



YASNAC PC NC Maintenance Manual

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Chapter 1: General Installation and Electrical Connection

This section addresses the basic system: configuration, specifications, enclosure design, electrical connections, and installation.

1.1 Component Arrangement

The YASNAC PC NC unit is composed of two boards: JCP20 and JFC20 (JZNC-JFC10). (Refer to the figure below.) The PC NC unit is inserted into a PC extended bus (ISA) inside the personal computer (PC) case. The I/O module, servo unit, spindle drive, and motor are the same as those of the YASNAC J100 CNC UNIT.

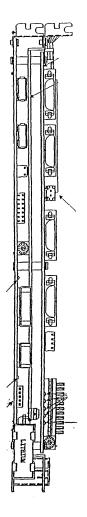




Figure 1.1: The YASNAC PC NC Unit

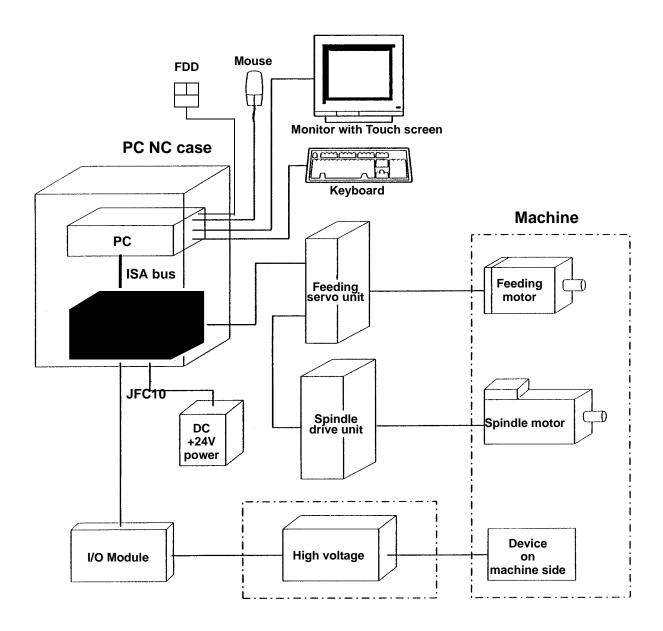


Figure 1.2: The YASNAC PC NC System Structure Diagram

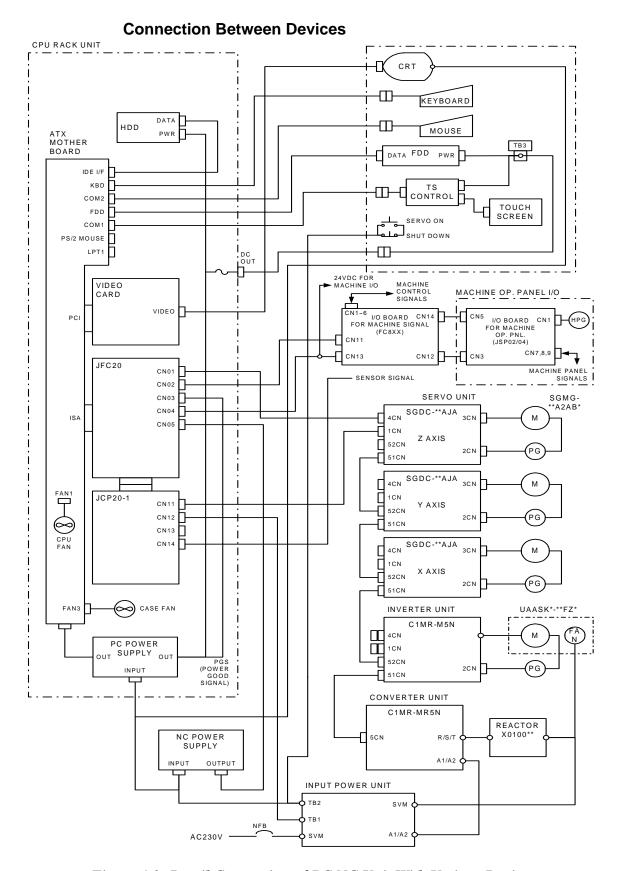


Figure 1.3: Detail Connection of PC NC Unit With Various Devices.

Connector Layout NC Side

The following figure provides a detailed Connectors Layout of the YAS-NAC JZNC-JFC10 board.

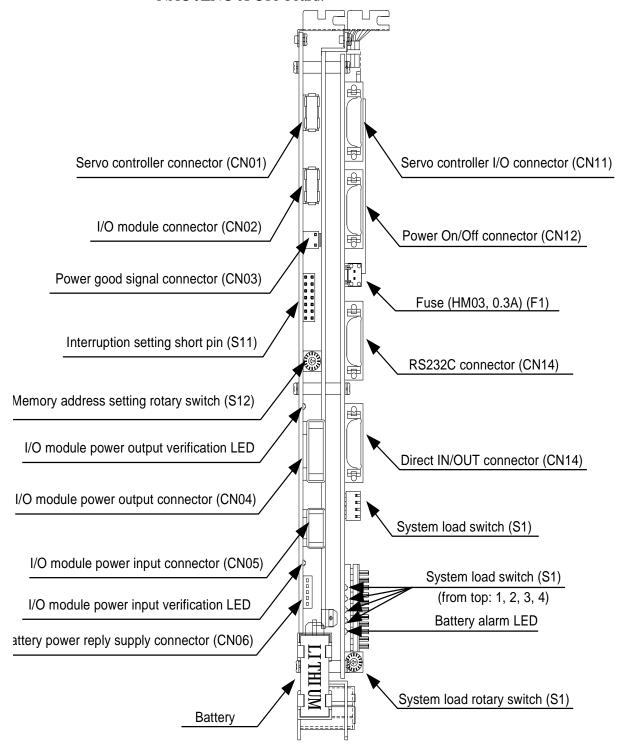


Figure 1.4: Detailed Layout of the YASNAC JZNC-JFC10 Board

Connector Layout (PC Side)

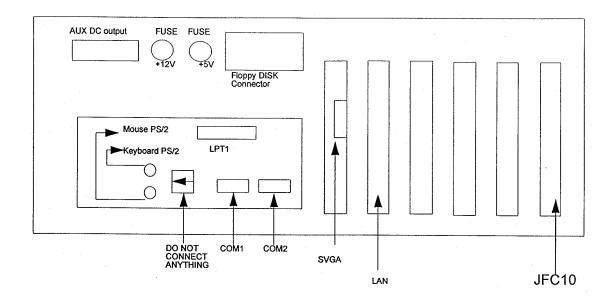


Figure 1.5: Connector Layout of the PC NC CPU Rack (top view)

1.2 General Specifications

The enclosure must be designed to meet all of the following conditions.

Table 1.1: Specifications

Item		Specifications		
Ambient Conditions	Temperature*	Storage and Transportation	-15°C to +65°C	
		Operating (around enclosure)	PC NC unit I/O module Servo Amplifier 14" Color monitor with touch screen	0°C to +53°C
Humidity			20% to 80% RH (with operation) 10% to 90% RH (with non-operat	ion)
	Vibration during operation		Less than 4.9m/s	
Others PC NC Unit inpu			Free from dust, coolant, or organic solvent	
		ut power supply	+24VDC <u>+</u> 10% 180V-264VAC	
	Power Supply UPS000004	Jnit	Input power supply voltage: 180\ Frequency: 47Hz to 63Hz Momentary interruption: 0.5 cycle	

Note: Avoid installing the control panel in a location subject to direct sunlight, near heat generating

devices, or outdoors, even if the ambient temperature is within the specified range.

Design of the enclosure should be made on the basis that the average temperature increase of air within the enclosure (containing the PC NC unit and other components) should be 10°C below the external air temperature.

(1) Temperature Increase within the Enclosure (Average Temperature Increase)

The internal temperature increase (sheet metal enclosure) is generally as follows: where,

 ΔT : Internal temperature increase (${}^{o}C$)

P: Heat generation in enclosure (W)

qe: Enclosure heat percolation ratio (W/°C)

k: Heat transit ratio of sheet metal $(W/m^{2o}C)$

6W/m^{2o}C: With internal cooling fan

4W/m^{2o}C: Without internal cooling fan

A: Efficient heat diffusion area of enclosure (m²)

Area capable of diffusing heat in surface area of the enclosure

(Excluding area contacting other devices)

Example: Allowable heat generation in the enclosure with internal circulating fan

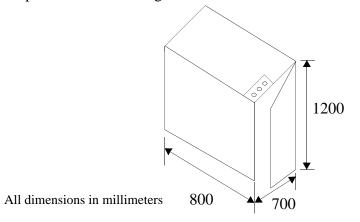


Figure 1.6: Enclosure Dimensions

Efficient heat diffusion area is independently located, so bottom area is excluded.

 $A=4.16m^{2}$

If the heat generation in the enclosure is supposed to be 246W (113W in the

CNC portion, 104W in the servo portion, and 29W in the I/O portion):

$$\Delta T = \frac{P}{qe} = \frac{P}{k \cdot A}$$
$$\frac{246}{6 \times 4.16} = 9.9 \, (^{\circ}C)$$

Therefore, the above value is within the temperature increase value.

When it exceeds 10°C, separate cooling countermeasures must be arranged.

(2) Heat Exchanger Cooling Capacity

Yaskawa can provide heat exchangers where the cooling capacity is insufficient even with a circulating fan mounted in the enclosure.

Table 1.2: Heat Exchangers

Heat Exchanger	Cooling Capacity	External Dimensions (mm)
REX1550	100W /10°C	295 width x 890 height x 50 depth
HEATEX02	250W /10°C	440 width x 924 height x 50 depth

The heat generation indicated in the above table is the allowable heat generated when the internal temperature increase in the enclosure is limited to under 10°C.

Example: Allowable Heat Generated in the Enclosure with Heat Exchanger

The amount of internal heat generated to make the internal temperature under 10°C when the enclosure is equipped with a HEATEX02 Heat Exchanger is expressed by the following equation:

P=
$$k \cdot A \cdot \Delta T + 250 \text{ W}/10^{\circ}\text{C}$$

= $6 \times 4.16 \times 10 + 250$
= $499 \text{ W}/10^{\circ}\text{C}$

Therefore, the amount of internal heat generated must be less than 499W.

(3) Mounting Heat Exchanger

The heat exchanger must be mounted on the enclosure provided by the machine tool builder, as shown in the figure below. Mount the exchanger so that the internal air is drawn from the upper portion and discharged through the lower portion, while the external air is drawn in from the lower portion and discharged through the upper portion.

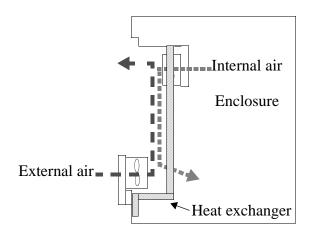


Figure 1.7: Mounting of Heat Exchanger on the Machine Builder's Enclosure

(4) Heat Generation by Respective Units

Table 1.3: Heat Generation

Unit	Туре	Total Heat Generation (W)	Internal Heat Generation (W)	Minimum Wind Velocity for Cooling
PC NC rack	JZNC-JPCRKM	_	_	_
14" Color CRT with Touchscreen	JZNC-JPCOP	_	_	_
I/O Module	JANCD-FC810*	29	29	0
	JANCD-FC860*	29	29	0
	JANCD-FC861*	14.5	14.5	0
Converter	CIMR-MR5N23P7	84	44	2.5
	CIMR-MR5N25P5	84	44	
	CIMR-MR5N27P5	119	61	
	CIMR-MR5N2011	152	70	
	CIMR-MR5N2015	204	88	
	CIMR-MR5N2018	273	108	
	CIMR-MR5N2022	335	132	
	CIMR-MR5N2030	392	160	
Spindle Inverter	CIMR-MR5N23P7	84	44	2.5
	CIMR-MR5N25P5	185	58	
	CIMR-MR5N27P5	244	77	
	CIMR-MR5N2011	307	89	
	CIMR-MR5N2015	454	119	
	CIMR-MR5N2018	565	144	
	CIMR-MR5N2022	717	180	
	CIMR-MR5N2030	869	219	
Reactor	UZBA-B 20A 0.53 mH	35	35	0
	UZBA-B 30A 0.35 mH	45	45	0
	UZBA-B 40A 0.265 mH	50	50	0
	UZBA-B 60A 0.18 mH	65	65	0
	UZBA-B 80A 0.13 mH	75	75	0
	UZBA-B 90A 0.12 mH	90	90	0
	UZBA-B 120A 0.09 mH	90	90	0
	UZBA-B 160A 0.07 mH	100	100	0

Table 1.3: Heat Generation (Continued)

Unit	Туре	Total Heat Generation (W)	Internal Heat Generation (W)	Minimum Wind Velocity for Cooling
	SGDC-05AJ A	28	10	2.5
Servo Unit	SGDC-10AJ A	48	12	
	SGDC-15AJ A	73	15	
	SGDC-20AJ A	108	18	
	SGDC-30AJ A	148	22	
	SGDC-50AJ A	208	28	

- 1. The heat generated by the CNC unit varies depending on the addition of options. The heat generated by the I/O module varies with I/O status.
- 2. Internal heat generation is the heat remaining inside of the enclosure when the fin of the servo is exposed outside of the enclosure, and when the external air is applied to the fin at greater than 2.5m/s
- 3. The thermal design of the enclosure to house the servo unit varies with machine specifications, but is acknowledged to use a value of 70% of the load factor.

Chapter 2: Routine Inspection

This chapter includes the requirements to maintain optimum operating conditions over time.

2.1 Routine Inspection

The table below details routine inspection of the PC NC.

Table 2.1: Routine Inspection

Area	Inspect Item	Frequency	System OFF/ON*	Remarks
Battery	Verify battery alarm LED is on.	At power on	ON	If alarm LED is on, replace battery.
Servo motor	Vibration and noise	Daily	ON	Feel by hand; listen by ear.
	Motor contamina- tion and damage	Daily (or as required)	ON and OFF	Visual inspection
Fan	Air flow	Monthly	ON and OFF	Feel by hand; listen by ear.
Touch screen	Clean	Daily	ON and OFF	Use clean rag.
	Calibrate	Monthly	ON	Use Calibration Screen.
Control panel	Verify doors are tightly closed.	Daily	OFF	Visual inspection
	Verify tight fit, no gaps in the side plates, and door gaskets are not worn.	Monthly	OFF	Visual inspection

^{*} With the exception of inspections made while the NC is in the energized state (i.e., external cleanliness, vibration, noise, etc.), turn off the source power supply to the NC before undertaking routine maintenance service. To remove power completely from the NC, turn off the main circuit breaker on the power panel of the machine.

2.2 Battery

To determine whether the battery must be replaced, and replacement directions, follow the steps below.

1. Press the **Power OFF** button.

- 2. Turn OFF the door interlock switch, if provided. (The power can be turned ON with the door open.)
- 3. Open the door to view the NC rack.
- 4. Turn the power ON. If the Battery Alarm LED is displayed in the Message Bar on the top portion of the screen, the battery must be replaced within 16 hours. Do not use commercially-available batteries. Contact a Yaskawa customer service representative.
- 5. If the battery must be replaced, turn the power OFF. Remove the battery from the battery holder.
- 6. Place the new battery in the holder and set the connector. (Note: the direction of the connector is unimportant; however, poor connection may result in a lack of conduction.). Refer to the figure below.

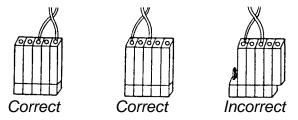


Figure 2.1: Battery Connection



Figure 2.2: Replacement Battery

Note: • Replace the battery as soon as possible after the power goes OFF to avoid data loss.

- Do not turn the power ON and OFF in rapid sequence.
- Wait 4 to 5 seconds after the power has been turned ON before turning the power OFF.
- 7. With the power ON, ensure that the "Message Alarm" display on the CRT and the red LED at the front of the JZNC-JFC10 PCB is OFF.

Note: If the "Message Alarm" display on the CRT or the red LED on the front are still illuminated, the probable cause is improper battery connection, or a defective battery.

When alarms 2121 or higher (encoder battery errors) occur, DGN #35024 (*BALM) is not output. When DGN #35024 (*BALM) is output, the LED goes on only when the CMOS backup battery is exhausted. This battery differs from the encoder batter.

2.3 Servo Motor

Inspect the servo motor *daily* as follows.

Table 2.2: Servo Motor Inspection

Inspect Item	Remarks
Vibration and noise	Vibration can be checked by resting the hand on the motor. Noise can be checked by using a listening stick. Contact maintenance personnel immediately when any abnormality is found.
Motor contamination and damage	Visually check the motor exterior. If dirt or damage are observed, inspect the motor by removing the machine cover. Refer to the machine manufacturer's manual.

2.4 Fan

Verify the CPU rack cooling fan is running by placing a hand on the outside case in the path of the airflow.



Figure 2.3: CPU Rack and Fan

If the cooling fan speed falls below 2000rpm, a "Slow Fan" warning message appears. When this occurs, open the CPU rack and check the fan for any obstacles that may inhibit the fan rotation. If no obstacles are present, call a Yaskawa customer service representative.

If the CPU rack cooling fan speed falls below 1800rpm, a "Fan Alarm of CNC Unit" message appears. When this occurs, Cycle Start is not possible. Open the CPU rack and check the fan for any obstacles that may inhibit the fan rotation. If no obstacles are present, call a Yaskawa customer service representative.

2.5 Touch Screen

Clean the touch screen *daily*. Select PC Settings from the Utilities Menu. Select the **Touch Screen Cleaning** button. When the screen below appears, proceed to clean the touch screen.

Press the escape key to return to the previous screen.

- 1. Ensure there are no metal or other hard particles on the touch screen that may scratch the screen.
- 2. Use a general purpose liquid glass cleaner and a clean rag.
- 3. *Never* spray glass cleaner directly onto the touch screen. Always spray onto the clean rag.
- 4. Wipe the touch screen completely.
- 5. When finished, press the **Escape** key.

2.6 Control Panel

Details of the standard cabinet are explained below. Questions on customized cabinets should be referred to the manual issued by the machine manufacturer.

Follow the steps below for routine *daily* maintenance of the control panel.

- 1. Inspect the door(s) daily to ensure tight closure. The control panel is constructed as a dust-proof, sheet-steel enclosure with gasketed doors to keep out dust and oil mists. Keep the door(s) tightly closed at all times.
- 2. Following inspection of the control with the door open, close the door and fasten the door locks (two per door) securely using the key provided (Number YE001). When opening (counter-clockwise rotation) or closing (clockwise rotation), insert the key all the way into the keyhole and turn until it clicks (approximately a quarter-turn). The key can be removed from an open or closed position.

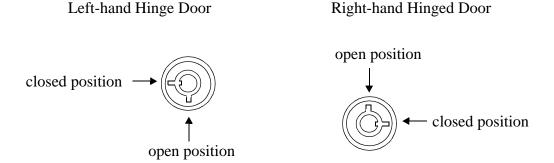


Figure 2.4: Open and Closed Positions

Note: If the optional door interlocking switch is provided, opening the door shuts off the main power supply and stops all operations.

The following *monthly* maintenance must be performed.

- 1. Inspect the gaskets on the rims of the front and rear doors for openings or damage.
- 2. Inspect the inside of the enclosure; clean it if necessary.
- 3. Look for any opening in the door base when the doors are tightly shut.

Chapter 3: Maintenance Instruments

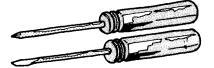
Measuring instruments, tools, and replacement parts are described in this chapter.

