ Reading the error codes:

The details of the error codes can be read using the PC utility software. Refer to the PC utility menus for more details on the same.

◆ Reading the alarm codes:

The details of the alarm codes can be read using the PC utility software. Refer to the PC utility menus for more details on the same.

◆ Error reset procedure:

@4↵ (↵ : CR)
R00 (receive)

☆ RS232C operation (TBX)

◆ Reading the error codes:

The details of the error codes can be read using the TBX. Refer to the TBX section for more details on the same.

◆ Reading the alarm codes:

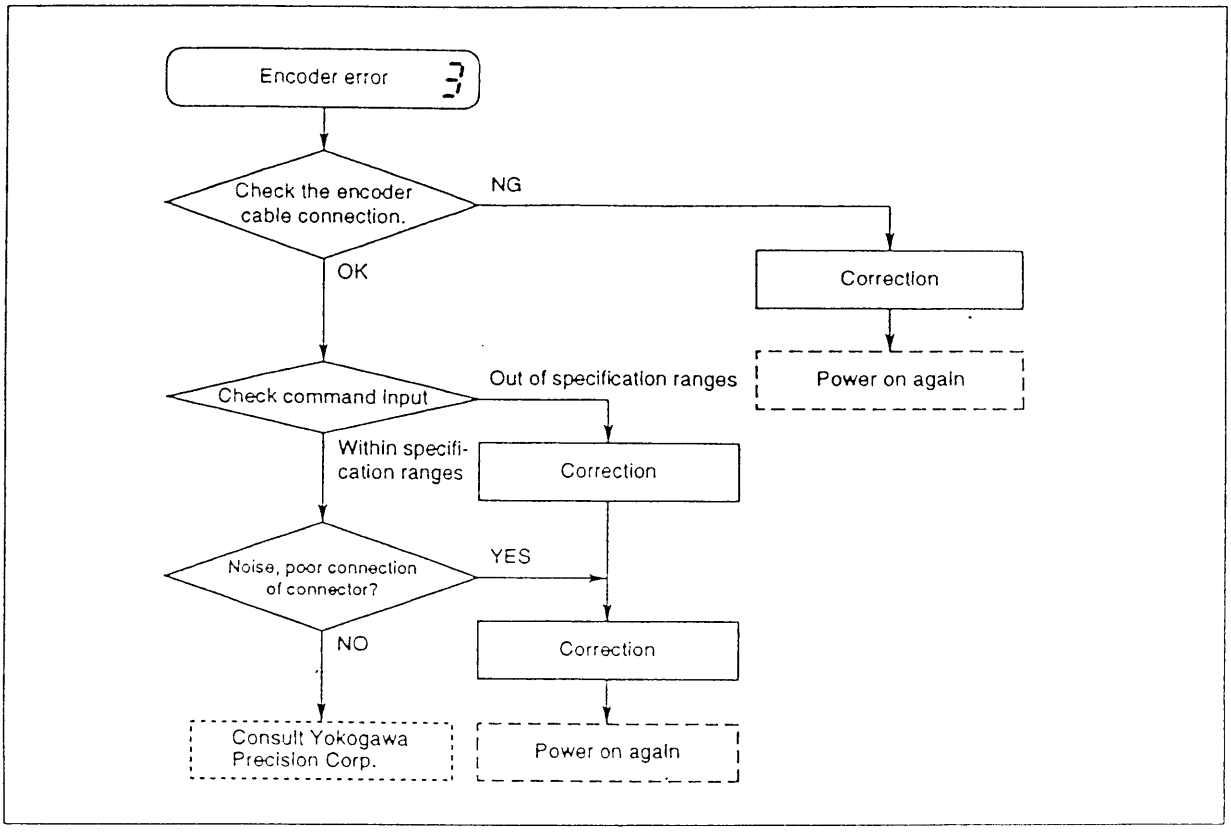
The details of the alarm codes cannot be read using the TBX

◆ Error reset procedure:

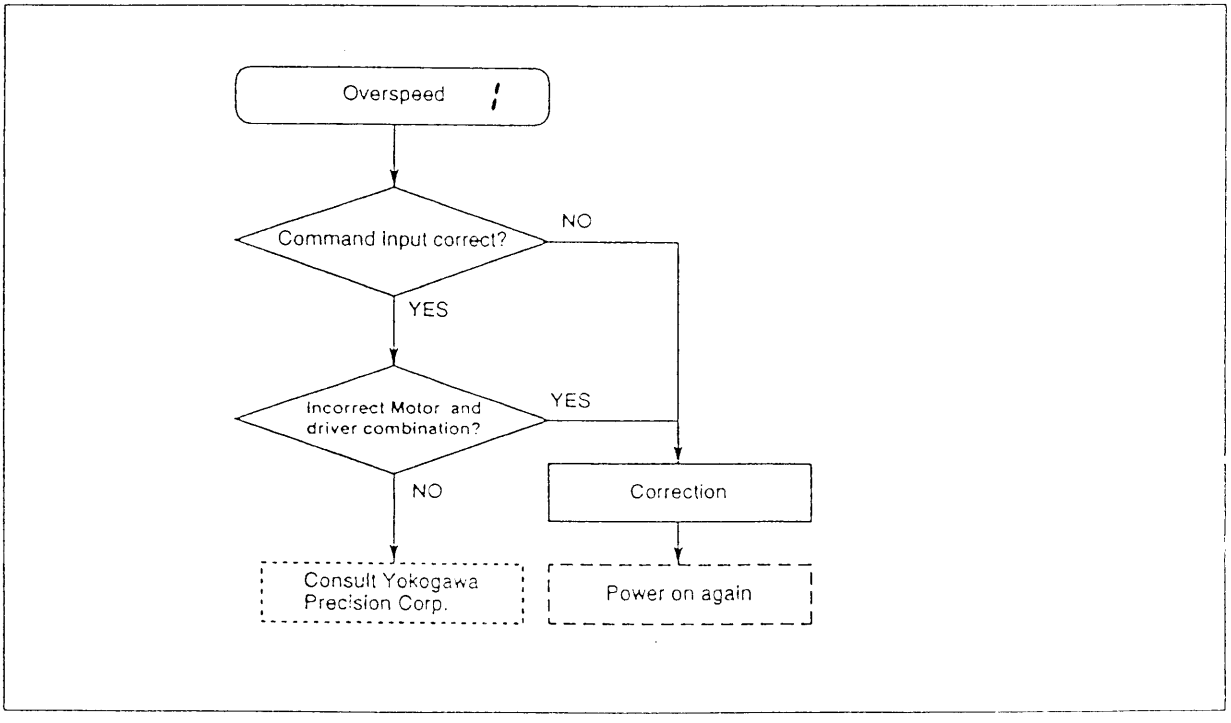
@4↵ (↵ : CR)
R00 (receive)