Table 3.1: Measuring Instruments

Name	Allowable Measuring Range	Purpose
Tester	10 to 33VAC (at 40 to 100Hz) Tolerance: ±2%	To measure AC power voltages
	Several mV to 100VDC Tolerance: ±2%	To measure DC power voltages
or multi-purpose digital meter	Up to multiples of $10M\Omega$	To measure currents

The only required tools are those listed below.

- Phillips screwdrivers (large, medium, and small)
- Standard screwdrivers (medium and small)
- ROM extractor: IC extractor model GX-6



Maintenance/replacement parts are:

- Fuse model HMO3, 0.3A; approximate mass: 0.4g
- NC card fuse



 CPU rack fuse: 1A 250V 3AG fast-acting type glass body cartridge fuse; or 250V 3AG fast-acting type glass body cartridge fuse

Note: The current CPU rack fuse is 1A Littlefuse #312001, but will change to 3A Littlefuse #312003 fuse per ECO #N-9910-020.

• Motherboard battery: coin-type 3V lithium battery, part # Mitsubishi #CR2032, or Maxell #CR2032

Chapter 4: Troubleshooting

4.1 Maintenance Data

To locate the cause of problems or when contacting your Yaskawa customer service representative for advice, users must precisely understand the actual situation. To minimize the downtime, check the following points carefully.

riangle CAUTION

- When an alarm occurs, eliminate the fault and assure operation safety before resetting it. Failure to observe this caution could result in equipment malfunction.
- For details on the machine-related sequence, refer to the machine tool manual.

Checking the Status of Problems

(1) Understanding the Situation

To identify the nature of the problem, first check the following items.

- Type of operation that causes a problem.

 Do other types of operations not cause problems?
- Q Details of problems
 How, frequency (always or sometimes), and when?
- Unusual situation when the problem occurred.
- Was there an unusual external occurrence (such as power failure or lightning) when the problem occurred?
- Timing of problem occurrence.
 Did the problem occur during or after the operation of the keys, or in a specific operation mode?
- (2) Check Items
 - (a) Problems related with axis feed and spindle drive

Check the following items.

- Indication status of the LEDs on the drive unit
- Fuses and breakers

- Timing of problem occurrence when the power is turned ON, during acceleration, during deceleration or during fixed speed spindle rotation, etc.?
 - (b) Problems related to part program

Record the program block data, offset data, workpiece coordinate system offset data, coordinate system setting data, etc.

Checking the NC Information

Aside from the specific problem, the following information must be obtained regarding the hardware environment.

- Machine tool builder's name
- Delivery date of machine tool
- Type and model name of the machine tool
- Type and model name of the NC and units

Example

NC unit	YASNAC PC NC
Servo drive	SGDC-AJA
Servo motor	SGMG
Spindle drive	CIMR-M5N20155
Spindle motor	UAASKD-11HB11

Display of Alarm Information

If an alarm occurs, the top priority alarm number and alarm comment are displayed in the normal display area disregarding the selected mode and the screen.

Cause of Alarm and Corrective Action

The following shows the listing of YASNAC PC NC alarms.

Table 4.1: Alarm Numbers and Classification

Number	Contents	Stop Mode	Output	How To Reset
0000 to 0049	Errors related to edit and operation Occurring in the background mode also.	Block stop	Input error alarm	Reset
0050 to 0099	Errors related to edit and operation Not occurring in the background mode.	Block stop	Input error alarm	Reset Power OFF for #0050 and #0051
0100 to 0499	Program error	Block stop	Input error alarm	Reset
1000 to 1099	Program error DNC, COMS total, etc.	Block stop	Input error alarm	Reset
2000 to 2199	Machine related error OT, reference point return, machine ready, in-position, etc.	Stop after deceleration, or immediate stop	Alarm	Reset operation after removing the cause. With the alarm caused by the machine ready signal, if it occurs in the first power ON operation, it is automatically reset.
3000 to 3299	Servo and spindle related alarm ESP, CPU mutual monitoring	Immediate stop, or serve, OFF	Alarm	Reset after removing the cause. With the SVOFF alarm, it is automatically reset by the SVON.
8000 to 8049	Memory check error Watchdog timer error Offline error	Immediate stop, or serve OFF	Alarm	For maintenance CPU halt Switching to the maintenance screen
9000 to 9049	Error occurring in background editing (basically the same as with 0000 to 0049)	Not stopped	Back- ground error output	Reset or with reset soft-key
No number indication BAT indication BAT, AXIS	Battery error Encoder alarm	Not stopped	No output	Changing the battery
No number indication Warning message	Key operation error, edit operation error (not serious operation error)	Not stopped	Warning	Next key operation

4-3

Troubleshooting (1)

(1) Alarm Number 1099 (High Temperature)

Table 4.2: Countermeasures - Alarm #1099 (High Temperature)

Cause	Check Item	Countermeasures
Ambient temperature of the NC rack exceeded the specified value* due to the failure of the cooling fan. * 70°C ± 3°C when measured above CPS-18.	 Open the NC unit door to check whether the cooling fan is operating correctly. Ensure that air is blowing out through the ventilation port of the cooling duct. Ensure that the ventilation port of the cooling duct is not blocked. 	If the fan is faulty, it must be replaced. Contact your Yaskawa customer service representative. If the cooling duct is blocked, remove the interfering object and start the cooling fan.
Internal temperature of the power supply unit is high.	Allow the power supply unit to cool by turning OFF the power with the PC NC unit door opened. If the alarm occurs even after the power supply unit has been cooled for 30 minutes, the power supply unit is faulty.	The power supply unit must be changed. Contact your Yaskawa customer service representative.
Ambient temperature of the I NC unit is high.* *: Allowable temperature range for operation is 0 to 40°C.	Measure the ambient temperature. If the NC unit is placed in direct sunlight, the NC unit temperature may exceed the allowable limit.	This is not the failure of the NC unit. Remove the cause.

(2) Alarm Numbers 2061 to 2068 (Reference Point Return Area Error)

Table 4.3: Troubleshooting - Alarm #2061 ~ 2068 (Reference Point Return Area Error)

Cause	Check Item	Countermeasures
The reference point return start point is at the zero point side of the deceleration limit switch.	#3073 DO (1st axis) #3073 DO (1st axis) #3073 D1 (2nd. axis) #3073 D2 (3rd axis) #3073 D3 (4th axis) #3073 D4 (5th axis) #3073 D5 (axis) #3073 D5 (axis) #3073 D6 (axis) #3073 D7 (axis) #	Return the axis to a position on the deceleration LS or away from it and, then execute reference point return once again.
Approach feedrate is too fast.	Compare the setting for the approach feedrate parameter with the parameter list.	Change the setting for parameters pm2521 to pm2525 to an appropriate value.

(3) Alarm Numbers 2071 to 2078, 2081 to 2088 (Reference Point Return Position Error)

Table 4.4: Troubleshooting - Alarm Numbers 2071 ~ 2078, 2081 ~ 2088 (Reference Point Return Position Error)

Cause	Check Item	Countermeasures
Alarm in manual reference point return operation	Determine whether the error occurs every time.	Contact a Yaskawa customer service representative.
Alarm in automatic reference point return operation	G28: Determine whether the alarm occurs every time.	Contact a Yaskawa customer service representative.
	G27: Check the point specified in the program to determine whether it agrees with the zero point.	Review the program.

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(4) Alarm Numbers 2101 to 2108 (P-SET Error)

The P-SET alarm occurs if the error between the position specified in the program and the actual machine position is larger than the value set for parameterspm1321 (1st axis) to pm 1325 (5th axis) in the following modes of operation.

At the completion of positioning in G00, G27, G28, G29, G30, etc., error detect ON (1/O monitor parameter #3004 D4 = 1), and G04 (dwell).

If error pulses have been accumulated, check the number of accumulated pulses on the Error Pulse Display Screen before contacting a Yaskawa customer service representative.

(5) Alarm Number 3000 (Servo Power Not Ready)

Table 4.5 Troubleshooting - Alarm #3000 (Servo Power Not Ready)

Cause	Check Item	Countermeasures
Secondary power supply is not applied	If the NC RESET switch is depressed after depressing the POWER ON button once, or after clearing the emergency stop or alarm state, the alarm message is displayed. This does not indicate the occurrence of an alarm.	Press the POWER ON button again.
With the secondary power ON, I/O input specification is not turned ON (for automatic servo power ON)	Verify the following on the I/O monitor screen: #3005 DO = 1 (SVON) #3503 DO = 1 (SVONS)	Contact your Yaskawa customer service representative.
Emergency stop signal stays ON.	Determine whether alarm Number 3002 is displayed (#3503 D4 = 1) on the screen.	Reset the emergency stop input signal.
The secondary power ON signal is turned OFF due to some other alarm.	Check the alarm indication for other alarms.	Take appropriate measures by referring to the alarm code.

(6) Alarm Number 3001 (Control Not Ready)

The PC NC executes self-diagnosis after power ON. This alarm occurs when the positioning error checked during this self-diagnosis exceeds the values set for parameters pm 1321 (1st axis) to pm1325 (5th axis).

Table 4.6: Troubleshooting - Alarm Number 3001 (Control Not Ready)

Cause	Check Item	Countermeasures
	Select the error pulse display screen from the present position display	Contact a Yaskawa customer service representative.
PG signal remains output.	screen in the common process and check the error pulse value.	PG or AC servo must be changed. Contact a Yaskawa customer service representative.

(7) Alarm Numbers 3041 to 3048 (Excessive Follow-up Error)

If the follow-up error between the command values and the actual position values exceeds 120% of the error in rapid traverse (100%) operation, this alarm occurs. Check the values set for parameters pm1671 to pm1675, pm1681 to pm1685 and contact a Yaskawa customer service representative.

(8) Alarm Number 3051 (Excessive Follow-up Error: Spindle)

If the follow-up error between the command values and the actual position values exceeds the value set for parameter pm1351, this alarm occurs. Check the values set for parameter pm1351 and contact a Yaskawa customer service representative.

(9) Alarm Numbers 3061 to 3068 (Overload)

Table 4.7: Troubleshooting - Alarm Numbers 3061 ~ 3068 (Overload)

Cause	Check Item	Countermeasures
Cutting conditions	Determine whether the alarm occurred during machining.	Turn OFF the power and allow the servomotor to cool. Then change to lighter machining conditions and restart the operation.
Guideways are not lubricated properly, causing heavy axis movements.	Inspect the guideways to determine whether they are lubricated properly.	Contact the machine tool builder, or a Yaskawa customer service representative.

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(10) Alarm Numbers 3081 to 3088 (Broken PG Cable)

The A and B phase signal cables are checked for breakage.

Table 4.8: Troubleshooting - Alarm Numbers 3081 ~ 3088 (Broken PG Cable)

Cause	Check Item	Countermeasures
Signal cables between the NC and the AC servo drive unit are broken or loose.	Ensure that the cable connectors are plugged into the connectors securely.	If they are loose or disconnected, re-connect them correctly.
Faulty PG cable breakage detection circuit.	Determine whether the alarm occurs in the first pressing of the POWER ON button even when the cables are con- nected correctly.	Contact your Yaskawa customer service representative.
Error in motor type parameter setting	Determine whether the motor type setting parameters (pm 1061 to pm 1065) has been set to "0".	Correct the setting for the motor type parameters (pm1061 to pm1065).

(11) Alarm Number 3091 (Broken Spindle PG Cable)

The A, B, and C phase signal cables are checked for breakage.

Table 4.9: Troubleshooting - Alarm Number 3091 (Broken Spindle PG Cable)

Cause	Check Item	Countermeasures
Signal cables between the NC and the AC servo drive unit are broken or loose.	Ensure that the cable connectors are plugged into the connectors securely.	If they are loose or discon- nected, re-connect them cor- rectly.
Faulty PG cable breakage -detection circuit	Determine whether the alarm occurs in the first pressing of POWER ON button even when the cables are connected correctly.	Contact a Yaskawa customer service representative.
Faulty PG	If an alarm occurs during low speed operation, the PG may be faulty.	Contact a Yaskawa customer service representative.

(12) Alarm Numbers 3121 to 3125 (Excessive Speed)

This alarm is detected if the motor speed exceeds 1.2 times the maximum motor speed.

Contact a Yaskawa customer service representative.

(13) Alarm Numbers 3161 to 3165 (Absolute Error)

Malfunction of the absolute encoder is detected. Contact a Yaskawa customer service representative after checking the following:

- Whether the alarm occurs immediately after the control power is turned ON.
- Whether the alarm is cleared when the power is turned OFF and then turned ON again.
- Whether the battery alarm occurs at the same time.

(14) Alarm Numbers 3181 to 3185 (Position Error)

Malfunction of the PG pulse (counter in the absolute encoder) is detected. Contact your Yaskawa customer service representative after checking the following:

- Whether the alarm occurs immediately after the control power is turned ON.
- Whether the alarm occurs frequently during operation.

(15) Alarm Numbers 3201 to 3205 (Servo Drive Unit Communication Error)

Communication error between the NC and the AC servo drive unit is detected. Contact your Yaskawa representative.

(16) Alarm Numbers 3301 to 3305 (Overcurrent)

Contact your Yaskawa customer service representative after checking the following:

- Whether the alarm occurs immediately after the control power is turned ON.
- Whether the alarm occurs after turning ON the main power.

(17) Alarm Number 3311 to 3315 (MCCB Trip)

- Contact your Yaskawa customer service representative after checking the following:
- Whether the alarm occurs immediately after the control power is turned ON.
- Whether the alarm occurs after turning ON the main power.

(18) Alarm Number 3321 to 3325 (Regeneration Error)

Contact your Yaskawa customer service representative after checking the following:

- Whether the alarm occurs immediately after the control power is turned ON.
- Whether the alarm occurs after turning ON the main power.

(19) Alarm Numbers 3331 to 3335 (Over Voltage)

Contact your Yaskawa customer service representative after checking the following:

- Whether the alarm occurs at the start of motor rotation.
- Whether the alarm occurs during deceleration.

(20) Alarm No.: 3341 to 3345 (Under Voltage)

Contact your Yaskawa customer service representative after checking the following:

- Whether the alarm occurs after turning ON the main power.
- (21) Alarm Numbers 3351 to 3355 (Heat Sink Overheat)

Table 4.10: Troubleshooting - Alarm # 3351 ~ 3355 (Heat Sink Overheat)

Cause	Check Item	Countermeasures
Faulty control board	Check whether the alarm occurs immediately after the control power is turned ON.	Contact your Yaskawa representative.
Fan stop	Check whether the alarm occurs during operation (alarm recurs if the control power is turned ON after turning it OFF once, or the operation restarts when the NC is reset after several minutes.) Check whether the fan is rotating.	Contact your Yaskawa customer service representative.

(22) Alarm Numbers 3361 to 3365 (Wire Break in Current Instruction Cable)

Contact your Yaskawa customer service representative after checking the following:

- Whether the alarm occurs immediately after the control power is turned ON.
- Whether an alarm other than the current instruction cable breakage alarm occurs.
- (23) Alarm Numbers 3371 to 3375 (Open Phase Detection)

Contact your Yaskawa customer service representative after checking the following:

- Whether the alarm occurs immediately after the control power is turned ON.
- Whether the alarm occurs after turning ON the main power.

Troubleshooting (2)

Check both the drive unit and the PC NC unit for systems equipped with a drive unit compatible with YENET1 200. If a fault is detected, the drive unit notifies the PC NC unit of the alarm information in both systems.

The drive unit first gives the PC NC unit the information on the occurrence of an alarm (Alarm Number 3101 to 3105 and Number 3201) and then the content of the alarm. The NC unit displays alarm Number 3100 when it receives the alarm information from the drive units.

Therefore, three alarms usually occur if an error is detected in the drive unit. If a blown fuse occurs with the X-axis servo unit, Alarm Numbers 3100, 3101, and 3021 occur.

(1) Alarm Numbers 3021 to 3025 (Fuse Blown)

The main circuit of the servo unit may be faulty.

The servo unit detects the error.

Contact your Yaskawa customer service representative.

(2) Alarm Numbers 3041 to 3045, 3051 (Excessive Follow-up Error)

This alarm occurs if the follow-up error exceeds 120% of the error in rapid traverse (100%) operation.

The servo unit detects the alarm.

Improper gain adjustment is one of the reasons.

Contact a Yaskawa customer service representative.

(3) Alarm Numbers 3061 to 3065 (Overload)

This alarm occurs if the load exceeds the rated torque considerably.

The servo unit detects the error.

Review the cutting conditions. Contact a Yaskawa customer service representative after checking whether the alarm occurred simply after turning the control power ON.

(4) Alarm Nos.: 3081 to 3085 and 3091 (Broken PG Cable)

The encoder signal cable or the encoder itself will be faulty.

The servo unit or the inverter detects the error.

Contact a Yaskawa customer service representative.

(5) Alarm Numbers 3101 to 31051 (Servo Alarm)

This alarm occurs when the NC unit detects the alarm signal output from the servo unit.

Check the contents of the alarm by displaying the servo alarm display screen (press [F2] of the alarm job in the common process.).

(6) Alarm Numbers 3111 to 3115 (Servo Communication Alarm)

Probable causes of this alarm are a broken YENET1 200 communication cable, loose cable connection and communication processing error.

The servo unit detects the alarm.

Contact a Yaskawa customer service representative after making sure that the cable is securely connected.

(7) Alarm Numbers 3121 to 3125 (Excessive Speed)

This alarm occurs if the motor speed exceeds 4950 r/rein or the value set for the parameter.

The servo unit detects the alarm.

Check whether the connection to the encoder is correct.

Contact a Yaskawa customer service representative.

(8) Alarm Numbers 3141 to 3145 (Overrun, Run-away Prevention)

The encoder will be faulty.

The servo unit detects the alarm.

Contact a Yaskawa customer service representative.

(9) Alarm Numbers 3151 to 3155 (Phase Detection Error)

The encoder signal cable or the encoder itself will be faulty.

The servo unit detects the error.

Contact a Yaskawa customer service representative.

(10) Alarm Numbers 3161 to 3165 (Absolute Error)

This alarm occurs if the absolute value data cannot be received correctly in one to two seconds after turning ON the power to the encoder.

The servo unit detects the error.

The encoder or the servo unit will be faulty.

Contact a Yaskawa customer service representative.

(11) Alarm Numbers 3181 to 3185 (Absolute Position Error)

The number of feedback pulses is checked every turn of the encoder, and this alarm occurs if there is an error in the number of pulses counted.

The servo unit detects the alarm.

The encoder or the servo unit will be faulty, or malfunction could have occurred due to noises.

Contact a Yaskawa customer service representative.

(12) Alarm Number 3201 (Inverter Alarm)

This alarm occurs when the NC unit detects the alarm signal output from the inverter.

Check the contents of the alarm by displaying the servo alarm display screen (press [F2] of the alarm job in the common process.).

(13) Alarm Numbers 3281 to 3285, 3291 (YENET1 200 command time-out)

This alarm occurs when the YENET1200 communication lines fail to get ready.

The NC units detects the alarm.

The servo unit or the inverter unit is faulty.

Contact a Yaskawa customer service representative.

(14) Alarm Numbers 3301 to 3305 (Overcurrent)

The servo unit detects the alarm.

The servo unit may be faulty if the alarm occurs before the operation is started after turning the power ON.

If the alarm occurs during operation, a ground fault of the motor is the cause.

Contact a Yaskawa customer service representative.

(15) Alarm Numbers 3331 to 3335 (Over Voltage)

The servo unit detects the alarm.

If the alarm occurs when the power is turned ON to the spindle, the input voltage may be too high.

If the alarm occurs during motor operation, the operation conditions (i.e., lower motor speed) must be reviewed.

If the alarm occurs when the servo control power is turned ON, the servo unit will be faulty.