9.3 Procedure For Error Correction

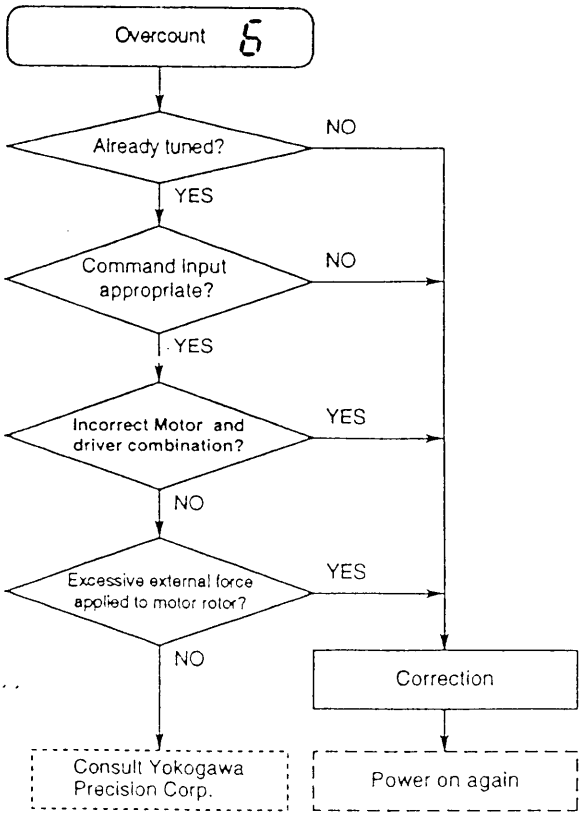
(1) Encoder Error



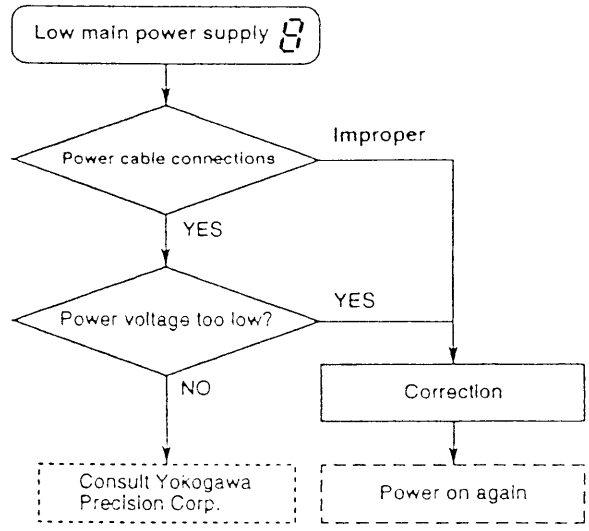
(2) Over Speed Error



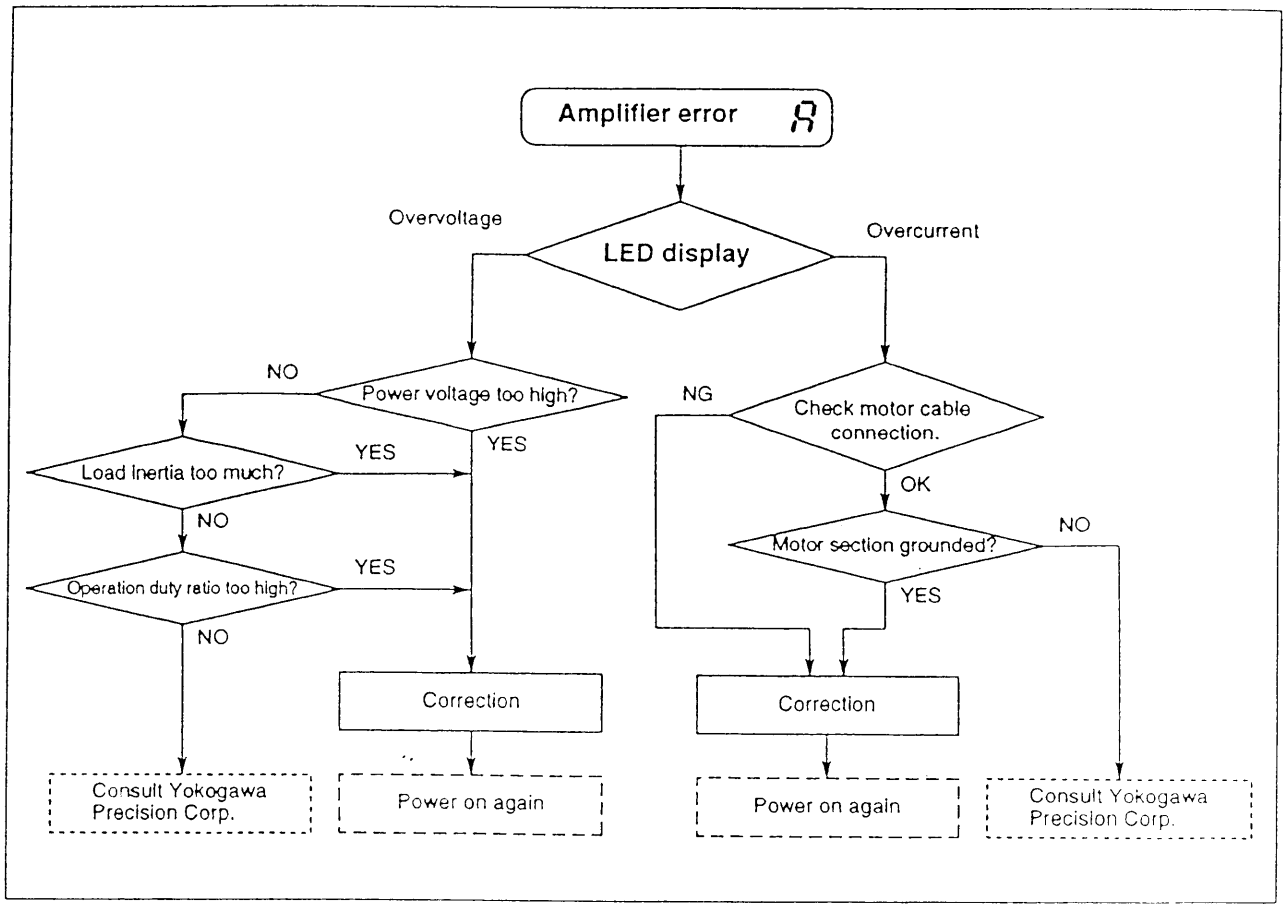
(3) Over Count Error



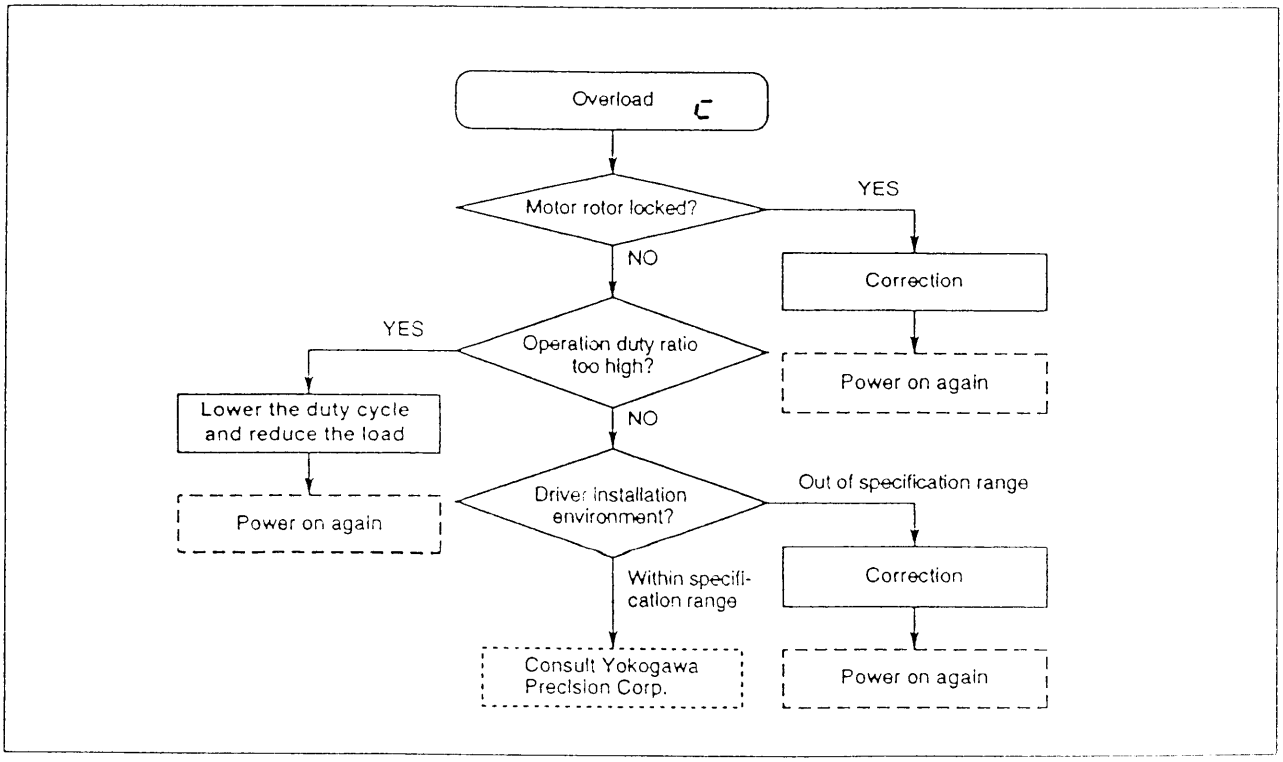
(4) Low Voltage Error



(5) Amplifier Error



(6) Over Load Error



Error Number: 3 **Battery error**

Error type:	[KIND_POR]	Start up error
Measures:	[TYPE_SYS]	Non start up
Main cause:	Drained lithium battery used for battery backup	
Remedial action:	Kindly change the lithium battery after opening the driver's side cover.	
	Perform a system wide backup by downloading all the relevant parameters, user defined cam data and the programs too as there is a likelihood of losing the data upon a system reset. After a system reset , if it proves necessary kindly upload the data back to the drive.	

Error Number: 4 **Watch dog error**

Error type:	[KIND_POR]	Start up error
Measures:	[TYPE_SYS]	Non start up
Main cause:	Watch timer error has occurred	
Remedial action:	Contact Yokogawa Precision Corporation or it's authorized dealer.	

Error Number: 9 **Servo constants error**

Error type:	[KIND_POR]	Start up error
Measures:	[TYPE_SYS]	Non start up
Main cause:	Abnormal value for the mechanical settings parameter (Example: The maximum velocity for the axis is too big a value)	
Remedial action:	After performing a system reset, kindly input the correct value for the parameter.	

Error Number: 10 **Parameter sum error**

Error type:	[KIND_POR]	Start up error
Measures:	[TYPE_SYS]	Non start up
Main cause:	Parameter value corrupted during upload due to a power shut down or outage etc.	
Remedial action:	After performing a system reset, kindly input the correct value for the parameter.	

Error Number: 11 **Parts sum error**

Error type:	[KIND_POR]	Start up error
Measures:	[TYPE_SYS]	Non start up
Main cause:	Parts settings corrupted during upload due to a power shut down or outage etc.	
Remedial action:	After performing a system reset, kindly input the correct value for the parameter.	

Error Number: 12 **Program file sum error**

Error type:	[KIND_POR]	Start up error
Measures:	[TYPE_SYS]	Non start up
Main cause:	Damaged program contents, due to power shut down (outage) while under uploading.	
Provision:	After performing a system reset, kindly upload the program once again.	

Error Number: 13 **Index compensation file sum error**

Error type:	[KIND_POR]	Start up error
Measures:	[TYPE_SYS]	Non start up
Main cause:	Damaged Index compensation file contents, due to the power shut down (outage) during uploading.	
Remedial action:	After performing a system reset, kindly upload the Index compensation file once again.	

Error number: 14 **System program error**

Error type:	[KIND_POR]	Start up error
Measures:	[TYPE_SYS]	Non start up
Main cause:	System program area was corrupted during program retrieval.	