Contact a Yaskawa customer service representative.

(16) Alarm Numbers 3351 to 3355 (Heat Sink Overheat)

This alarm occurs when the heat sink temperature is abnormally high.

The servo unit detects the alarm.

If this alarm occurs, turn OFF the power and allow the heat sink to cool. After that, turn the power ON again.

If the alarm occurs immediately after turning the power ON, the servo unit is faulty.

Contact a Yaskawa customer service representative.

(17) Alarm Numbers 3381 to 3385, 3391 (YENET1200 Communication Error)

This is an communication error between the NC unit and the servo unit or between the NC unit and the inverter unit; the NC unit detects the alarm when no answer is returned for the command output by the NC unit.

The servo unit or the inverter unit may be faulty, or the cable may not be connected securely.

Contact a Yaskawa customer service representative.

(18) Alarm Numbers 3401 to 3405 (Converter Alarm)

This alarm occurs due to the following reasons: blown fuse, regeneration alarm, open phase, or faulty board.

The servo unit detects the alarm.

Contact a Yaskawa customer service representative.

(19) Alarm Numbers 3411 to 3415 (Servo Unit Alarm)

This alarm occurs due to the following: destroyed parameter setting, faulty current detector, encoder battery alarm, memory error or sensor error.

The servo unit detects the alarm.

The servo unit or the motor is faulty.

Contact a Yaskawa customer service representative.

(20) Alarm Number 3421 (Inverter Unit Alarm)

This alarm occurs when the inverter detects an alarm other than the converter alarm, broken PG cable, excessive follow-up error and communication error.

Contact a Yaskawa customer service representative.

(21) Alarm Numbers 3425, 3431 to 3435 (YENET1 200 Watchdog Error)

This alarm occurs when the NC unit detects the watchdog error with the inverter unit or the servo unit.

The inverter unit or the servo unit will be faulty.

Contact a Yaskawa customer service representative.

(22) Alarm Numbers 3441 to 3445 (Ground Fault)

This alarm occurs when the servo unit detects the alarm when the power is turned ON.

The motor insulation is faulty.

Contact a Yaskawa customer service representative.

(23) Alarm Number 3451 and 3452 (Follow-up Error)

This alarm occurs when the follow-up error exceeds the value set for the servo unit parameter.

The servo unit detects the alarm.

If this alarm occurs during axis feed over a long distance, either the command speed must be lowered or the gain must be increased.

If the motor does not rotate, the servo unit may be faulty.

Contact a Yaskawa customer service representative.

Alarms Not Indicated by Alarm Numbers

(1) No Display is Given on the CRT

If nothing is displayed on the CRT, the CRT itself may be faulty, or the display circuit or connection cables may be faulty. When nothing is displayed even if the PC NC power can be turned ON, check the cable connection to the operation panel and also the connectors.

- (2) Handle Mode Operation is Impossible
 - (a) Handle mode signal is not input
 - Verify the bit status of UO monitor #3000.
 D2 = 1
 Other bits (DO, D1, D3 to D7) = 0
 - Verify the mode display given in the normal display area on the screen.

- (b) Axis selection signal is not input
 - I/O monitor
 Verify whether one of the following bits is ON.

#3070			
$D_0 = I$	1st axis		
$D_I = I$	2nd axis		
D ₂ = 1	3rd axis		
D ₃ = 1	4th axis		
D ₄ = 1	5th axis		

• No. 2 handle Verify whether one of the following bits is ON.

#3080			
$D_0 = I$	1st axis		
$D_I = I$	2nd axis		
D ₂ = 1	3rd axis		
D ₃ = 1	4th axis		
D ₄ = 1	5th axis		

• No. 3 handle Verify whether one of the following bits is ON.

#3081			
$D_0 = I$	1st axis		
$D_I = I$	2nd axis		
D ₂ = 1	3rd axis		
D ₃ = 1	4th axis		
D ₄ = 1	5th axis		

(c) There is no input to handle PG

- Check the input voltage (5V) at the handle PG terminal.
- Check the handle PG signal cable connector to see if it is securely plugged in.
- (d) Handle PG is faulty

Verify the following (counter monitor) on the I/O screen if the values change according to the operation of the pulse handle.

#3037 (No. 1 handle)

#3038 (No. 2 handle)

#3039 (No. 3 handle)

(e) Other related parameters
Verify the setting for the following parameters.

Maximum feedrate for handle operation	Parameter pm2860 (linear axis) Parameter pm2861 (rotary axis)
Acceleration/deceleration time constant	Parameters pm2561 to pm2565
Pulse multiplication ratio of "x100" is set (pm2003 D7 = 1)	Parameter pm2549

(3) Jog Operation is Impossible

(a) Jog mode signal is not input Verify the bit status of I/O monitor #3000.

D1 = 1

Other bits (DO, D2 to D7) = O

(b) Axis move direction signal is not input. Verify the bit status of I/O monitor #3071 and #3072.

	#3071	#3072		
D0	+1st axis	D0	-1st axis	
DI	+2nd axis	DI	-2nd axis	
D2	+3rd axis	D2	-3rd axis	
D3	+4th axis	D3	-4th axis	
D4	+5th axis	D4	-5th axis	

(c) Jog feedrate signal is not input, or job feedrate setting parameter is incorrect

Verify the bit status on the I/O monitor screen to determine whether it changes according to the operation of the JOG FEEDF.ATE switch, and also verify whether the setting for the parameters is correct.

Table 4.11: Jog Feedrate

STEP	D4	D3	D2	D1	D0	JOG FEEDRATE
	JV16	JV8	JV4	JV2	JV 1	
1	0	0	0	0	0	Set for parameter pm2400
2	0	0	0	0	1	Set for parameter pm2401
3	0	0	0	1	0	Set for parameter pm2402
4	0	0	0	1	1	Set for parameter pm2403
5	0	0	1	0	0	Set for parameter pm2404
6	0	0	1	0	1	Set for parameter pm2405
7	0	0	1	1	0	Set for parameter pm2406
8	0	0	1	1	1	Set for parameter pm2407
9	0	1	0	0	0	Set for parameter pm2408
10	0	1	0	0	1	Set for parameter pm2409
11	0	1	0	1	0	Set for parameter pm2410
12	0	1	0	1	1	Set for parameter pm2411
13	0	1	1	0	0	Set for parameter pm2412
14	0	1	1	0	1	Set for parameter pm2413
15	0	1	1	1	0	Set for parameter pm2414
16	0	1	1	1	1	Set for parameter pm2415
17	1	0	0	0	0	Set for parameter pm2416
18	1	0	0	0	1	Set for parameter pm2417
19	1	0	0	1	0	Set for parameter pm2418
20	1	0	0	1	1	Set for parameter pm2419
21	1	0	1	0	0	Set for parameter pm2420
22	1	0	1	0	1	Set for parameter pm2421
23	1	0	1	1	0	Set for parameter pm2402
24	1	0	1	1	1	Set for parameter pm2423
25	1	1	0	0	0	Set for parameter pm2424
26	1	1	0	0	1	Set for parameter pm2425
27	1	1	0	1	0	Set for parameter pm2426
28	1	1	0	1	1	Set for parameter pm2427
29	1	1	1	0	0	Set for parameter pm2428
30	1	1	1	0	1	Set for parameter pm2429
31	1	1	1	1	0	Set for parameter pm2430
32	1	1	1	1	1	Set for parameter pm2431

(d) Axis interlock is input

Check the bit status on the I/O monitor screen. If "0", the corresponding axis cannot move.

#3078		
D ₀ = I	1st axis	
$D_I = I$	2nd axis	
D ₂ = 1	3rd axis	
D ₃ = 1	4th axis	
D ₄ = 1	5th axis	

(e) Machine lock is ON

- Even when the machine lock function is ON, the position display changes. Check the input of the machine lock switch (1/O monitor, #3006 D5 = 0). If "1", the axes do not move.
- Check the internal toggle switch (parameter pm0000 D 1 = 0). If "1", the axes do not move.

(4) Manual Rapid Traverse is Impossible

(a) The rapid mode is not selected
Check the bit status of I/O monitor #3000.
DO = 1
Other bits (D1 to D7) = 0

(b) Axis move direction signal is not input. Check the bit status of I/O monitor #3071 and #3072.

	#3071		#3072
D0	+1st axis	D0	-1st axis
DI	+2nd axis	DI	-2nd axis
D2	+3rd axis	D2	-3rd axis
D3	+4th axis	D3	-4th axis
D4	+5th axis	D4	-5th axis

- (c) Rapid traverse override is not input
 - Check the bit status on the I/O monitor screen to determine whether it changes according to the operation of the RAPID TRAVERSE RATE OVERRIDE switch, and also verify whether the setting for the parameters is correct.

Table 4.12: Input Status and Rapid Traverse Rate

Input St	atus Of #3003	Rapid Traverse Rate				
ROV2	ROV1	1st axis	2nd axis	3rd axis	4th axis	5th axis
1	1	Set for pm2801	Set for pm2802	Set for pm2803	Set for pm2804	Set for pm2805
1	0	[Set for pm2801] x 1/2	[Set for pm2802] x 1/2	[Set for pm2803] x 1/2	[Set for pm2804] x 1/2	[Set for pm2805] × 1/2
0	1	[Set for pm2801] × 1/4	[Set for pm2802] x 1/4	[Set for pm2803] x 1/4	[Set for pm2804] × 1/4	[Set for pm2805] × 1/4
0	0	F ₀ (set for pm2447)			1	

Table 4.13: Input Status and Rapid Traverse Rate

Input Status			Rapid Traverse Rate
ROV4	ROV2	ROV1	1st to 5th Axis I
1	0	1	F ₂ (set for prn2449)
1	0	0	F ₁ (set for pm2448)
0	1	1	100%
0	1	0	50%
0	0	1	23%
0	0	0	F ₀ (set for pm2447)

(d) Parameter related to Rapid traverse is set incorrectly.

4-23

(e) Axis interlock is input Check the bit status on the I/O monitor screen. If "O", the corresponding axis cannot move.

#3078				
$D_0 = I$	1st axis			
$D_I = I$	2nd axis			
D ₂ = 1	3rd axis			
D ₃ = 1	4th axis			
D ₄ = 1	5th axis			

(f) Machine lock is ON

- Even when the machine lock function is ON, position display changes. Check the input of the machine lock switch (I/O monitor, 3006 D5 = 0). If "1", the axes do not move.
- Check the internal toggle switch (parameter pm0000 D1 = 0). If "1", the axes do not move.

(5) Manual Reference Point Return is Incorrect

The following explanation is given assuming that jog and rapid traverse are executed correctly.

- (a) Manual reference point return signal is not input Check the I/O monitor #3007 D0. The status must be" 1". Otherwise, the axis continues moving to OT at the same feedrate even if it reaches point A.
- (b) Jog or rapid traverse mode is not selected. I/O monitor #3000 D0 or D1 must be"1".
- (c) Deceleration limit switch signal is not input. Check I/O monitor #3073 DO to D4 while moving an axis at a slow feedrate such as in jog operation.

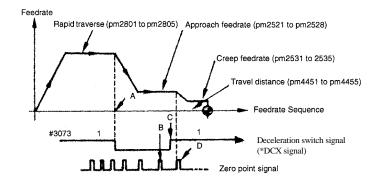


Figure 4.1: Reference Point Return Control I/O Signals

- (d) Parameter setting is incorrect.Check the setting for the related parameters against the parameter sheet.
- (e) Position of the dog for the deceleration limit switch is incorrect. If the dog position is incorrect, the zero point could be shifted by one turn of the motor.
- (f) Others (loose coupling or dog)
 If another adjustment is incorrect, zero point could shift at random.

(6) Cycle Start is Impossible

- (a) Cycle start signal is not input or feed hold signal is open. Determine whether the I/O monitor #3003 D0 is "1" when the cycle start switch is pressed. In this case, the feed hold signal must be open; this can be confirmed by I/O monitor #3003 D1 = 1.
- (b) Start interlock signal is input. If I/O monitor #3004 D2 = 1, cycle start is impossible.
- (c) The NC is in the reset status.

 Normal status: I/O monitor #3500 D1 = 0.

 Also check the external reset signal status.

 Normal status: I/O monitor #3004 D1 = 0

- (7) G01, G02, or G03 Mode Operation is Impossible
 - (a) The spindle is in the speed agreed status.

 Verify whether parameter pm 1000 D7 = 1.

 If it is "1", check whether the spindle is in the speed agreed status by I/O monitor #3111.
 - (b) FEEDRATE OVERRIDE switch setting is 0%.

 Determine whether the setting for I/O monitor #311 1 D0 to D4 is correct.
 - (c) In the dry run mode, setting for jog feedrate is incorrect.

Table 4.14: I/O Monitor and Feedrate Override

I/o Monitor #3040					
D4	D3	D2	D1	D0	Feedrate Override (Automatic Operation)
OV16	OV8	OV4	OV2	OV 1	
0	0	0	0	0	0%
0	0	0	0	1	10%
0	0	0	1	0	20%
0	0	0	1	1	30%
0	0	1	0	0	40%
0	0	1	0	1	50%
0	0	1	1	0	60%
0	0	1	1	1	70%
0	1	0	0	0	80%
0	1	0	0	1	90%
0	1	0	1	0	100%
0	1	0	1	1	110%
0	1	1	0	0	120%
0	1	1	0	1	130%
0	1	1	1	0	140%
0	1	1	1	1	150%
1	0	0	0	0	160%
1	0	0	0	1	170%
1	0	0	1	0	180%
1	0	0	1	1	190%
1	0	1	0	0	200%
1	0	1	0	1	220%
1	0	1	1	0	240%
1	0	1	1	1	260%

1	1	0	0	0	280%	
1	1	0	0	1	300%	
1	1	0	1	0	340%	
1	1	0	1	1	380%	
1	1	1	0	0	420%	
1	1	1	0	1	460%	
1	1	1	1	0	500%	
1	1	1	1	1	540%	

Table 4.14: I/O Monitor and Feedrate Override (Continued)

(d) Start interlock signal is input. If I/O monitor #3004 D2 = 1, start interlock is ON.

Normal: #3004 D2 = 0

(e) Axis interlock is input.

Verify I/O monitor #3087 D0 to D4.

Normal: #3078 D0 to D4 = 1

(f) Setting of the servo system is incorrect. Verify whether the axes can be moved manually.

(8) Spindle Rotation is Impossible

(a) Error in a program (no S command or no spindle start M code)Verify the contents of the program on the [RUN] screen.

- (b) Start signal has not been input. Verify the output signals (#1100s) on the I/O monitor screen.
- (c) Spindle rotation command has not been output. Verify #3654 to #3656 on the 110 monitor screen.
- (d) The spindle drive is in the alarm status. Verify the alarm indication of the spindle drive.
- (e) Combination of GRO and SOR is incorrect, or "0" is input for parameter pm1412 or pm1413.

Table 4.15: Input of GRO and SOR and S4-digit Command Analog Voltage

I/O Monit	tor #3110	
D7	D6	S4-digit Command Analog Voltage
GRO Input	SOR Input	
0	0	Voltage corresponding to the spindle speed specified in the NC program.
0	1	Voltage corresponding to parameter pm 1412
1	0	Voltage corresponding to parameter pm 1413
1	1	0V

Note: If "1" is set for parameter pm1000 D5, SSTP input is reversed.

(f) Setting for the parameters related to spindle operation is incorrect.

Verify the setting for the related parameters.

#3110 D0	GR1
#3110 D1	GR2
#3110 D2	GR3
#3110 D3	GR4

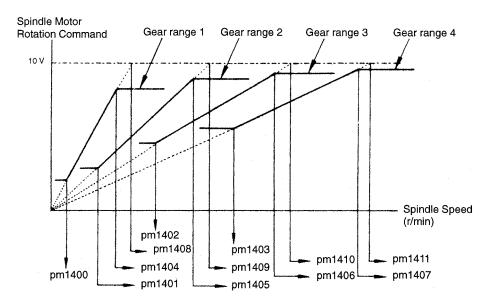


Figure 4.2: Spindle Rotation

(9) FIN Wait Status after Execution of Spindle Related Commands

If sequence processing is interrupted waiting for a signal, the NC enters the FIN wait status.

(a) Spindle speed agree signal is not input.

If the NC enters this status after the execution of a command such as "M03 S100", verify whether #311 1 D6 = 1 (waiting for FIN).

Verify the I/O signals of #1000s at the I/O section by referring to the ladder chart supplied by the machine tool builder.

(b) Spindle zero speed signal is not input.

If the NC enters this status after the execution of the "M05" command, check the I/O signals of #1000s at the I/O section by referring to the ladder chart supplied by the machine tool builder.

(c) Others

If the NC enters this status after the execution of "M19" or "M20" (spindle orientation command), check the I/O signals related with spindle orientation by referring to the ladder chart supplied by the machine tool builder.

(10) Edit Operation is Impossible

(a) The edit lock signal is input.

Check I/O monitor #3007 D2.

Normal: #3007 D2 = 0

If "#3007 D2 = 1", program edit is impossible.

- (b) Edit lock is set by the parameter (pm0000 D7). Set "pm0000 D7 = 0" to cancel the edit lock setting.
- (c) Others

The corresponding alarm message is displayed.

OVER MEM CAP!

TOO MANY PROGS!

ALREADY IN!

Delete unnecessary programs and edit the program again.

(11) Skip Function (G31) Failure

The skip signal has not been input.

- Check the ON/OFF status of the skip signals.
- Check the operation of proximity switches.

PC NC Alarms Not Indicated By Alarm Numbers

(1) Fuse F1 blown on JZNC-JFC 10 card of CPU Rack.

When the 0.3 A F1 Fuse is blown on the JFC 10 card, the "3002 Emergency stop" Alarm occurs on the CNC.

In the diagnostic, when the #3500 bit 2 * ESPS signal is ON, and the "3002 Emergency stop" alarm still occurs on the PC NC Status bar, check the 0.3 A F1 Fuse on the JFC 10 card.

(2) Fuse F2 blown on JZNC-JFC 10 card of CPU Rack.

When the 5A F2 fuse is blown on the JFC 10 card, the "3001 Servo Alarm and 3002 Emergency stop" alarms occur. Check the LED D4, just above CN04 Connector of the JFC 10 card of CPU Rack. If this LED is not lit, the F2 Fuse has blown. Replace the fuse.

(3) The Servo ON and Shut Down button connections are not connected, or are wrongly connected.

When the Servo ON and Shut Down buttons are not connected to the CN12 Connector, or are wrongly connected, "3002 Emergency stop and 3001 Servo alarms" is displayed on the PC NC. Check that the Servo ON and Shut Down buttons are properly connected to the CN12 Connector.

Note: When the F1 or F2 fuses are blown, replace them with the same type of fuse.

Touch Screen Maintenance

The touch screen requires periodic cleaning as follows.

- 1. Whenever chips fall on the display unit.
- 2. Whenever coolant falls.

- 3. Whenever dust has accumulated on the screen.
- 4. Whenever greasy, or when any mist, or dust appears on the screen.
- 5. If the display is not clear or clean.

Clean the touch screen as follows:

Go to **Utilities**, \rightarrow **PC Settings**. Touch the Touch Screen Cleaning icon. A blank screen display appears. A blank screen display appears, thereby making any dust on the screen easy to view, and easy to clean.

Do:

- 1. Use standard glass cleaning liquid, applied to a clean cloth, to wipe the touch screen.
- 2. Use only a clean, soft cloth.

Don't:

- 1. Spray glass cleaning liquid directly on the touch screen. Apply cleaning fluid only with clean cloth.
- 2. Use any hard or sharp materials to clean the touch screen.
- 3. Use a sponge or hands to clean the touch screen.
- 4. Apply pressure while cleaning the touch screen

PC NC Mode of Operation

The PC NC operation modes can be broadly divided into two categories: the online mode and the offline mode. Although the operation mode can be switched using the switch settings, it cannot be switched during operation. (The PC NC references the system number switches only at system startup.)

** If the system is started after the system number switches are set into undefined numbers, or the hardware check program has not been booted and the system number switches are set as B &C, a "Boot Log" message appears and the system will not start normally.

Table 4.16: Operation Mode Content

System Number Switch	Mode of operation	Operation Mode Type
0	Normal operation mode	0
1	Normal operation mode	0
2	Normal operation mode	0
4	Ladder development mode	0
E	Memory operation mode	**

Online = O, Offline = * *

Self - Diagnosis Function Specification

During boot up of the PC NC

Processing Progress message display classification corresponding to the content of			LED Display		System	Cause of failure	
number display	corresponding to the content of NC power input processing.	4	3	2	1	number SW	Cause of failure
1	LED PORT WRITE	0	0	0	•	0, 1, 2, 4, E	JCP20 PCB
2	YENET RAM CHECK	0	0	•	0	0, 1, 2, 4, E	JCP20 PCB
3	SYSTEM-SW READ	0	0	•	0	0, 1, 2, 4, E	JCP20 PCB
4	FLASH TOTAL CHECK	0	0	•	0	0, 1, 2	JCP20 PCB
5	JIF PORT READ	0	0	•	0	0, 1, 2, 4, E	JCP20 PCB
6	REV.READ	0	0	•	0	0, 1, 2, 4, E	JCP20 PCB
7	ISA-RAM CHECK	0	0	•	0	0, 1, 2, 4, E	JCP20 PCB
8	YENET INITIAL	0	•	0	•	0, 1, 2, 4, E	JCP20 PCB
9	CMOS CLEAR	0	•	0	•	0, 1, 2, 4,	JCP20 PCB
10	CMOS TOTAL CHECK	0	•	0	•	0, 1, 2,	JCP20 PCB
11	PARAMETER READ	0	•	0	0	0, 1, 2, 4,	JCP20 PCB
12	MOTION INITIAL	0	•	•	•	0, 1, 2, 4,	JCP20 PCB, SERVO
13	LADDER START	0	•	•	•	0, 1, 2, 4	JCP20 PCB
14	INTEX INITIAL	•	0	0	0	0, 1, 2, 4, E	
15	TASK SETUP	•	0	•	0	0, 1, 2, 4, E	
16	JTABLE SET	•	•	0	0	0, 1, 2, 4, E	JCP20 PCB

Parameter setting is incorrect.

• Verify the setting for parameter pm2001 DO. If the setting for pm2440 is "0" while "pm2001 D0 = 1", an axis does not move.

pm2001 D0 = 1	The feedrate in the skip feed mode (G31) is the feedrate set for parameter pm 2440.
pm2001 D0 = 0	The feedrate in the skip feed mode (G31) is the feedrate specified with an F code.

- Verify the setting for parameters pm5011 D0 to D2.
- Set the signal status at the start of the processing when the SKIP signal is input.



- If "0", processing starts at the point at which 24V faI1s to 0V.
- After changing the setting, turn OFF the power once and turn it ON again.
- Verify the setting for parameters pm5010 D0 to D0.

The setting for this parameter determines ENABLE/DISABLE of the control circuit for the "SKIP" input.

- Set "1" to use the skip function.
- After changing the setting for this parameter always turn OFF the power once and then turn it ON again.

VS-626MR5 Alarm List

In the VS-626MR5, the protective functions operate according to the error content when a fault and an error phenomenon are generated during a drive operation when the drive is stopped. This error content is displayed on the 7 segment LED, according to alarm number.

Table 4.17: Alarm List

Alarm Number	Name	Content			
01	Overcurrent	Output current flowed more than the overcurrent detection level.			
04	Main circuit fuse is blown	Main circuit fuse is blown.			
05	Overload	Output current exceeded the overload level.			
11	Output overvoltage	Output voltage exceeded the overvoltage setting value.			
12	Main circuit low voltage	Main circuit input voltage went below the low voltage detection level while driving.			
13	Control circuit low voltage	Control circuit power supply went below the low voltage detection level.			
14	Power failure for servo driver	Control voltage supplied to the servo driver is abnormal.			
15	Power supply frequency error	Power supply frequency excessive deviation (50Hz or 60Hz±6%)			
16	An initial charge defect	Main circuit condenser charge was not completed in the setting time.			
23	Built-in MC defective per- formance	Magnetic contactor does not work.			
43	Heat sink over heating 1 (minor fault)	Heat sink temperature exceeded the upper limit.			
44	Heat sink overheating 2	Heat sink temperature exceeded the upper limit and has passed one minute or more.			
45	Heat sink thermistor dis- connection	Thermistor for the heat sink temperature detection was disconnected.			
46	Control card temperature error (minor fault)	Control card temperature exceeded +80°C.			
47	Control card temperature error 2	Control card temperature exceeded +85°C.			
d2	CPU built-in A/D defective	Built-in A/D converter is defective.			
F0	ROM defect	Memory (PROM) is defective.			
F1	EEPROM defect	Memory (EEPROM) is defective.			
F5	CPU defect	Internal RAM check error (at initialization).			
• •	Control card fault	WDT time-out			

01:Overcurrent

Error Contents The output current flowed more than the overcurrent detection level.

Detection Methods If the output current exceeds 180% of the rated current of transistor

(IGBT), the gate is instantaneously blocked (regeneration operation

stop) and the overcurrent detection signal is turned ON.

Cause and measures

Cause	Measures
Main power (R, S, T) open phase, momentary power failure	Check the main power supply ripple.
Servo/inverter control parameter setting defect	Set a correct value referencing with the shipment setting.
Servo and inverter fault	Check the input current of the servo and the inverter. Exchanged the servo and the inverter.
Reactor selection defect	Perform the proper selection (correspond to the converter capacity).
Converter capacity selection defect	Check the capacity connected to servo and inverter. Exchange the converter.
Current detection signal connector contact defect	Check that there are no loose connectors.
Control card fault	Exchange unit exchange (exchange control card)

04:The main circuit fuse fusion

Error Contents The main circuit fuse has fused.

Detection Methods The main circuit fuse signal consists of the gate driver and outputs to

the control card (2CN-6). If the main circuit fuse disconnection detec-

tion signal has been turned ON, the current is intercepted.

Cause	Measures
Fuse fusion	Check fuse (R phase / T phase) continuity. Exchange the fuse (R phase / T phase).
Gate driver fault	Confirm that the fuse (R phase and T phase) does not fuse. Exchange unit (gate driver exchange)
Control card fault	Exchange unit (control card exchange)

05: Overload

Error Contents The output current exceeded the overload level.

Detection Methods Converter output over load level: 120% per one minute of the converter

rated output current [= 30 minutes rating]

Cause and measures

Cause	Measures
Servo and inverter fault	Check the input current of the converter. Check that there are no errors in the servo and inverter.
Converter capacity selection defect	Check the capacity connected to the servo and inverter. Exchanged the converter.
The frequency of the acceleration/ deceleration drive is high.	Check the acceleration/deceleration drive frequency from the drive pattern.
Control card fault	Exchange unit (exchange control card)

11:Output overvoltage

Error Contents Output voltage exceeded the overvoltage setting value.

Detection Methods The main circuit DC voltage signal [VDET] consists of the gate driver

and outputs to the control card (2CN-20).

If VDET exceeds the main circuit DC voltage detection signal level [411V], the gate is blocked (regeneration operation stop), and the main

circuit overvoltage detection signal is turned ON.

Cause	Measures
Main power supply (R,S,T) voltage is not in the specification value.	Check the power supply voltage. Adjust the power supply voltage within the specification value.
Main power supply (R,S,T) open phase, momentary power off.	Check the power supply ripple. Normalize the power supply.
Converter capacity selection defect	Check the capacity connected to servo and inverter. Exchanged the converter.

12:Power circuit low voltage

Error Contents The main circuit input voltage went below the low voltage detection

level while driving.

Detection Methods The main circuit AC low voltage signal is consistent with the control

card from the R/S phase voltage.

Cause and measures

Cause	Measures
Main power supply (R, S, T) voltage is low.	Adjust the power supply voltage within the specification value.
Main power supply (R, S, T) open phase, wavy warp, momentary power failure	Check the power supply ripple. Normalize the power supply.

13:Control circuit low voltage

Error Contents The control circuit power supply went below the low voltage detection

level.

Detection Methods The power supply voltage signal for the control circuit is consistent

with the gate driver, and outputs to the control card (2CN-12).

An alarm process is performed if this detection method level continues 5 seconds and the control circuit low voltage detection level is (200V)

or lower.

Cause and measures

Cause	Measures
Control power supply (A1, A2) voltage is low.	Check the control power supply voltage. Adjust the power supply voltage within the specification value.

14: Power failure for servo driver

Error Contents The control voltage supplied to the servo driver is abnormal.

Detection Methods An alarm process is performed and the gate is blocked (regeneration

operation stop) if power supply for the servo driver has continued in the

off position from 24V±5% for 5 seconds.

Cause and measures

Cause	Measures
Control power supply (A1, A2) voltage is low.	Check the control power supply voltage. Adjust the control power supply voltage within the specification value.
Control power supply overload by servo unit defect	Remove the connected servo. Exchange servo unit.
Power circuit fault	Confirm that the control power supply voltage is within the specification value. Exchange the unit or the power circuit module (DC-DC converter).
Combination of unit and PROM is wrong.	Confirm the unit and the PROM number.
Control card fault	Exchange the unit (exchange control card)

15:The power supply frequency error

Error Contents The power supply frequency excessive deviation (deviation \geq 6% fre-

quency)

Detection Methods 50/60Hz cannot be distinguished because the power supply frequency

was not in $50\text{Hz}\pm6\%$ or $60\text{Hz}\pm6\%$ when main power is supplied (after the second attempt at turning ON). Or, the frequency was off from $\pm6\%$ for three cycles continuously after 50Hz/60Hz was recognized.

Cause and measures

Cause	Measures
Main power supply (R, S, T) open phase, wavy warp, and momentary power failure	Check the power supply ripple. Check that the power supply is normalized.
Control card fault	Unit exchange (control card exchange)

16:An initial charge is defective.

Error Contents The main circuit condenser charge was not completed in the setting

time.

Detection Methods An alarm process is performed and the gate is blocked (regeneration

operation stop) if there is no difference between VAC and VDC in 60V or less even if five seconds or more have passed since MC was turned

ON.

Cause and measures

Cause	Measures
MC fault	Confirm that the MC operates within a few seconds after turning ON. Exchange MC.
Charging current control resistance disconnection	Confirm that there is DC generative voltage rising. Exchange resistance.

23:Integration MC defective performance

Error Contents The magnetic contactor does not work.

Detection Methods If answer does not return after 500ms after MC is turning ON, the gate

is blocked (regeneration operation stop), and the alarm is processed.

Cause and measures

Cause	Measures
MC fault (coil disconnection/defective contact)	Confirm that the MC operates within a few seconds after the second attempt of turning ON. Exchange MC.
MC answer signal disconnection	Check the connection of the signal conductor.

43, 44:Heat sink overheating 1 and 2

Error Contents 43: Heat sink temperature exceeded the upper limit. (minor fault)

44: Teosinte temperature exceeded the upper limit and has passed for

one minute or more.

Detection Methods The voltage for the heat sink temperature detection is consistent with

the thermistor signal (2CN-10) for the heat sink temperature detection.

If the temperature of the heat sink exceeds 80°C, the minor fault display is performed due to heat sink overheating 1(43). The drive continues.

The minor fault display is released if the temperature of the heat sink is

79°C or less.

If the state of heat sink overheating 1(43) continues for one minute, the gate is blocked (regeneration operation stop), and the alarm is pro-

cessed due to heat sink overheating 2(44).

Cause and measures

Cause	Measures
Ambient temperature is high.	Check the ambient temperature. Improve the cooling.
Control card fault	Exchange unit (exchange control card)

45:Heat sink thermistor disconnection

Error Contents The thermistor for the heat sink temperature detection was discon-

nected.

Detection Methods

Cause and measures The voltage for the heat sink temperature detection is consistent with

the thermistor signal (2CN-10) for the heat sink temperature detection.

If the heat sink temperature is -20°C or less, the gate is blocked (regen-

eration operation stop), and the alarm is processed.

Cause	Measures
Ambient temperature is low.	Check the ambient temperature. Raise the ambient temperature to -20°C or more.
Thermistor signal conductor disconnection for cooling fin temperature detection	Check the thermistor wiring.
Control card fault	Unit exchange (control card exchange)

46, 47: Control card temperature error 1, 2

Error Contents 46: Control card temperature exceeded +80°C. (minor fault)

47: Control card temperature exceeded +85°C.

The voltage for the control card temperature detection is consistent with the thermistor signal for the temperature detection on the control card.

If the temperature of the control card exceeds 80°C, the minor fault display is performed due to control card temperature error 1 (46). The drive continues.

The minor fault display is released if the temperature of the control card is 79°C or less.

If the temperature of the control card exceeds 85°C, the current is intercepted due to control card temperature error 1 (46).

Cause	Measures
Ambient temperature is high.	Check the ambient temperature. Improve the cooling.
Control card fault	Exchange unit (exchange control card)

D2:CPU built-in A/D is defective.

Error Contents Built-in A/D converter is defective.

Cause and measures

Cause	Measures
The (2.5V) voltage is defective for A/D converter check.	Check the voltage. Exchange unit (exchange control card)
A/D converter fault	Exchange unit (exchange control card)

F0:ROM is defective.

Error Contents Memory (PROM) is defective.

Cause and measures

Cause	Measures
PROM is defective.	Exchange PROM. Exchange unit (exchange control card)

F1:EEPROM is defective

Error Contents Memory (EEPROM) is defective.

Cause	Measures
Memory (EEPROM) is defective.	Exchange unit (exchange control card)

F5:CPU is defective.

Error Contents Internal RAM check error (at initialization).

Cause and measures

Cause	Measures
CPU fault	Exchange unit (exchange control card)

..: Control card fault

Error Contents WDT time-out

Cause and measures

Cause	Measures
Control card fault	Exchange unit exchange (exchange control card)

VS-626M5 Alarm List (digital operator)

In VS-626M5, the security function operates according to the error content when a fault and an error phenomenon are generated during a drive operation, while the drive is stopped. This error content is displayed by an error number (AL code) in a digital operator. Moreover, in M5A type is displayed to the seven segment LED by the number of two digits.

The fault code is the signal output in the 6CN-26 ~ 29 pins of the M5A type; 1 is indicated ON (close) and 0 is OFF (opening). (The figure of four digits shows the state of 29, 28, 27, and 26 pins from the left)

The rank of A, B, and S meanings are as follows.

- A: Major fault. The current is intercepted and the drive is stopped simultaneously with the detection of an error. The motor coasts to a stop. An error reset is accepted.
- B: Minor fault. The drive continues.
- S: Major fault. The current is intercepted and the drive is stopped simultaneously with the detection of an error. The motor coasts to a stop. An error reset is not accepted. Turn OFF the control power supply to release an error display.

An error number of AL-80 \sim AL-9F is displayed only by the host NC unit. They are not displayed in a digital operator of VS-626M5.

Table 4.18: Alarm Descriptions

Number	Name	Content	Fault Code	Rank
AL-01	Overcurrent	Output current flowed more than the overcurrent detection value or the inverter output (load) was short-circuit.	0000	A
AL-02	Ground fault	Ground fault current in the inverter output side exceeded the ground fault detection level.	0000	A
AL-04	Main circuit fuse open circuit	The DC circuit fuse fused.	0000	A
AL-05	Inverter output overload	Output current flowed more than 120% /min. at 30 min. rating.	0000	A
AL-10	Converter error	An error occurred in the converter unit.	0001	Α
AL-11	Main circuit overvoltage	Main circuit DC voltage exceeded the overvoltage setting value.	0001	A
AL-12	Main circuit low voltage	Main circuit DC voltage went below the low voltage detection level while driving.	0001	A
AL-13	Control circuit low voltage	Control circuit power supply went below the low voltage detection level.	0001	A
AL-20	Wiring switch over drive defect	Wiring switch over drive did not complete in setting time or less.	0010	А
AL-21	Emergency stop drive defect	Did not stop within ten seconds after the specified the emergency stop.	0010	A
AL-30	Encoder signal disconnection	Motor encoder signal conductor disconnection/ improper connection.	0011	A
AL-31	Overspeed of motor	Motor speed exceeded 120% of setting rated speed.	0011	A
AL-32	Speed over-deviation	Speed became 50% or less of the command value.	0011	Α
AL-33	Load error	Inverter output opening (speed feedback is 0.)	0011	Α
AL-40	Motor overheat (minor fault)	Motor temperature exceeded the upper limit.	0100	В
AL-41	Motor overheating 2	Motor temperature exceeded the upper limit for one minute or more.	0100	A
AL-42	Motor thermistor disconnection	Thermistor for the motor temperature detection was disconnected.	0100	A
AL-43	Heat sink overheating (minor fault)	Heat sink temperature exceeded the upper limit.	0100	В
AL-44	Heat sink overheating 2	Heat sink temperature exceeded the upper limit for one minute or more.	0100	A
AL-45	Heat sink thermistor dis- connection	Thermistor for the heat sink temperature detection was disconnected.	0100	A
	L	I	1	1

4-43

Table 4.18: Alarm Descriptions (Continued)

AL-46	Control card tempera- ture error (minor fault)	Control card temperature exceeded +80 °C.	0100	В
AL-47	Control card tempera- ture error 2	Control card temperature exceeded +85 °C.	0100	А
AL-60	Tuning incompletion (minor fault)	Orientation command was inputted without tuning drive.	0110	В
AL-61	C-phase signal detection defect.	C-phase signal was not able to be detected at tuning.	0110	А
AL-62	C-phase signal width defect	C-phase signal exceeded 100 pulses at tuning.	0110	А
AL-63	One revolution pulse number error	A pulse per one revolution exceeded 4096±1 at tuning.	0110	А
AL-64	Position detection signal disconnection	Encoder signal for position detection disconnection/improper connection	0110	А
AL-65	INC signal error (minor fault)	INC signal input timing error.	0110	В
AL-70	Tuning incompletion	Orientation command was inputted without tuning drive.	0111	В
AL-71	Magnetic sensor reading detection defect	Magnetic sensor signal voltage level does not enter a proper value (at tuning).	0111	А
AL-73	One revolution pulse number error	Motor pulse per spindle speed exceeded ±6%. (at tuning).	0111	А
AL-74	Magnetic sensor signal disconnection	Magnetic sensor signal conductor disconnection/improper connection.	0111	А
AL-75	INC signal error	INC signal input timing error.	0111	В
AL-80	YENET1200 communication error	Communication error between YENET1200 card and NC units.		А
AL-81	The position over-deviation	Position deviation exceeded allowable range.		А
AL-82	YENET1200 card ROM defect	YENET1200 card memory (PROM) is defective.		S
AL-83	YENET1200 communication WDT error 1	WDT error between YENET1200 card and NC units		Α
AL-84	YENET1200 communication WDT error 2	WDT error between YENET1200 card and control cards		A
AL-85	YENET1200 card NMI	NMI was detected by the YENET1200 card.		S
AL-86	YENET1200 card zero division	Division process/overflow error was detected by the YENET1200 card.		S
AL-87	Communication time- out 1	The response to the communication command between the YENET1200 card and control cards does not return.		A
AL-88	Communication time- out 2	Internal processing time-out error of YENET1200 card.		A