Remedial action:	Contact Yokogawa Precision Corporation or it's authorized dealer.	

Error number: 19 **Axis operation hand shake error**

Error type:	[KIND_ERR]	Error
Measures:	[TYPE_EH1]	Emergency abort, Servo OFF status
Main cause:	During an axis operation, hand shaking was interrupted.	
Remedial action:	Contact Yokogawa Precision Corporation or it's authorized dealer.	

Error number: 20 **Driver error**

Error type:	[KIND_SRV]	Servo Error
Measures:	[TYPE_SRV]	Servo OFF
Main cause:	Driver operation error.	
Remedial action:	Kindly carry out the error reset.	

Error number: 21 **Driver over load**

Error type:	[KIND_SRV]	Servo Error
Measures:	[TYPE_SRV]	Servo OFF
Main cause:	Driver overload error.	
Remedial action:	Take action to remove the overload and then carry out an error reset operation.	

Error number: 22 **Driver pulse disconnection**

Error type:	[KIND_SRV]	Servo Error
Measures:	[TYPE_SRV]	Servo OFF
Main cause:	Encoder cable has a fault or is disconnected.	
Remedial action:	Replace cable or connect the cable properly.	

Error number: 23 **Position deviation overrun**

Error type:	[KIND_SRV]	Servo Error
Measures:	[TYPE_SRV]	Servo OFF
Main cause:	The position deviation has either exceeded the maximum limit or is under the minimum value defined for the relevant parameter.	
Remedial action:	①	Change the relevant parameter's value
	②	Reduce the acceleration/deceleration of the motor.