Table 4.18: Alarm Descriptions (Continued)

AL-89	Undefined parameter number setting error	Undefined parameter number was specified.		А
AL-8A	YENET1200 undefined command error	Undefined YENET1200 command was specified.		А
AL-8B	Error by which parameter cannot be changed	Error by which I/F card parameter can not be changed.		A
AL-90	Handshake error	Handshake error between YENET1200 card and control cards		S
AL-91	YENT1200RAM defect	YENET1200 card memory (RAM) is defective.		S
AL-92	YENT1200RAM defect 2	YENET1200 card memory (IC) is defective.		S
AL-97	Communication command error 1	YENET1200 communication command error (undefined warning generation)		
AL-98	Communication command error 2	The YENET1200 communication command error (orientation tuning can not be done).		
AL-99	Communication command error 3	YENET1200 communication command error (memory access can not be done)		
AL-9A	Communication command error 4	The YENET1200 communication command error (parameter write-in can not be done).		
AL-9B	Communication command error 5	The YENET1200 communication command error (parameter read-out can not be done).		
AL-9C	Communication command error 6	The YENET1200 communication command error (disable to change while parameter driving).		
AL-9D	Communication command error 7	YENET1200 communication command error (parameter command upper and lower limit exaggerated)		
AL-9E	Communication command error 8	YENET1200 communication command error (access number illegality)		
AL-9F	Communication command error 9	YENET1200 communication command error (command code undefined)		
AL-A0	YENET1200 card error	YENET1200 card is abnormal. [Alarm signal error from card]	1010	А
AL-A1	YENET1200 card RAM defect	YENET1200 memory (RAM) is defective. [Common RAM pattern check error at initialization]	1010	S
AL-A2	YENET1200 card I/O error 1	Data transfer (send and receive) error between YENET1200 card and control card [Handshake error at initialization]	1010	S
AL-A3	YENET1200 card I/O error 2	Data transfer (send and receive) error between YENET1200 card and control card [WDT count error at on-line mode]	1010	S
AL-A4	YENET1200 card I/O error 3	Data transfer (send and receive) error between YENET1200 card and control card [2ms interruption time-out error from card]	1010	S

Table 4.18: Alarm Descriptions (Continued)

AL-b0	Initial starting point taking-in (=incorporation) error	C-phase signal cannot be detected when initial starting point taking-in after power supply is ON. (IPM motor).	1011	A
AL-b1	Encoder pulse number error	Encoder pulses per one rotation exceeded ±10 pulses of a normal value (IPM motor).		А
AL-b2	AL-b2 Low-speed winding acceleration error Motor speed exceeded the low-speed winding maximum speed by a low-speed winding. (IPM motor).		1011	A
AL-d1	A/D converter for the speed command defective	A/D converter for the speed command of the I/O card is defective.	1101	A
AL-d2	CPU integrated A/D converter defect	CPU integrated A/D converter is defective.	1101	А
AL-d3	U phase A/D converter defect	A/D converter for the U phase current detection is defective.	1101	A
AL-d4	W phase A/D converter defect	A/D converter for the W phase current detection is defective.	1101	A
AL-d5	Control circuit I/O error	Data transmission error between CPUs [C196 side detection]	1101	A
AL-d6	Control circuit I/O is error 2	Data transmission error between CPUs [DSP side detection]	1101	A
AL-d7	Control circuit I/O error 3	Data transmission error between CPUs [C196 side detection at initialization].	1101	S
AL-E0	Motor code selection error	Selected motor code (C1-25) and inverter capacity (C1-56) don't match.	1110	S
AL-E1	Motor code unregis- tered	Motor code setting in the C1-25 is not registered.	1110	S
AL-E2	Parameter set range defect	Memory (EEPROM) data exceeded the upper and lower limit value.	1110	S
AL-E3	Orientation card mis- match	Orientation selection bit and the orientation card do not agree.	1110	А
AL-E4	Inverter capacity selection error	Selected inverter capacity (C1-56) and unit don't match.	1110	S
AL-F0	ROM defect	Memory (PROM) is defective. [Sum check error]	1111	Α
AL-F1	EEPROM (EEPROM) defect 1	Memory (EEPROM) is defective. [Verification error]	1111	S
AL-F2	EEPROM (EEPROM) defect 2	Memory (EEPROM) is defective. [EEPRM initialization code error]	1111	S
AL-F3	EEPROM (EEPROM) defect 3	Memory (EEPROM) is defective. [BCC check error]	1111	S
AL-F4	EEPROM (EEPROM) defect 4	Memory (EEPROM) is defective. [defective write-in at on-line mode].	1111	A
CPF00	Control circuit error 1	5 seconds has past after power was turned ON, inverter control card and operator transmission are not consistent.		S

Table 4.18: Alarm Descriptions (Continued)

CPF01	Controlling circuit error 2	More than two seconds of transmission error has occurred when inverter control card and operator transmission are consistent once after power turned ON.	 S
• •	Control card fault	WDT time-out (LED display of I/O card two digits)	 S

AL-01:Overcurrent

Detection Methods

Error Contents The output current flowed more than the overcurrent detection value

(rated current 150%) or the inverter output (load) was short-circuited.

An alarm will sound in the following cases. When either of maximum value of output current (Iu, Iv, Iw) exceeds the overcurrent level, or when the transistor (IGBT) between CE (between collector emitters) is abnormal drive.

The three-phase current detected by the current detector is rectified in the full wave. If this current value exceeds the overcurrent detection drive level, the current is instantaneously intercepted, and the overcurrent detection signal is turned ON. Or, when transistor (IGBT) is not normally turned ON despite the gate signal was turned OFF, the current is instantaneously intercepted, and the overcurrent detection signal is turned ON.

If the overcurrent detection signal has been turned ON, the drive is stopped and the alarm is displayed.

Cause	Measures
Main circuit improper wiring	Check wiring according to the interconnect chart.
Motor winding layer-short	Check the resistance value between motor terminals. Exchange the motor with a non-defective one.
Motor encoder fault	Confirm that there is no abnormal motor speed changes by speedometer indication or drive state display (U1-01). Exchange encoder or motor.
Unit code (C1-56) improper setting	Confirm the control parameter (C1-56) setting, and refer to the setting list.
Motor code improper setting	Confirm the control parameter (C1-25) setting, and refer to the setting list.
Control parameter setting is defective.	Refer to the setting list for the control parameters.
Control card fault	Exchange unit (exchange control card)

AL-02:Ground fault

Error Contents The ground fault current in the inverter output side exceeded the

ground fault detection level (25% of the rated current of the transistor).

Detection Methods Add three-phase output current (Iu, Iv, Iw) detected by the current

detector. If this addition value exceeds the ground fault detection drive level, the current is instantaneously intercepted, and the ground fault

detection signal is turned ON.

If the ground fault detection signal has been turned ON, the drive is

stopped and the alarm is displayed.

Cause and measures

Cause	Measures
Ground fault	Verify there is no short-circuit between inverter I/O terminal and ground.
Insufficient insulation in the motor.	Check the motor. Exchange the motor with a non-defective one.
Control card fault	Exchange unit (exchange control card)

AL-04: Main circuit open fuse line

Error Contents The main circuit fuse has fused.

Detection Methods Output to the control card formatting the main circuit open fuse line

signal by the gate driver (7CN-5). If the main circuit open fuse line signal has been turned ON, the current is intercepted and the alarm is dis-

played.

Cause	Measures
Main circuit fuse fusion	Check the main circuit fuse continuity. Repair the inverter (fuse and transistor)
Control card fault	Exchange unit (exchange control card)

AL-05:Inverter output overload

Error Contents The output current flowed more than 120% /min. at 30 min. rating.

Detection Methods The three-phase current detected by the current detector is rectified in

the full wave and converted into the output current detection signal. Inverter output overload level: 120% /min. or equivalent of inverter

rated current [=30min rating]

Cause and measures

Cause	Measures
Motor overload	Check the load status with the load factor meter.
The frequency of the accel/deceleration drive is high.	Check the accel/deceleration drive frequency from the drive pattern.
Motor encoder fault	Confirm that there is no abnormal motor speed changes by the speedometer indication or the drive state display (U1-01). Exchange encoder or motor.
Encoder signal conductor disconnection, the improper connection, and connector omission.	Check the encoder signal wiring.
Motor code improper selection	Confirm the control parameter (C1-25) setting and refer to the setting list.
Control parameter setting is defective.	Refer to the setting list for the control parameters.
Control card fault	Exchange unit exchange (exchange control card)

AL-10: The converter is abnormal

Error Contents An error occurred in the converter unit.

Detection Methods Converter error signal [CONFLT] is turned ON if error has occurred in

the converter unit (VS-656MR5). If the converter error signal [CON-

FLT] has been turned ON, it become an alarm.

Cause	Measures
Converter error	Confirm error content by the converter LED display.
Control signal connector connection defect	Confirm that there are no loose connectors (5CN, 51CN, 52CN).
Control card fault (inverter)	Exchange unit (exchange control card)
Control card fault (converter)	Exchange unit (exchange control card)

AL-11:Main circuit overvoltage

Error Contents The main circuit DC voltage exceeded the overvoltage setting value

(410V).

Detection Methods Output to the control card formatting the main circuit AC voltage sig-

nal [VDET] by the gate driver (7CN-41). If VDET exceeded the main circuit overvoltage detection level [410V], the current is instantaneously intercepted, and the main circuit overvoltage detection signal is

turned ON.

If the main circuit overvoltage detection has been turned ON, the drive

is stopped and the alarm is displayed.

Cause	Measures
Power supply voltage is high.	Check the voltage between input terminals.
Power supply voltage is low (regenerative ability decrease by the voltage reduction).	Change the power supply voltage to the value in the specification value by the transformer tap changer etc.
Power supply open phase and power failure	Normalize the power supply.
Motor code improper selection	Confirm control parameter (C1-25) setting and refer to the setting list.
Control parameter setting is defective.	Refer to the setting list for the control parameters.
The converter selection is defective.	Perform a proper selection (related to servo capacity).
The reactor selection is defective.	Perform a proper selection (corresponded to the converter capacity).
Control card fault	Exchange unit (exchange control card)
Converter (MR5) error	Exchange unit (exchange converter)

AL-12:Main circuit low voltage

Error Contents The main circuit DC voltage became below the low voltage detection

level (149V) while driving.

Detection Methods Output to the control card formatting the main circuit DC voltage sig-

nal [VDET] by the gate driver (7CN-41).

Determine whether VDC is lower than the main circuit low voltage detection level or that it is more than the main circuit low voltage

release level.

Main circuit low voltage detection level: 149V (200V class) and 298V

(400V class)

Main circuit low voltage release levels: 159V (200V class) and 318V

(400V class)

Cause	Measures
Converter selection is defective.	Perform a proper selection (related to the servo capacity).
Reactor selection is defective.	Perform a proper selection (corresponding to the converter capacity).
Power supply voltage is low.	Change the power supply voltage in the specification value by transformer tap, etc.
Power supply open phase/power failure	Check the voltage between input terminals. Change the power supply voltage in the specification value by transformer tap, etc. Normalize the power supply.
Bus-bar (main circuit P, N) connection is defective	Confirm that there are no loose connections in the bus-bar.
Connector connection for main circuit DC voltage detection is defective.	Confirm that there are no loose connections in the main circuit DC voltage detection.
Control card fault	Exchange unit (exchange control card)

AL-13:Control circuit low voltage

Error Contents The control circuit power supply went below the low voltage detection

level (200V).

Detection Methods Output to the control card formatting the power supply voltage signal

for control circuit by the gate driver (7CN-37).

If control circuit low voltage detection level (200V) is lower, the cur-

rent is intercepted and the alarm is displayed.

Cause and measures

Cause	Measures
Control power voltage (A1/r, A2/t) is low.	Change the power supply voltage in the specification value by changing transformer tap.
Control power supply input connector (P1, N1) connection is defective.	Confirm that there are no loose control power input connections.
Control card fault	Exchange unit (exchange control card)

AL-20:Winding switch defective performance

Error Contents The wiring switchover drive did not complete in setting time or less

(two seconds).

Detection Methods Winding switch command signal CC(2CN-11) to the magnetic contac-

tor for the winding switch is provided. Winding switch state signal CA1(2CN-12) from the magnetic contactor for the winding switch is

provided.

An alarm will occur if the winding switch command signal and state

signal to the magnetic contactor continue the disagree state

(CHWE=OFF) for two seconds.

Cause	Measures
Motor code improper selection	Confirm the control parameter (C1-25) setting and refer to the setting list.
Lack of drive power supply of magnetic contactor for winding switch (disconnection and improper wiring)	Check whether a regulated voltage is applied to the winding switch contactor (17) and the terminal (18).
Improper connection/disconnection of sig- nal conductor of magnetic conductor for winding switch	Check wiring according to the interconnect chart. Exchange the magnetic contactor for the winding switch with a non-defective one.
Control card fault	Exchange unit (exchange control card)

Remarks

Connector number	Name	Content	Note
2CN-10	24V	Winding switch command signal2CN-10, 11= 24V: L winding	_
2CN-11	CC	= 0V: H winding	_
2CN-12	CA1	Winding switch state signal 2CN-12, 13=24V: L winding	U1-09bit 14 (CHWA)
2CN-13	CA2(0V)	= 0V: H winding	Lighting: H winding

AL-21:Emergency stop defective performance

Error Contents Did not stop within ten seconds after specified the emergency stop.

alarm is displayed. (Emergency stop signal EMG is OFF) / (during driving) / (the above two conditions were consistent for 10 seconds.)

Cause and measures

Cause	Measures
Damping torque by discharging torque drive is reduced.	Check that neither the control parameter (C1-24) setting nor the TLL, TLH I are specified. Change the drive circuit so that neither TLL nor TLH can operate during emergency stop.
Motor code improper selection	Confirm the control parameter (C1-25) setting and refer to the setting list.
Load moment of inertia is large.	Check the acceleration/deceleration time to the rated speed are ten seconds or more (However, set to C1-10:0.1sec). Reduce the inertia moment. Enlarge the capacity of the inverter.
Control card fault	Exchange unit (exchange control card)

AL-30:Encoder signal disconnection

Error Contents Motor encoder signal conductor (A/B phase of 2 CN) disconnection/

improper connection

Cause	Measures
Encoder signal conductor disconnection, improper connection, and the connector omission	Check encoder signal conductor wiring.
Control card fault	Exchange unit (exchange control card)

AL-31:Motor overspeed

Error Contents The motor speed exceeded 120% of setting rated speed (C1-26).

Cause and measures

Cause	Measures
Improper drive by noise (encoder cable characteristic defect)	Check that the encoder signal conductor is isolated from the main circuit wiring and other power lines. Check encoder cable specification (twisted-pair shield wire) [recommended cable "KQVV-SW" by Fujikura-Densen Co.]
Motor encoder fault	Confirm that there is no abnormal motor speed changes by the speedometer indication or the drive state display (U1-01). Exchange encoder or motor.
Control parameter setting is defective.	Refer to the setting list for the control parameter.
Control card fault	Exchange unit (exchange control card)

AL-32: The speed deviation is excessive.

Error Contents The speed became 50% or less than 25% of the command value.

alarm is displayed. (the state which becomes speed coincidence (15% fix) after acceleration is completed) / (the speed command is parameter) / (an electric mode is specified) / (Is the orientation control operating?) / (the speed command is less than 1/2 or 1/4 of feedbacks

[selected by C1-38.b4]? (the above conditions were consistent with the continued speed deviation over protect drive delay time [C1-40.b1-

b0])

Cause	Measures
Motor overload	Is the load heavy? Check that there is no interlock of cutters.
Torque limit drive	Check that neither external limiting torque signal TLL nor TLH are inputted.
Zero speed damping time (C1-35) is set.	Exceed the drive delay time of speed deviation overprotection (C1-40.b1-b0).
Control parameter setting is defective.	Refer to the setting list for the control parameter.
Main circuit disconnection and improper connection	Check wiring between the inverter and the motor.
Encoder signal conductor disconnection, improper connection, and the connector omission.	Check encoder signal conductor wiring.

Improper drive by noise (encoder cable characteristic defect)	Check the encoder signal conductor is isolated from the main circuit wiring and other power lines. Check encoder cable specification (twisted-pair shield wire) [recommended cable "KQVV-SW" by Fujikura-Densen Co.]
Motor encoder fault	Confirm that there is no abnormal motor speed changes by the speedometer indication or the drive state display (U1-01). Exchange encoder or motor.
Control card fault	Exchange unit (exchange control card)

AL-33: The load is abnormal.

Error Contents The inverter output (U, V, W) is not connected (speed feedback is 0.)

alarm is displayed. (load error detection selection bit C1-40.b7 is ON) / (not orientation control mode) / (speed command is greater than 1%) / (speed feedback is 0) (the above condition continued 5 seconds or

more)

Cause	Measures
Inverter output opening	Check inverter output (U, V, W) connection.
Motor encoder fault	Confirm that there is no abnormal motor speed changes by the speedometer indication or the drive state display (U1-01). Exchange encoder or motor.

AL-40, 41: Motor overheating 1 and 2

Error Contents AL-40: The motor temperature exceeded the upper limit.

AL-41: The motor temperature exceeded the upper limit for one minute

or more.

signal THSA, THSB (2CN-8, 9).

If the motor temperature exceeds the motor overheating detection level (determined by the motor parameter. Normally 155 °C on F type), minor fault display is performed due to motor overheating 1(AL-40).

The drive continues.

If the state of motor overheating continues for one minute, the current

is intercepted due to motor overheating 2(AL-41).

Cause and measures

Cause	Measures
Motor overload	Check the motor temperature by the drive state display (U7-01).
Motor cooling fan power wire disconnection	Check wiring according to the interconnect chart.
Motor cooling fan fault	Turn ON the power and check that the motor cooling air is normal. Exchange the motor cooling fan or the motor.
Motor cooling ability decrease	Check neither dust nor oil, etc. adhere to the motor cooling air passage etc.
Thermistor signal conductor short-circuit	Check motor thermistor signal conductor wiring.
Control card fault	Exchange unit (exchange control card)

AL-42:Motor thermistor disconnection

Error Contents The thermistor for the motor temperature detection was disconnected.

Detection Methods The motor temperature detection voltage is consistent from thermistor

signal THSA and THSB (2CN-8,9).

Motor temperature is less than motor thermistor disconnection level (-

10°C), the current is intercepted, and the alarm is displayed.

Cause	Measures
Motor temperature is low.	Check the motor ambient temperature. Raise the ambient temperature to -10°C or more. Observe the motor temperature by the drive state display (U7-01).
Thermistor signal conductor short-circuit	Check the motor temperature by the drive state display (U7-01). Correct motor thermistor signal conductor wiring.
Control card fault	Exchange unit (exchange control card)

AL-43, -44: Heat sink overheating 1 and 2

Error Contents AL-43: The heat sink temperature exceeded the upper limit.

AL-44: The heat sink temperature exceeded the upper limit for one

minute or more.

Detection Methods The heat sink temperature detection voltage is consistent from ther-

mistor signal (7CN-39) for the heat sink temperature detection.

If the heat sink temperature exceeds the heat sink overheating detection level (determined by the inverter capacity), a minor fault display is performed due to heat sink overheating 1(AL-43). The drive continues.

If the state of heat sink overheating continues for one minute, the cur-

rent is intercepted due to heat sink overheating 2(AL-44).