Error number: 25 **Logic I/O error**

Error type:	[KIND_POR]	Start up Error
Measures:	[TYPE_SYS]	Non start up
Main cause:	Error in the Logical I/O.	
Remedial action:	Contact Yokogawa Precision Corporation or it's authorized dealer.	

Error number: 30 **Servo not ready**

Error type:	[KIND_ERR]	Error
Measures:	[TYPE_EL2]	Decelerate to a stop and abort operation.
Main cause:	Driver is not in the Servo ON status.	
Remedial action:	Turn ON the Servo. (Kindly, use the error reset to turn OFF the error status).	

Error number: 31		**Position command Servo not ready**
Error type:	[KIND_ERR]	Error
Treatment :	[TYPE_EL2]	Decelerate to a stop and abort operation.
Main cause:	The position command rate of change is unusually large.	
Remedial action:	Kindly reduce the motor's acceleration / deceleration values.	
Error number: 40		**(+) direction hardware overtravel limit**
Error type:	[KIND_ERR]	Error
Treatment :	[TYPE_EL2]	Decelerate to a stop and abort operation.
Main cause:	The (+) direction hardware overtravel limit was exceeded.	
Remedial action:	Reset the error status.	
Error number: 41		**(-) direction hardware overtravel limit**
Error type:	[KIND_ERR]	Error
Treatment :	[TYPE_EL2]	Decelerate to a stop and abort operation.
Main cause:	The (-) direction hardware overtravel limit was exceeded.	
Remedial action:	Reset the error status.	
Error number: 42		**(+) direction software overtravel limit**
Error type:	[KIND_ERR]	Error
Treatment :	[TYPE_EL2]	Decelerate to a stop and abort operation.
Main cause:	The (+) direction software overtravel limit was exceeded.	
Remedial action:	Reset the error status.	
Error number: 43		**(-) direction software overtravel limit**
Error type:	[KIND_ERR]	Error
Treatment :	[TYPE_EL2]	Decelerate to a stop and abort operation.
Main cause:	The (-) direction software overtravel limit was exceeded.	
Remedial action:	Reset the error status.	
Error number: 44		**Out of range coordinate values**
Error type:	[KIND_ERRALM2]	Error/Operation warning
Treatment :	[TYPE_EL2]	Decelerate to a stop and abort operation.
Main cause:	Command coordinate value exceeded the range for the same.	
Remedial action:	Reset the error status.	
Error number: 45		**Abnormal program coordinates**
Error type:	[KIND_ERRALM2]	Error/Operation warning
Treatment :	[TYPE_EL2]	Decelerate to a stop and abort operation.
Main cause:	Program coordinates were corrupted.	
Remedial action:	First carry out an error reset, then proceed with the homing operation and thus, fix the coordinate system values.	
Error number: 46		**Emergency abort enabled**
Error type:	[KIND_ERR]	Error
Treatment :	[TYPE_EL2]	Emergency abort (immediately bring the motor to a stop)
Main cause:	System was brought to a stop by means of an emergency abort input.	
Remedial action:	Remove the emergency abort input and then carry out an error reset.	

Error number: 47	Anomalies in data execution
Error type:	[KIND_ERR] Error
Measures:	[TYPE_EL2] Decelerate to a stop and abort operation.
Main cause:	There are anomalies in the data executed.
Remedial action:	Reset the error status and then input correct data.

Error number: 48	Software data overflow
Error type:	[KIND_ERR] Error
Measures:	[TYPE_EL2] Decelerate to a stop and abort operation.
Main cause:	System software exceeded arithmetic data limit.
Remedial action:	Please bring scaling value to small after reset error

Error number: 49	Abnormal home position
Error type:	[KIND_ERRALM1] Error/Operation warning
Measures:	[TYPE_EL2] Decelerate to a stop and abort operation.
Main cause:	The position of home proximity signal and the motor's Z phase are too close to one another.
Remedial action:	Shut down the power supply to the system, mechanically relocate the position of the homing sensor and then start up the servo system and carry out the homing operation and then carry out normal operations.

Error number: 50	Execute mode operation when the motor is under error status.
Error type:	[KIND_ERRALM2] Error/Operation warning
Measures:	[TYPE_EL2] Decelerate to a stop and abort operation.
Main cause:	When motor is stopped and already under error status, commanding a mode change will cause this error to flag up.
Remedial action:	Kindly reset the error status.

Error number: 51	Parts not ready
Error type:	[KIND_ERRALM2] Error/Operation warning
Measures:	[TYPE_EL2] Decelerate to a stop and abort operation.
Main cause:	Command the selection of a part number which is not defined.
Remedial action:	Reset the error status and then select the correct part and carry out operations.

Error number: 52	Program not ready
Error type:	[KIND_ERRALM2] Error/Operation warning
Measures:	[TYPE_EL2] Decelerate to a stop and abort operation.
Main cause:	Command the selection of an undefined program number (not registered).
Remedial action:	Reset the error status and then select a registered program number.

Error number: 53	Index compensation file not ready
Error type:	[KIND_ERRALM2] Error/Operation warning
Measures:	[TYPE_EL2] Decelerate to a stop and abort operation.
Main cause:	Command the selection of an undefined index compensation file number.
Remedial action:	Reset the error status and then select a registered index compensation file number.

Error number: 54 — **Z phase homing velocity for recognition is abnormal**

Error type:	[KIND_ERRALM2] Error/Operation warning
Measures:	[TYPE_EL2] Decelerate to a stop and abort operation.
Main cause:	During an homing run, the motor's Z phase homing velocity for the first run is below the minimum speed limit specified for this axis.
Remedial action:	Carry out an error reset and increase the value of the Z phase homing velocity (parameter #13). Also reduce the value of the parameter #7 (acceleration value under a trapezoidal move), during a trapezoidal move.

Error number: 55 — **Execution not permitted while system is still under mode operations.**

Error type:	[KIND_ERRALM2] Error/Operation warning
Measures:	[TYPE_EL2] Decelerate to a stop and abort operation.
Main cause:	A mode change was requested while the motor was executing a mode operation.
Remedial action:	Upon error carry out an error reset. However, if an alarm is raised, stop the mode execution and restart the system.

Error number: 56 — **Abnormal M interface**

Error type:	[KIND_ERRALM2] Error/Operation warning
Measures:	[TYPE_EL2] Decelerate to a stop and abort operation.
Main cause:	M interface is in abnormal state.
Remedial action:	Carry out an error reset.

Error number: 57 — **Attempt a mode change while still in mechanical mode setting**

Error type:	[KIND_ERRALM] Operation warning
Measures:	[TYPE_SYS] Non start up
Main cause:	While the motor is still under mechanical setting mode status, Stop or Abort operations was carried out.
Remedial action:	Recycle power to the driver or carry out a system reset and then carry out a mode change operation.

Error number: 58 — **Program crashed**

Error type:	[KIND_ERR] Error
Measures:	[TYPE_EL2] Decelerate to a stop and abort operation.
Main cause:	The program crashed due to invalid instructions.
Remedial action:	Input a valid program once again.

Error number: 59 — **Invalid block no**

Error type:	[KIND_ERRALM2] Operation warning
Measures:	[TYPE_EL2] Non start up
Main cause:	Invalid block was specified during the execution of the program.
Remedial action:	Upon error carry out an error reset.

Error number: 60 — **Invalid command selection**

Error type:	[KIND_ERRALM2] Error/Operation warning
Measures:	[TYPE_EL2] Decelerate to a stop and abort operation.
Main cause:	Invalid command was entered.
Remedial action:	Upon error carry out an error reset.

Error number: 61 **Abnormal command format**

Error type: [KIND_ERRALM2] Error/Operation warning
Measures: [TYPE_EL2] Decelerate to a stop and abort operation.
Main cause: Invalid command was entered.
Remedial action: Upon error carry out an error reset.

Error number: 62 **Data out of range**

Error type: [KIND_ERRALM2] Error/Operation warning
Measures: [TYPE_EL2] Decelerate to a stop and abort operation.
Main cause: Input data was out of range.
Remedial action: Upon error carry out an error reset.