Cause	Measures
Inverter overload	Check the heat sink temperature by the drive state display (U1-13: heat sink temperature).
Inverter cooling fan fault	Turn ON the power and check that the motor cooling air is normal. Exchange the inverter cooling fan.
Heat sink cooling ability decrease	Check neither the heat sink dust nor oil, etc. adhere.
Thermistor signal conductor short-circuit	Check heat sink thermistor signal conductor wiring.
Control card fault	Exchange unit (exchange control card)

AL-45:Heat sink thermistor disconnection

Error Contents The thermistor for the heat sink temperature detection was discon-

nected.

Detection Methods The heat sink temperature detection voltage is consistent from ther-

mistor signal (7CN-39) for the heat sink temperature detection.

If heat sink temperature is less than heat sink level disconnection detec-

tion level

(-10°C), the current is intercepted due to heat sink thermistor discon-

nection (AL-45).

Cause and measures

Cause	Measures
Inverter ambient temperature is low.	Check the inverter ambient temperature of the inverter. Raise the ambient temperature -10°C or more. Observe the heat sink temperature by the drive state display (U1-13).
Thermistor signal conductor for heat sink temperature detection	Check the inverter temperature by the drive state display (U1-13). Correct thermistor signal conductor wiring for the heat sink temperature detection.
Control card fault	Exchange unit (exchange control card)

AL-46, -47: Control card temperature errors 1, 2

Error Contents AL-46: The control card temperature exceeded +80 °C.

AL-47: The control card temperature exceeded +85 °C.

Detection Methods The control card temperature detection voltage is consistent from the

control card temperature detection sensor signal.

If the control card temperature exceeds 80°C, minor fault display is per-

formed due to control card error 1(AL-46). The drive continues.

If the control card temperature exceeds 85°C, the current is intercepted

due to control card error 2(AL-47).

Cause	Measures
Inverter ambient temperature is high.	Check the inverter ambient temperature. Observe the temperature of the drive state display (U1-12) control card.
Control card fault	Exchange unit (exchange control card)

AL-60:Tuning incompletion

Error Contents The orientation command was input without tuning (minor fault, and

encoder method ORT).

Detection Methods When orientation signal ORT is ON in a state of tuning operation selec-

tion bit (C2-22.b4) becomes tuning enable (=0), minor fault display is

performed due to tuning incompletion AL-60.

Cause and measures

Cause	Measures
Orientation tuning is uncompleted.	Adjust according to the orientation adjustment procedure and the control parameter.

AL-61:The C-phase signal detection is defective.

Error Contents The C-phase signal was not able to be detected at tuning. (encoder

method ORT).

Detection Methods C-phase signal was not able to be detected when rotating forward direc-

tion with 60r/min. and waited 5 seconds. Or, C-phase signal was not able to be detected when rotating reverse direction with 60r/min. and

waited 5 seconds after forward direction check is completed.

Cause	Measures
Load axis encoder signal conductor disconnection, improper connection, and connector omission	Check load axis encoder signal conductor wiring.
Load axis encoder fault	Exchange the load axis encoder with non-defective one.
Orientation card fault	Confirm A, B, and the C-phase pulse by the check terminal on the orientation card. Exchange the orientation card with a non-defective one. Exchange the load axis encoder with a non-defective one.

AL-62:The C-phase signal width is defective.

Error Contents The C-phase signal exceeded 100 pulses at tuning. (encoder method

ORT).

Detection Methods PG counter latched by the C-phase signal with forward rotation by tun-

ing is memorized. Same manner as above, PG counter latched by the C-phase signal with reverse rotation by tuning is memorized. Calculate C-phase signal width from this. If 100 pulses are exceeded, an alarm

will sound.

Cause and measures

Cause	Measures
Motor and inverter earth is defective.	Check continuity to see that the motor and inverter are properly grounded.
Improper drive by noise (encoder cable characteristic defect)	Check encoder signal conductor is isolated from the main circuit wiring and other power lines. Check encoder cable specification (twisted-pair shield wire) [recommended cable "KQVV-SW" by Fujikura-Densen Co.]
Load axis encoder fault	Confirm A, B, and the C-phase pulse by the check terminal on the orientation card. Exchange the load axis encoder with a non-defective one.
Control card fault	Exchange unit (exchange control card)

AL-63:Pulse number error per one rotation

Error Contents A pulse per one rotation exceeded 4096±1 at tuning (encoder method

ORT).

When orientation signal ORT is ON in a state of tuning operation selection bit (C2-22.b4) becomes tuning enable (= 0), minor fault display is

performed due to tuning incompletion AL-60.

Detection Methods By tuning:

PG counter latched by C-phase signal with forward rotation is memorized. The number of pulse per rotation is calculated from the differences of the latched PG counter. This value exceeded 4096±1.

Or,

PG counter latched by C-phase signal with reverse rotation is memorized. The number of pulse per rotation is calculated from the differences of the latched PG counter. This value exceeded 4096±1.

Check three times in forward/reverse direction respectively that the number of pulses per one rotation is normal.

Cause and measures

Cause	Measures
Motor and inverter earth is defective.	Check continuity to see that the motor and inverter are properly grounded.
Improper drive by noise (encoder cable characteristic defect)	Check the encoder signal conductor is isolated from the main circuit wiring and other power lines. Check encoder cable specification (twisted-pair shield wire) [recommended cable "KQVV-SW" by Fujikura-Densen Co.]
Load axis encoder fault	Confirm A, B, and the C-phase pulse by the check terminal on the orientation card. Exchange the load axis encoder with a non-defective one.
Control card fault	Exchange unit (exchange control card)

AL-64:Position detection signal disconnection

Error Contents Encoder signal conductor disconnection / improper connection for the

position detection (encoder method ORT)

Detection Methods If the following condition consists, an alarms will sound. (encoder

method ORT card is installed) / (encoder selection is set of load axis encoder [C1-22.b6=0) / (ORT card encoder disconnection signal is

ON).

Cause	Measures
Load axis encoder signal conductor disconnection, improper connection, and connector omission	Check load axis encoder signal conductor wiring.
Load axis encoder fault	Exchange the load axis encoder with a non-defective one.
Orientation card fault	Confirm the A, B, and the C-phase pulse by the check terminal on the orientation card. Exchange the orientation card with a non-defective one. Exchange the load axis encoder with a non-defective one.

AL-65:INC signal error

Error Contents The INC signal input timing error (encoder method ORT)

(C2-22.b5 = 0 which is a setting when selecting INC positioning reference point is a former stopping position command) / (starting point latch has not completed) / (INC signal is ON [enable when rising ORT

signal].

starting point latch is done by executing the absolute positioning. The starting point latch will be cleared when it has become 50r/min. or

more.

Cause and measures

Cause	Measures
INC signal was turned ON without absolute positioning.	Confirm the fault phenomenon by driving in the same drive parameter. Change the circuit so that the INC signal is specified after absolute positioning is performed.

Remarks INC signal is enabled when inputs as same as ORT signal, or input pre-

viously.

C2-22.b5 INC positioning reference point selection

0: Previous stop position command1: Current stop position command

AL-70: The tuning incompletion.

Error Contents The orientation command was inputted without tuning. (magnetic sen-

sor method ORT)

[Detection Methods When orientation signal ORT is ON in a state of tuning operation selec-

tion bit (C3-22.b4) becomes tuning enable (=0), minor fault display is

performed due to tuning incompletion AL-60.

Cause	Measures
· ·	Adjust according to the orientation adjustment procedure and the control parameter.

AL-71: The magnetic sensor signal detection is defective.

Error Contents The magnetic sensor signal voltage level does not enter a proper value

(at tuning).

Cause and measures

Cause	Measures
Magnetic sensor signal disconnection and improper connection	Check magnetic sensor signal wiring.
Magnetic sensor and magneto defective	Exchange a magnetic sensor and magneto

AL-73:Pulse number error per one rotation

Detection Methods The motor pulse per spindle one rotation exceeded $\pm 6\%$. (at tuning,

magnetic sensor method ORT)

Cause and measures

Cause	Measures
Improper setting of transmission gear ratio	Check the control parameter (C1-27, 28, 29)
Encoder signal conductor disconnection and improper connection	Check motor encoder signal conductor wiring.
Improper drive by noise (encoder cable characteristic defect)	Check encoder signal conductor is isolated from the main circuit wiring and other power lines. Check encoder cable specification (twisted-pair shield wire) [recommended cable "KQVV-SW" by Fujikura-Densen Co.]

AL-74: Magnetic sensor signal disconnection

Error Contents The magnetic sensor signal conductor disconnection/improper connec-

tion.

Detection Methods An alarm sounds when sensor signals are not able to be detected after

waiting 10 seconds.

Cause	Measures
Magnetic sensor signal conductor disconnection	Check wiring for the magnetic sensor reading line.
Magnetic sensor fault	Exchange the magnetic sensor, Perform tuning, again.

AL-75:INC signal error (magnetic sensor method orientation)

Error Contents The INC signal input timing error

(C3-22.b5 = 0 which is a setting when selecting INC positioning reference point is a former stopping position command) / (starting point latch has not completed) / (INC signal is ON [enable when rising ORT

signal].

Starting point latch is done by executing the absolute positioning. The starting point latch will be cleared when it has become 50r/min. or

more.

Cause and measures

Cause	Measures
INC signal was turned ON without absolute positioning.	Confirm the fault phenomenon by driving in the same drive parameter. Change the circuit so that the INC signal is instructed after absolute positions is performed.

The AL-A0: YENET1200 card error

Error Contents YENET1200 card error [alarm signal error from card]

Detection Methods If the following condition exists, an alarm will sound.

(the system GO command was issued by the host system) / (YENET1200 card error signal CCLAM(12CN-38) is ON).

Cause	Measures
YENET1200 card connection defect	Confirm the YENET1200 card connection (12CN).
YENET1200 card fault	Exchange unit (exchange YENET1200 card)
Control card fault	Exchange unit (exchange control card)

AL-A1:YENET1200 card RAM is defective.

Error Contents YENET1200 memory (RAM) is defective. [common RAM pattern

check error at initialization]

Cause and measures

Cause	Measures
YENET1200 card connection defect	Confirm the YENET1200 card connection (12CN).
YENET1200 card fault	Exchange unit (exchange YENET1200 card)
Control card fault	Exchange unit (exchange control card)

AL-A2:YENET1200 card I/O error 1.

Error Contents Data transfer (send and receive) error between YENET1200 card and

control card

[handshake error at initialization]

Cause and measures

Cause	Measures
YENET1200 card connection defect	Confirm the YENET1200 card connection (12CN).
YENET1200 card fault	Exchange unit (exchange YENET1200 card)
Control card fault	Exchange unit (exchange control card)

AL-A3:YENET1200 card I/O error 2

Error Contents Data transfer (send and receive) error between YENET1200 card and

control card [WDT count error at on-line mode]

Cause	Measures
YENET1200 card connection defect	Confirm the YENET1200 card connection (12CN).
YENET1200 card breakdown	Exchange unit (exchange YENET1200 card)
Control card fault	Exchange unit (exchange control card)

AL-A4:YENET1200 card error 3

Error Contents] Data transfer (send and receive) error between YENET1200 card and

control card [2ms interruption time-out error from card]

[Cause and measures]

Cause	Measures
YENET1200 card connection defect	Confirm the YENET1200 card connection (12CN).
YENET1200 card fault	Exchange unit (exchange YENET1200 card)
Control card fault	Exchange unit (exchange control card)

AL-b0:Initial starting point taking-in error

Error Contents C-phase signal cannot be detected after motor is rotating one or more

revolutions when initial starting point input after power supply is ON.

Cause and measures

Cause	Measures
Encoder C-phase signal disconnection and improper connection	Check encoder C-phase signal wiring.
Motor encoder fault	Exchange the encoder or the motor.
Control card fault	Exchange unit (exchange control card)

AL-b1:Encoder pulse number error

Error Contents A B-phase pulse count value from C-phase to the following C-phase

was shifted ± 10 pulses or more from the normal value.

Cause	Measures
Encoder C-phase signal disconnection and improper wiring	Check encoder signal conductor wiring. Confirm that wether one C-phase pulse goes out per one rotation by rotating motor by hand.
Encoder (built-in motor) adjustment is defective.	In case of built-in motor, readjustment for encoder may able to be performed.
Improper drive by noise	Has the motor and inverter ground been properly wired? Are the signal conductor and the power line separated? Is specified twisted-pair shield wire used for the encoder signal conductor?

AL-b2:Low-speed loop acceleration error

Error Contents The motor speed continued 8msec or more in the state which exceeded

max. wpm of low speed winding during low-speed winding.

Cause and measures

Cause	Measures
An external sequence is defective.	Examine an external sequence whether the winding switch point is normal.

AL-d1:A/D converter for I/O card speed command is defective.

Error Contents The A/D converter for the speed command of the I/O card is defective.

Cause and measures

Cause	Measures
I/O card connection defect	Confirm the connection (12CN) between the I/O card and the control card.
I/O card fault	Exchange unit (exchange I/O card)
Control card fault	Exchange unit (exchange control card)

AL-d2:CPU integrated A/D converter is defective.

Error Contents The CPU integrated A/D converter is defective.

Cause	Measures
Control card fault	Exchange unit (exchange control card)

AL-d3:A/D converter for the U phase current detection is defective.

Error Contents The A/D converter for the U phase current detection is defective.

Cause and measures

Cause	Measures
Control card fault	Exchange unit (exchange control card)

AL-d4:The A/D converter for the W phase current detection is defective.

Error Contents The A/D converter for the W phase current detection is defective.

Cause and measures

Cause	Measures
Control card fault	Exchange unit (exchange control card)

AL-d5:Control circuit I/O error 1

Error Contents The data transmission error between CPOS [C196 side detection]

Cause and measures

Cause	Measures
Control card fault	Exchange unit (exchange control card)

1 AL-d6: Control circuit I/O error 2

[Error Contents] The data transmission error between CPOS [DSP side detection] [Cause and measures]

Cause	Measures
Control card fault	Exchange unit (exchange control card)

AL-d7:Control circuit I/O error 3

Error Contents The data transmission error between CPOS [C196 side detection at ini-

tialization]

Cause and measures

Cause	Measures
Control card fault	Exchange unit (exchange control card)

AL-E0:Motor code selection error

Error Contents The selected motor code (C1-25) and inverter capacity (C1-56) don't

match.

Detection Methods If inverter capacity selection for the motor parameter application

selected motor code (C1-25) and inverter capacity selection (C1-56) don't match, an alarm display (initial processing) is performed due to

motor selection error (AL-E0).

Cause and measures

Cause	Measures
Motor code (C1-25) setting defect	Refer to the motor type, motor code (C1-25), inverter type, and the inverter capacity selection (C1-56).

AL-E1: The motor code is not registered.

Error Contents The motor code setting in the C1-25 is not registered.

Detection Methods An alarm will sound if the set motor code was not registered in the

motor code selection (C1-25) (initialed processing)

Cause	Measures
Motor code (C1-25) setting defect	Refer to the motor form and motor code (C1-25).
The version of control card PROM is improper.	Confirm the PROM version (U1-21:PROM number). Confirm the application PROM version of motor code (C1-25) by the setting list. Exchange control card (PROM)
Control card fault	Exchange unit (exchange control card)

AL-E2: The parameter setting range is defective.

Error Contents Memory (EEPROM) data exceeded the upper and lower limit value.

Cause and measures

Cause	Measures
The rated speed (C1-26) setting value is defective.	Confirms whether rated speed (C1-26) is in the setting range. Cycle ON the control power after setting a correct value if the command is out of the range. (motor max. speed setting selected by the motor code C1-25 is the upper limit of rated speed C1-26, therefore, AL-E2 may occur due to C1-26 upper value changes when motor code was changed.
parameter command is defective.	Confirm the each parameter setting value. (Operator's data display blinks if it is out of setting range)
Control card fault	Initialize the parameter drive (brace the setting value). Exchange unit (exchange control card)

AL-E3:Orientation card mis-match

Error Contents The orientation selection bit and the orientation card do not agree.

Detection Methods Orientation selection bit (C1-39 bit 0) is "0" (encoder system) and

magnetic sensor system orientation card is mounted.

Or,

Orientation selection bit (C-1-31 bit 0) is "1" (magnetic sensor system)

and magnetic sensor system orientation card is not mounted.)

Cause	Measures
Orientation card and orientation preference parameter do not agree.	Confirm the orientation card type and orientation selection signal (C1-39 bit 0)
The orientation card installation is defective.	Confirm that there are no loose connectors (13CN).
Orientation card fault	Exchange the orientation card with a non-defective one.

AL-E4:Inverter capacity selection error

Error Contents The selected inverter capacity (C1-56) and unit don't match.

Cause and measures

Cause	Measures
Inverter capacity selection (C1-56) setting is defective.	Confirm the inverter type, and inverter capacity selection (C1-56).
Control card fault	Exchange unit (exchange control card)
Gate driver fault	Exchange unit (exchange gate driver)

AL-F0:ROM is defective.

Error Contents The memory (PROM) is defective. [Sum check error]

Cause and measures

Cause	Measures
PROM is defective.	Exchange PROM on the control card with a non-defective one.
Control card fault	Exchange unit (exchange control card)

AL-F1(F1): EEPROM is defective 1

Error Contents The memory (EEPROM) is defective. [Verification error at initializa-

tion|

Cause	Measures
Control card fault	Exchange unit (exchange control card)

AL-F2:EEPROM is defective 2.

Error Contents The memory (EEPROM) is defective. [EEPRM initialization code

error]

Cause and measures

Cause	Measures
The parameter initialization operation incompletion.	Initialize the parameter operation.
Control card fault	Exchange unit (exchange control card)

AL-F3:EEPROM is defective 3.

Error Contents The memory (EEPROM) is defective. [BCC check error]

Cause and measures

Cause	Measures
Parameter initialization operation incompletion.	Initialize the parameter operation.
Control card fault	Exchange unit (exchange control card)

AL-F4:EEPROM is defective 4.

Error Contents The memory (EEPROM) is defective. [defective write-in at on-line

mode]

Cause	Measures
Control card fault	Initialize the parameter drive.
	Exchange unit (exchange control card)

CPF00:Control circuit error 1.

Error Contents The serial transmission error between inverter and operators

5 seconds have past after power turned ON, inverter control card and operator transmission are not consistent (detects and displays by soft-

ware on the operator side.)

Cause	Measures
The digital operator connector contact is defective.	Check that there are no loose insertions on connectors (3CN).
The digital operator fault	Exchange a digital operator with a non-defective one.
Improper connection of power supply signal conductor of I/O card connector (6CN)	Check power supply signal conductor wiring of I/O card connector (6CN).
I/O card fault	Exchange the I/O card with a non-defective one.
Improper connection of power supply signal conductor of control card connector (1CN)	Check the power supply signal conductor wiring of the control card connector (1CN).
Control card fault	Exchange unit (exchange control card)

CPF01:The control circuit is abnormal 2.

Error Contents The serial transmit error between inverter and operators

More than two seconds of transmission error occurred when inverter control card and operator transmission are consistent once power turned ON. (detects and displays by software on the operator side.)

Cause	Measures
Digital operator connector contact defective	Check that there are no loose insertion of connector (3CN). Check that there is no defect in the digital operator and connector.
Improper connection of power supply signal conductor of I/O card connector (6CN)	Check power supply signal conductor wiring of I/O card connector (6CN).
I/O card fault	Exchange unit (exchange I/O card)
Improper connection of power supply signal conductor of control card connector (1CN)	Check power supply signal conductor wiring of control card connector (1CN).
Control card fault	Exchange unit (exchange control card)

The motor does not rotate

Cause and measures

Cause	Measures
Security function drive	Check the occurring fault by digital operator's security function drive display mode.
Main circuit disconnection / improper connection	Check wiring between the inverter and the motor.
The control signal is passive.	Confirm the sequence input signal by the drive state display (U1-09). Drive preparation RDY, Emergency stop EMG, Drive FWD or REV Check (U1-02) whether speed command SCOM is inputted.
Torque limit drive	Check whether neither external limiting torque signal TLL nor TLH are inputted.
Motor winding disconnection	Check resistant value between motor terminals [circuit tester is required)] Exchange the motor with a non-defective one.
Motor fault A fixed stator and rotor come in contact. Damage of bearing	Confirm that motor shaft is turning by hand. Exchange the motor with a non-defective one.
Control card fault	Exchange unit (exchange control card)

The motor rotates slowly or not rotate because of vibration.