Error number: 63 **Abnormal access timing**

Error type: [KIND_ERRALM2] Error/Operation warning
Measures: [TYPE_EL2] Decelerate to a stop and abort operation.
Main cause: Attempt to change the mechanical mode settings parameter while not in the mechanical settings mode.
Remedial action: Change to the mechanical settings mode and then make the appropriate changes.

Error number: 64 **Invalid write operation**

Error type: [KIND_ERRALM2] Error/Operation warning
Measures: [TYPE_EL2] Decelerate to a stop and abort operation.
Main cause: Attempted to write data while under the monitor parameter mode.
Remedial action: Upon error carry out an error reset.

Error number: 65 **Parameter number out of range**

Error type: [KIND_ERRALM2] Error/Operation warning
Measures: [TYPE_EL2] Decelerate to a stop and abort operation.
Main cause: The parameter number specified was not within the valid specification range.
Remedial action: Upon error carry out an error reset.

Error number: 66 **Invalid device specified**

Error type: [KIND_ERRALM] Error/Operation warning
Measures: [TYPE_SYS] Non start up
Main cause: Specified the RS232C communications while still under PLC operation (or vice versa).
Remedial action: Change to the RS232C communications and then carry out operations (or vice versa).

Error number: 67 **Application error - 0**

Error type: [KIND_ERR] Error
Measures: [TYPE_SRV] Servo off
Main cause: The Servo ON emergency switch on the front panel of the DYNASERV was turned ON.
Remedial action: Turn OFF the Servo ON emergency switch on the front panel of the DYNASERV and then carry out an error reset operation. If you do not wish to turn ON the Servo, simply carry out an error reset only.

Error number: 68 **Program nesting overrun**

Error type: [KIND_ERR] Error
Measures: [TYPE_EL2] Decelerate to a stop and abort operation.
Main cause: Nesting of programs is limited to 15 only. An error is caused if this number is exceeded.
Remedial action: Review the program statements and then correct the programming.

Error number: 69	Application error- 1	
Error type:	[KIND_ERR]	Error
Measures:	[TYPE_EL2]	Decelerate to a stop and abort operation.
Main cause:	During the auto-tuning mode of operation the motor resonates causing this error. (Inertia settings are initialized to 0)	
Remedial action:	Carry out manual tuning on the servo system (remember to set the servo stiffness parameter to a low value) or else after setting a low value for the servo stiffness value, carry out auto-tuning operation again.	

Error number: 80	Unrecognized command	
Error type:	[KIND_ALM]	Operation warning
Measures:	[TYPE_EL2]	Decelerate to a stop and abort operation.
Main cause:	Command is not recognized.	
Remedial action:	Enter correct command using the necessary format.	

Error number: 82	Capacity overwhelmed	
Error type:	[KIND_ALM]	Operation warning
Measures:	[TYPE_EL2]	Decelerate to a stop and abort operation.
Main cause:	The program data area capacity id filled completely.	
Remedial action:	Delete unnecessary programs to make space for new programs.	

Error number: 83	Emergency stop during hold on	
Error type:	[KIND_ALM]	Operation warning
Measures:	[TYPE_EL2]	Decelerate to a stop and abort operation.
Main cause:	While the system is under hold-on status emergency stop was executed.	
Remedial action:	Carry out a driver reset or else recycle power to the servo system.	

Error number: 84	Hold failure	
Error type:	[KIND_ALM]	Operation warning
Measures:	[TYPE_EL2]	Decelerate to a stop and abort operation.
Main cause:	When the system was not in an idle status, a hold-on command was entered.	
Remedial action:	Enter the idle status and then carry out this command.	

Error number: 85	Multiple device specified	
Error type:	[KIND_ALM]	Operation warning
Measures:	[TYPE_SYS]	Non start up
Main cause:	The device specification is not recognized.	
Remedial action:	Select and specify the correct device.	

Error number: 89	Battery alarm	
Error type:	[KIND_ELS]	Other
Measures:	[TYPE_EL2]	Decelerate to a stop and abort operation.
Main cause:	The lithium battery used for backup is low in power.	
Remedial action:	Open the driver's side panel and then change the lithium battery.	