Cause	Measures
Main circuit disconnection / improper connection	Check wiring between the inverter and the motor.
Encoder signal conductor disconnection / improper connection / the connector omission.	Check encoder signal conductor wiring.
Motor encoder fault	Confirm that there is no abnormal motor speed changes by the speedometer indication or the drive state display (U1-01). Exchange encoder or motor.
Speed command signal conductor disconnection / improper connection	Check speed command signal conductor wiring.
Torque limit drive	Check whether neither external torque limit signal TLL nor TLH are inputted.
Control card fault	Exchange unit (exchange control card)

The motor reverses

Cause and measures

Cause	Measures
Main circuit and motor encoder signal conductor improper connection	Check wiring according to the interconnecting wiring chart.

The motor does not rotate at the command speed.

Cause and measures

Cause	Measures
Speed command signal error	Check the speed command by the drive state display function (U1-02). Readjust the host speed command function.
Motor rated speed improper setting	Confirm the control parameter (C1-26) setting and refer to the setting list.
Motor speed adjustment is defective.	Check the motor speed by the drive state display function (U1-01). Adjust the motor speed by the control parameter (C1-12) (Refer to P157).
Speed control is P control	Check whether the PPI signal is not inputted by the drive state display function (U1-09).
Torque control drive	Check whether neither external torque limit signal TLL nor TLH are inputted.
Control card fault	Exchange unit (exchange control card)

The acceleration/declaration time is long.

Cause	Measures
Software starting time setting is defective. (Setting time is long)	Confirm the control parameter (C1-10) setting and refer to the setting list.
Motor code improper selection	Confirm the control parameter (C1-25) setting and refer to the setting list.
Torque control drive	Check whether neither external limiting torque signal TLL nor TLH are input.
Load machine overload	Check the load state for the load factor meter state to examine the load machine loss and inertia moment, etc. Raise the drive capacity of the inverter and the motor.
Control card fault	Exchange unit (exchange control card)

The motor noise is loud and the vibration is significant.

Cause and measures

Cause	Measures
Main circuit disconnection	Check wiring between the inverter and the motor.
The motor / the inverter earth is defective	Check that the motor and inverter are properly grounded and check continuity.
Improper drive by noise (encoder cable characteristic defect)	Check the encoder signal conductor is isolated from the main circuit wiring and other power lines. Check encoder cable specification (twisted-pair shield wire) [recommended cable "KQVV-SW" by Fujikura-Densen Co.]
Control parameter setting defect Especially, speed control proportional control gain	Refer to the setting list for the control parameter.
Motor installation is defective.	Check and tighten if loose, all installation screws.
Unbalanced motor	Check the balance of the rotor. Exchange the motor with a non-defective one.
Motor fault Motor bearing error Rotor fault	Check whether the motor noise and the vibration enter the specification value with driving with the motor unit. Exchange the motor with a non-defective one.
Coupling / alignment with load machine is defective.	Confirm that there is enough coupling and centering according to the connection with the machine.
Strength shortage of load machine	Check that there are no transformation nor a resonating point on the machine side.
Loosening of foundation bolt	Check and tighten if loose, all foundation bolts on the load machine.
Control card fault	Exchange unit (exchange control card)

The motor does not stop.

Cause	Measures
	Check that the drive signal (FWD or REV) is set to OPEN by the drive state display (U1-09).
Control card fault	Exchange unit (exchange control card)

The motor does not stop at the orientation.

Cause	Measures
Orientation signal OTR is not inputted.	Check that orientation signal ORT is set to CLOSE by the drive state display (U1-09).
Selection signal improper setting	Confirm the selection signal setting and refer to the setting list. C1-39 bit 0:Encoder method, 1: Magnetic sensor method C2-22 bit 6:Load axis encoder, 1: Motor encoder
Encoder signal conductor disconnection / improper connection / connector omission [Encoder method]	Confirm that there is no abnormal motor speed changes by the speedometer indication or the drive state display (U1-01). Exchange the encoder or the motor.
Magnetic sensor reading line disconnection / improper connection /connector omission [Magnetic sensor method]	Check the magnetic sensor signal conductor wiring.
Magnetic sensor and magneto fault [Magnetic sensor method]	Confirm that ORG signal is to be lit once per every load axis rotation by the drive state display function (U1-10).
Orientation card fault	Exchange the orientation card with a non-defective one.
Control card fault	Exchange unit (exchange control card)

The stopping position in which specified is differ (encoder method).

Cause and measures

Cause	Measures
Stopping position command improper setting	Check that the position command is correct by the drive state display (U3-04).
Binary and BCD command improper selection Or, BCD command resolution improper setting.	Confirm the control parameter (C1-25) setting and refer to the setting list. C2-22 bit 3 C2-12
Reference point selection fault when positioning the incremental positioning.	Confirm the control parameter (C1-25) setting and refer to the setting list. C2-22 bit 5
Load axis starting point position improper setting	Position by the starting position and measure position accuracy. Redo the tuning and reset the load axis starting point.
Encoder signal conductor disconnection / the improper connection / the connector omission.	Check the encoder signal conductor wiring.
Improper drive by noise (encoder cable characteristic defect)	Check the encoder signal conductor is isolated from the main circuit wiring and other power lines. Check encoder cable specification (twisted-pair shield wire) [recommended cable "KQVV-SW" by Fujikura-Densen Co.]
Control card fault	Exchange the control card with a non-defective one.

The stopping position in which specified is differ (magnetic sensor method).

Cause	Measures
Magnetic sensor / magneto mounting direction is opposite.	Check the installation of the sensor and magneto.
Magnetic sensor reading line disconnection / connector omission	Check the magnetic sensor single conductor wiring.
Orientation card fault	Exchange the orientation card with a non-defective one.
Control card fault	Exchange unit (exchange control card)

The orientation completion signal is not output.

Cause	Measures
Orientation signal ORT is not inputted.	Check to see that the orientation signal ORT is set to CLOSE by the drive state display (U1-09).
Selection signal improper setting Completion signal is not outputted when tuning at initialization.	Check that selection signal (bit 4 of C2-22, C3-22) is set correctly. 1 : enable tuning. 2: disable tuning
Transmission gear ratio improper setting	Check to see that the transmission gear ratio (C1-27-29) is set with a correct value and refer to the machine data.
Position control proportional gain is high.	Check that there is no vibration with forward/reverse direction near the stopping position. Reduce the position control proportional gain to suppress the vibration level.
Position control proportional gain is low.	Check that it is reaching the stopping position by the drive state display (U2-03, or U3-03). Raise the position control proportional gain to reach the command position.
Orientation card fault	Exchange the orientation card with a non-defective one.
Control card fault	Exchange unit (exchange control card)

PC NC Maintenance Manual The VS-626M5

The VS-626M5

The following information describes installation, maintenance and inspection, trouble-shooting, and specifications of the VS-626M5 and the VS-656MR5. Read this information thoroughly before operation.

General Precautions

- Some drawings in the following section are shown with the protective cover or shields removed, in order to describe detail with more clarity. Ensure all covers and shields are replaced before operating this product.
- This manual may be modified when necessary because of improvement of the product, modification, or changes in specifications.
 - Such modifications are denoted by a revised manual number.
- Yaskawa is not responsible for any modification of the product made by the user, because to modify the equipment voids the guarantee.

4.2 Notes For Safe Operation

Read the information below thoroughly before installation, operation, maintenance or inspection of the VS-626M5. Notes for safe operation are classified as "WARNING" or "CAUTION."



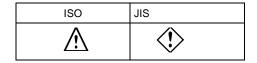
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.

Even items described following the caution notation may result in a vital accident in some situations. In either case, follow these important notes.

The warning symbols for ISO and JIS standards are different, as shown below.



The ISO symbol is used in this manual.

Both of these symbols appear on warning labels on Yaskawa products. Please abide by these warning labels regardless of which symbol is used.

The steps below are to be taken to insure proper operation.

Receiving

△ CAUTION

• Do not install or operate any inverter or converter which is damaged or has missing parts. Failure to observe this caution may result in personal injury or equipment damage.

Installation

A CAUTION

- Lift the mounting base. When moving the unit, never lift by the front cover, to avoid damaging the unit.
- Mount the inverter and the converter on nonflammable material (i.e., metal). Failure to observe this caution can result in a fire.
- Install a fan or other cooling device to keep the ambient temperature of inverter and converter below 55xC (131xF) and the intake air temperature to heat sink below 45xC (113xF). Overheating may cause a fire or damage to the unit.
- Build an external emergency stop circuit that immediately stops operation and shuts down power in an emergency. Failure to observe this caution may result in personal injury.

PC NC Maintenance Manual The VS-626M5

Wiring

- Only commence wiring after verifying that the power supply is turned OFF. Failure to observe this warning can result in an electric shock or a fire.
- Wiring must be performed only by qualified personnel. Failure to observe this warning can result in an electric shock or a fire.
- When wiring the emergency stop circuit, check the wiring thoroughly before operation. Failure to observe this warning can result in personal injury.
- Ensure the ground terminal is grounded. 200V class: ground to 100 or less. Failure to observe this warning can result in an electric shock or a fire.

- Verify that the converter rated voltage coincides with the AC power supply voltage. Failure to observe this caution can result in personal injury or a fire.
- Do not perform a withstand voltage test of the inverter and the converter. It may cause the semi-conductor elements to be damaged.
- Connect the inverter and the converter as shown in the connection diagram, to avoid damage to the inverter or converter.
- Tighten the terminal screws to the specified tightening torque. Failure to observe this caution can result in a fire.
- Never connect the AC main circuit power supply to output terminals U/T1, V/T2 and W/T3. The inverter may be damaged.

Operation

⚠ WARNING

- Only turn ON the input power supply after closing the upper and lower cover. Do not open the covers while current is flowing. Failure to observe this warning can result in an electric shock.
- Because the **Stop** button can be disabled by a function setting, install a separate emergency stop switch. Failure to observe this warning can result in personal injury.

⚠ CAUTION

- Never touch the heat sink; the temperature is very high. Failure to observe this caution can result in harmful burns to the body.
- Since it is easy to change operation speed from low to high speed, verify the safe working range of the motor and machine before operation. Failure to observe this caution can result in personal injury.
- Do not check signals during operation. The machine or the unit may be damaged.
- All the constants of the inverter have been preset at the factory. Do not change the settings unnecessarily. The machine or the unit may be damaged.

Operation Of Digital Operator

△ WARNING

 Disconnect all power before removing digital operator (JVOP-132). Then wait for the time described on warning labels after main circuit power supply and control power supply are disconnected and all LEDs of the inverter and the converter are extinguished. Failure to observe this warning can result in an electric shock. PC NC Maintenance Manual The VS-626M5

Maintenance and Inspection

⚠ WARNING

- Never touch high-voltage terminals in the inverter and the converter. Failure to observe this warning can result in an electric shock.
- Close upper and lower covers before powering up the inverter or the converter. To
 open the covers, make sure to shut OFF the molded-case circuit breaker. Failure to
 observe this warning can result in an electric shock.
- Perform maintenance or inspection only after verifying that the CHARGE LED and 7segment LED go OFF, after the main circuit power supply and control power supply are turned OFF. The capacitors are still charged and can be dangerous.
- Only authorized personnel should be permitted to perform maintenance, inspections
 or parts replacement. Remove all metal objects (watches, bracelets, etc.) before
 operation. Use tools which are insulated against electric shock. Failure to observe
 this warning can result in an electric shock.

- The control PC board employs CMOS ICs. Do not touch the CMOS elements. They
 are easily damaged by static electricity.
- Do not connect or disconnect wires or connectors while power is applied to the circuit.
 Failure to observe this caution can result in personal injury.

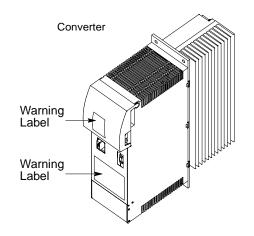
Others

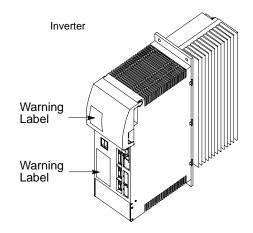
⚠ WARNING

• Never modify the product. Failure to observe this warning can result in an electric shock or personal injury and invalidates the guarantee.

Warning Label

Warning labels are displayed on the upper cover and the front cover of the inverter and the converter, as shown below. Follow these instructions when handling the inverter and the converter.





Model CIMR-MR5A27P5 [200V 10HP (7.5KW)]

Model CIMR-M5A27P5 [200V 10HP (7.5KW)]

Related Manuals

Refer to the following manuals as necessary.

Manual Name	Manual Number	Contents
Varispeed-656MR5/626M5 Connection Bus Bar/cable Instructions	TOE-C736-40.20	Describes VARISPEED- 656MR5/626M5 Connection Bus/Bar Cable.
Varispeed-626M5 Control Signal Connector Instructions	TOE-C736-40.19	Describes VARISPEED- 626M5 Control Signal Connector.
Varispeed-676H5/626M5 Digital Operator Extension Cable Instructions	TOE-C736-40.18	Describes VARISPEED- 676H5/626M5 Digital Operator Extension Cable.

PC NC Maintenance Manual The VS-626M5

4.3 Receiving

\triangle CAUTION

 Do not install or operate any inverter or converter which is damaged or has missing parts. Failure to observe this caution may result in personal injury or equipment damage.

The following information describes how to verify the inverter after delivery to the user.

Inspection Checkpoints

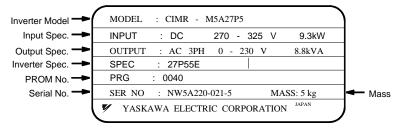
Checkpoints	Description
Does the inverter model number correspond with the purchase order?	Open the upper cover of the VS-626M5 and check the model number on the nameplate.
Are any parts damaged?	Visually check the exterior and verify that there was no damage during transport.
Is hardware properly seated and securely tightened?	Remove converter upper and lower covers. Check all visible hardware with appropriate tools.

If any of the above checkpoints are not satisfactory, contact your Yaskawa customer service representative.

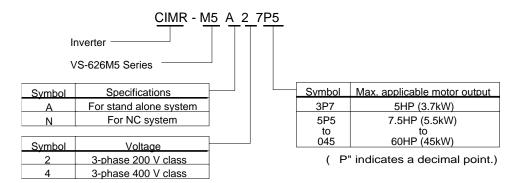
Check the nameplate data as follows below.

(a) Nameplate Data

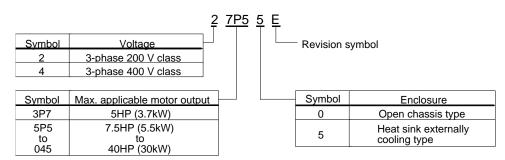
Example of model of 200VAC, 10HP (7.5kW)



The model designation is as follows:



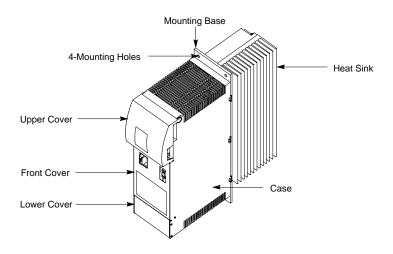
The specification designation is as follows:



"P" indicates a decimal point.

Identifying The Parts

Converter



Upper and Lower Covers Opened

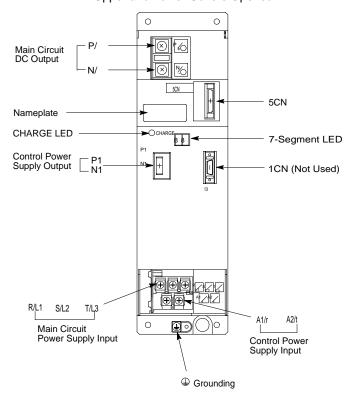
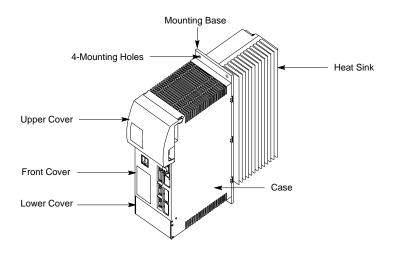


Figure 4.3: The VS-656MR5 (Model CIMR-MR5A27P5)

Inverter



Upper and Lower Covers Opened

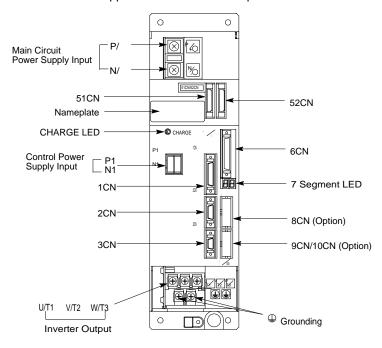


Figure 4.4: The VS-626M5 (Model CIMR-M5A27P5)

4.4 Installation

△ CAUTION

• Lift the mounting base. When moving the unit, never lift by the front cover, to avoid damaging the unit.

- Mount the inverter and the converter on a nonflammable material (i.e., metal). Failure to observe this caution can result in a fire.
- Install a fan or other cooling device to keep the ambient temperature of inverter and converter below 55°C (131°F) and the intake air temperature to heat sink below 45°C (113°F). Overheating may cause a fire or damage to the unit.
- Build an external emergency stop circuit that immediately stops operation and shuts down power in an emergency. Failure to observe this caution may result in personal injury.

This chapter describes the configuration, location and space when mounting the VS-626M5 and the VS-656MR5.

Choosing A Location To Mount The Converter

To ensure proper performance and long operating life, follow the recommendations below when choosing a location for installing the VS-626M5 and the VS-656MR5. Make sure the inverter and the converter are protected from the following conditions:

- Extreme cold and heat.
 Use only within ambient temperature range: 0°C to +55°C (32°F to 131°F)
- Rain, moisture.
- Oil sprays, splashes
- Salt spray.
- Direct sunlight. (Avoid using outdoors.)
- Corrosive gases or liquids.
- Dust or metallic particles in the air.
- Physical shock, vibration.
- Magnetic noise. (Example: welding machines, power devices, etc.)
- High humidity.
- Radioactive materials.
- Combustibles: thinners, solvents, etc.

Clearances

Install the VS-626M5 and the VS-656MR5 vertically and allow sufficient clearances for effective cooling.

- 1. For the external dimensions and mounting dimensions, refer to Appendix 2 "Dimensions."
- 2. Allowable intake air temperature to the inverter and the converter:

Open chassis type:0°C to +45°C (32°F to 113°F) Heat sink externally cooling type Inside heat sink:0°C to +45°C (32°F to 113°F) Inside unit: 0°C to +55°C (32°F to 131°F)

3. Near the heat sink, cooling air speed should be 2.5m/s for effective cooling (for external cooling type heat sink). See figure below.

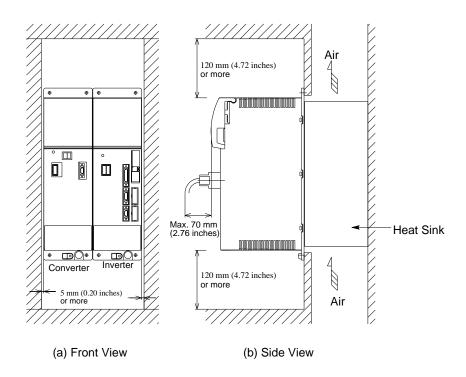


Figure 4.5: Clearances (external cooling type heat sink)

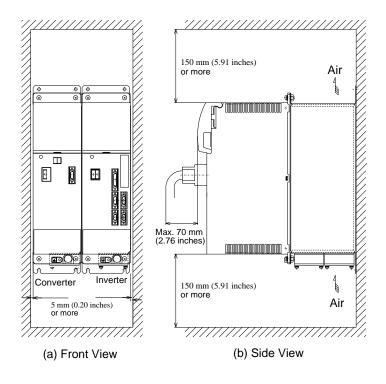


Figure 4.6: Clearances for Open Chassis Type

When using an open chassis type converter (11kW or more) in combination with an inverter (7.5kW or less), follow the installation procedure as shown below.

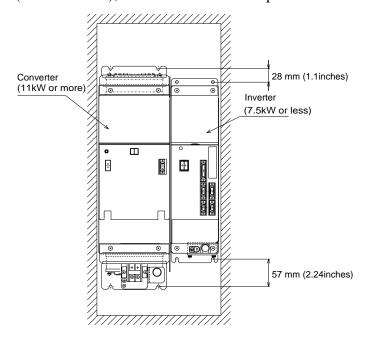


Figure 4.7: Installation

4.5 Wiring

⚠ WARNING

- Only commence wiring after verifying that the power supply is turned OFF. Failure to observe this warning can result in an electric shock or a fire.
- Wiring should be performed only by qualified personnel. Failure to observe this warning can result in an electric shock or a fire.
- When wiring the emergency stop circuit, check the wiring thoroughly before operation. Failure to observe this warning can result in personal injury.

\triangle CAUTION

- Verify that the converter rated voltage coincides with the AC power supply voltage.
 Failure to observe this caution can result in personal injury or a fire.
- Do not perform a withstand voltage test of the inverter and the converter. It may cause semi-conductor elements to be damaged.
- Make sure to connect the inverter and the converter as shown in the connection diagram. The inverter or the converter may be damaged.
- Tighten terminal screws to the specified tightening torque. Failure to observe this caution can result in a fire.

This section describes the connection with peripheral units, the main circuit wiring, and the control circuit wiring of the VS-626M5 and the VS-656MR5.

Connection With Peripheral Units

The following shows standard connection of the VS-626M5 with peripheral units.

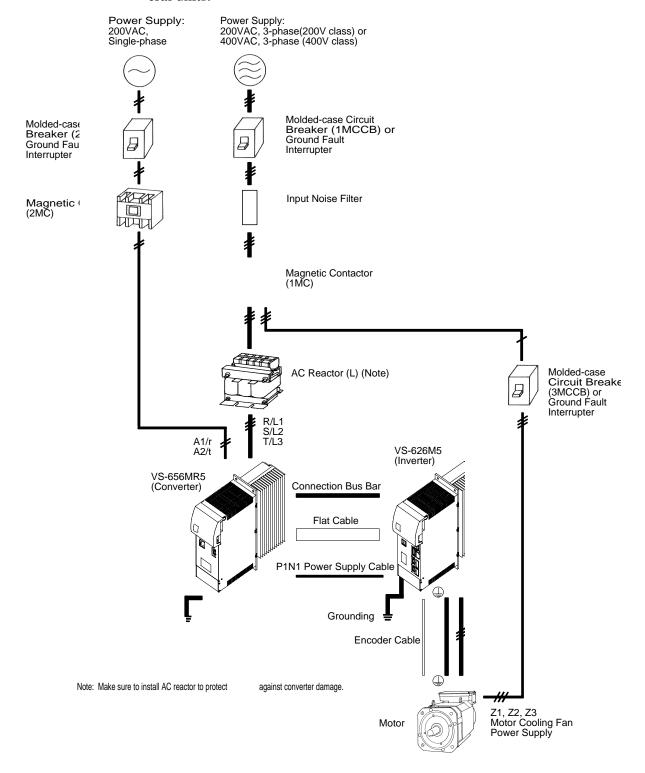


Figure 4.8: Connection with Peripheral Units

Connection Diagram

Below is a standard connection diagram of the VS-626M5 and the VS-656MR5.

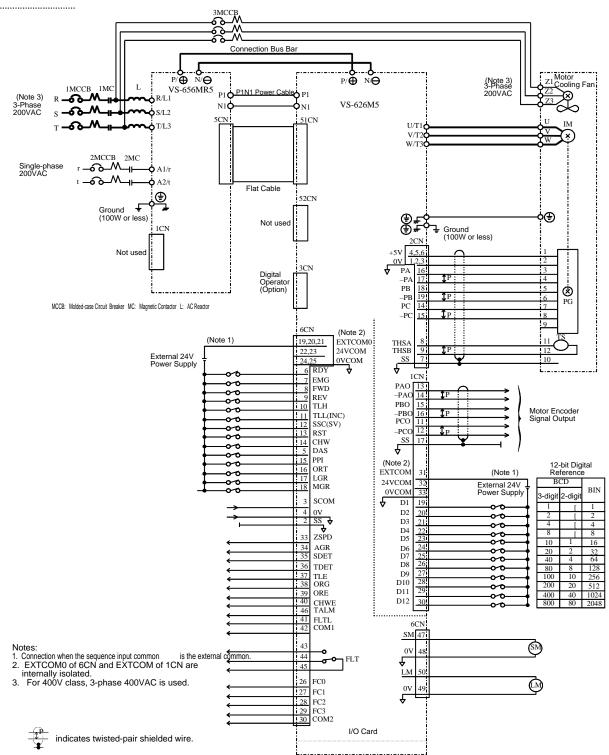


Figure 4.9: Connection Diagram (200V class, external cooling type heat sink)

Wiring The Main Circuit

⚠ WARNING

· Ensure the ground terminal is grounded.

\triangle CAUTION

 Never connect the AC main circuit power supply to output terminals U/T1, V/T2 and W/T3. The inverter may be damaged.

1. Wiring Precautions for Main Circuit Input

Installation of Molded-case Circuit Breaker (MCCB)
Connect the MCCB between the main circuit power supply input and VS-656MR5 input terminals R/L1, S/L2 and T/L3 to protect the wiring.

Installation of Ground Fault Interrupter

When connecting a ground fault interrupter to input terminals R/L1, S/L2 and T/L3, select one that is not affected by high frequency.

Examples: NV series by Mitsubishi Electric Co., Ltd. (manufactured in or after 1988), EG, SG series by Fuji Electric Co., Ltd. (manufactured in or after 1984)

Installation of Magnetic Contactor

When the main circuit power supply is shut OFF in the sequence, a magnetic contactor (MC) can be used instead of a molded-case circuit breaker (MCCB). However, when a magnetic contactor is switched OFF at the main circuit power supply input side, regenerative braking does not function and the motor coasts to a stop. (At this time, a protective function activates to display a fault.)

Frequent opening/closing of the magnetic contactor at the main circuit power supply input side may cause the inverter and the converter to malfunction.

Main circuit power supply input phases can be connected to any terminal regardless of the order of R/L1, S/L2 and T/L3 on the terminal block.

Installation of AC Reactor

Since the VS-656MR5 performs power regeneration, make sure to install an AC reactor corresponding to converter capacity. Installation of an AC reactor is effective for power factor improvement on the power supply side.

Installation of Surge Suppressor

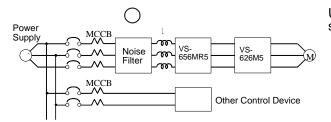
For inductive loads (magnetic contactors, magnetic relays, magnetic valves, solenoids, magnetic brakes, etc.) connected near the inverter, use a surge suppressor simultaneously.

Prohibition of Installation of Phase Advancing Capacitor

Do not connect a phase advancing capacitor or surge suppressor to the main circuit power supply input side (R/L1, S/L2, T/L3). It may become overheated and damaged by high harmonic components of the inverter. Also, the inverter may malfunction due to an overcurrent.

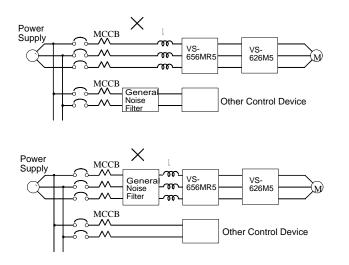
Using Input Noise Filters

Noise filters can reduce a high harmonics noise leak from the drive unit to the power line. Use the correct noise filter specified for inverter use as indicated in the examples below.



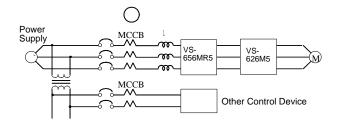
Use an exclusive noise filter specified for the inverter.

Figure 4.10: Using Input Noise Filter (Example 1)



A general-purpose noise filter will not be effective.

Figure 4.11: Using Input Noise Filter



By installing an isolating transformer on the power side of another control device, the same result is achieved as with installing a noise filter.

Figure 4.12: Using Input Noise Filter

2. Wiring Precautions for Converter Control Power Supply Input

Make sure to connect the MCCB with the converter control power supply input terminals A1/r and A2/t to protect wiring.

3. Wiring Precautions for Main Circuit between Converter and Inverter

Connection of Main Circuit DC Power Supply

Connect the converter main circuit DC output terminals $P/_$ and $N/_$ to the inverter main circuit power supply input terminals $P/_$ and $N/_$ using an exclusive-use connection bus bar. Secure the bus bar using all the power terminal screws, and tighten to a torque value of 4 to 5 $N\cdot m$.

Connection of Converter Control Power Supply Output
Connect converter control power supply output terminals P1 and N1 to
inverter left-side control power supply input terminals P1 and N1 using
exclusive-use power cable.

4. Wiring Precautions for Inverter Main Circuit Output

Connection of Terminal Block and Load

Connect output terminals U/T1, V/T2 and W/T3 to motor lead wires U, V and W. The connection method is indicated on the back of the terminal cover. Verify that the motor rotates in the forward direction (CCW: counterclockwise when viewed from the motor load side) with the forward run command.

Connection of Input Power Supply to Output Terminals Prohibition
Never connect the AC main circuit power supply to the output terminals U/T1, V/T2 and W/T3.

Strict Prohibition of Short Circuiting or Grounding of Output Circuit
Never touch the output circuit directly or put the output line in contact with
the inverter case. Doing so may cause an electric shock or grounding. In
addition, never short circuit the output line.

Phase Advancing Capacitor or LC/RC Noise Filter Connection Prohibition Never connect a phase advancing capacitor or LC/RC noise filter to the output circuit.

Avoidance of Installation of Magnetic Starter

Do not connect a magnetic starter or magnetic contactor to the output circuit. If the load is connected while the inverter is running, the inverter overcurrent protective circuit is activated because of inrush current.

Dealing with Emission Noise

To reduce the emission noise from the output side, cover the wirings with a metallic shield rather than installing a output noise filter. Make the wiring distance between the power line and signal line 30cm or longer, to reduce the emission noise.

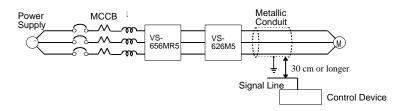


Figure 4.13: Dealing with Emission Noise

Wiring Distance between Inverter and Motor

The signal and power cables between the inverter and the motor must be separated and the cable extension must be as short as possible (20m or less).

5. Grounding

- Ground the ground terminal (\triangle). 200V class: Ground to 100Ω or less 400V class: Ground to 10Ω or less
- Never ground the inverter or the converter in common with welding machines, motors, or other large-current electrical equipment.
 Wiring for grounding cable must be separated from the large-current electrical equipment.
- Use ground wires, keeping the length as short as possible.
- Always ground converters, inverters and motors using a ground terminal, even when equipment is grounded through sill channel or steel plate.

• Ground the units as shown in the figures below.

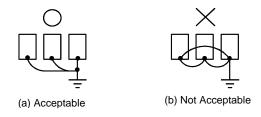


Figure 4.14: Grounding

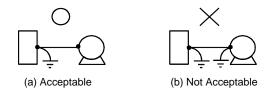


Figure 4.15: Grounding of Motor and Inverter

6. Functions of Main Circuit Terminals

The following tables outline the functions of the main circuit terminals.

Table 4.19: Converter Main Circuit Terminals

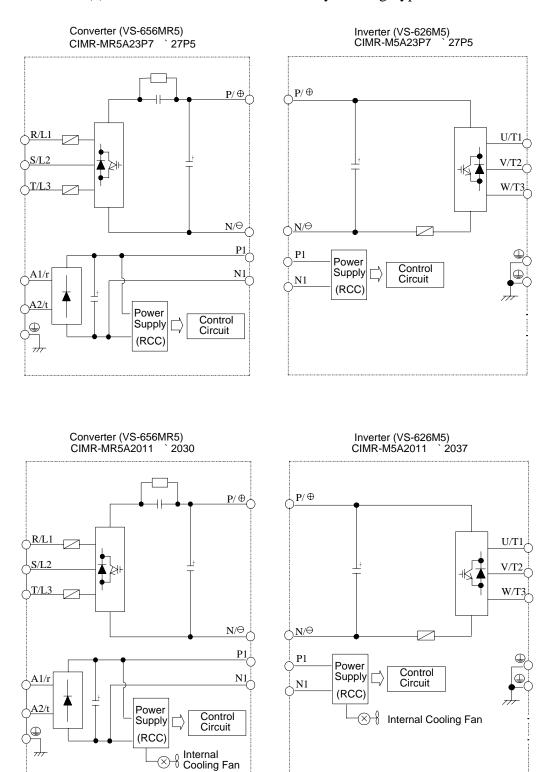
Symbol	Symbol	Name	Functions
200V class	R/L1 S/L2 T/L3	Main circuit power supply input	3-phase 200~220VAC @50Hz 200~230VAC @60Hz
	A1/r A2/t	Control power supply input	Single-phase 200~220VAC @50Hz 200~230VAC @60Hz
	A11/r1 A21/t1	Power supply input for cooling fan	Single-phase 200~220VAC @50Hz 200~230VAC @60Hz
	P/_ N/_	Main circuit DC output	270~325VDC (For inverter main circuit power supply)
	P1 N1	Control power supply output	282~325VDC (For inverter control power supply)
	Φ	Grounding	Ground terminal (Ground resistance : 100 f ¶ or less)
400V class	R/L1 S/L2 T/L3	Main circuit power supply input	3-phase 400~440VAC @50Hz 400~460VAC @60Hz
	A1/r A2/t	Control power supply input	Single-phase 200~220VAC @50Hz 200~230VAC @60Hz
	A11/r1 A21/t1	Power supply input for cooling fan	Single-phase 200~220VAC @50Hz 200~230VAC @60Hz
	P/_ N/_	Main circuit DC output	540~650VDC (For inverter main circuit power supply)
	P1 N1	Control power supply output	282~325VDC (For inverter control power supply)
	•	Grounding	Ground terminal (Ground resistance : $10f\P$ or less)

Table 4.20: Inverter Main Circuit Terminals

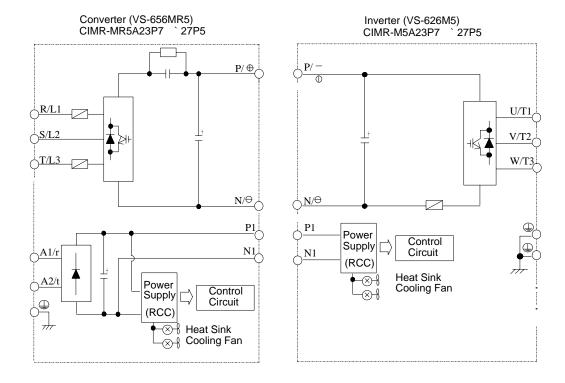
Voltage class	Symbol	Name	Functions
200V class	P/_ N/_	Main circuit power supply input	270~325VDC (Supplied from converter)
	P1 N1	Control power supply input	282~325VDC (Supplied from converter)
	A22/t2 for cooling fan 200~22		Single-phase 200~220VAC @50Hz 200~230VAC @60Hz
	U/T1 V/T2 W/T3	Inverter output	Inverter output to motor
	(1)	Grounding	Ground terminal (Ground resistance : 100 f ¶ or less)
400V class	P/_ N/_	Main circuit power supply input	540~650VDC (Supplied from converter)
	P1 N1	Control power supply input	282~325VDC (Supplied from converter)
	A12/r1 A22/t2	Power supply input for cooling fan	Single-phase 200~220VAC @50Hz 200~230VAC @60Hz
	U/T1 V/T2 W/T3	Inverter output	Inverter output to motor
	Φ	Grounding	Ground terminal (Ground resistance : $10f\P$ or less)

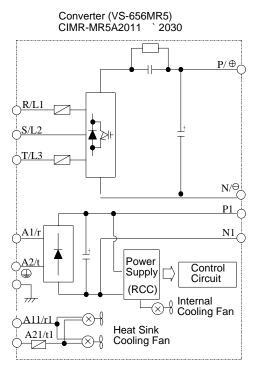
7. Main Circuit Configuration

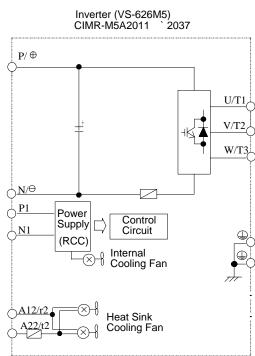
(a) 200V class Heat Sink Externally Cooling Type



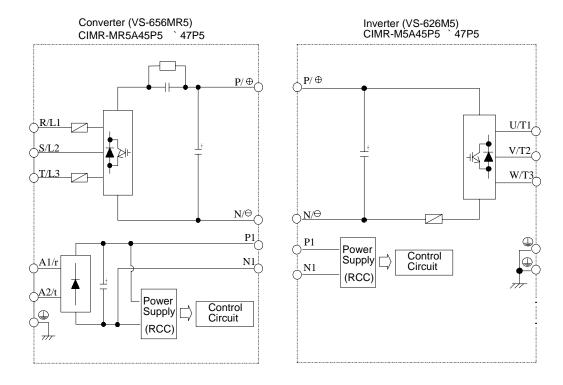
(b) 200V class Open Chassis Type

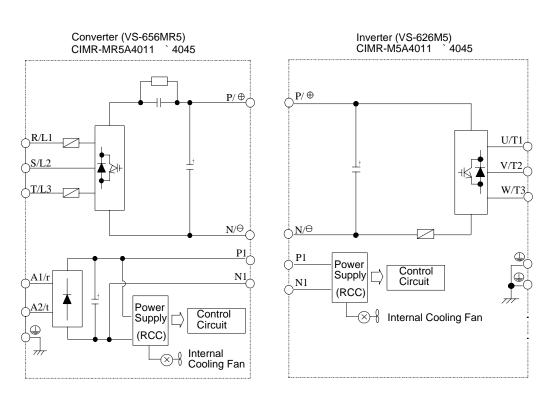






(c) 400V class Heat Sink (External Cooling Type)



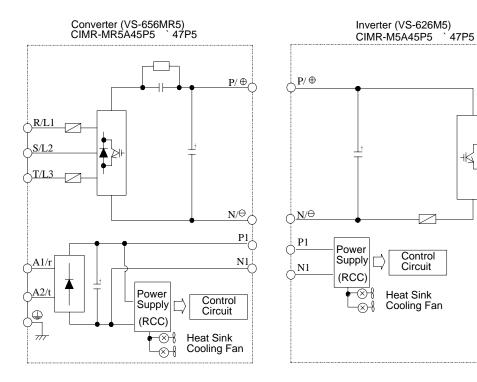


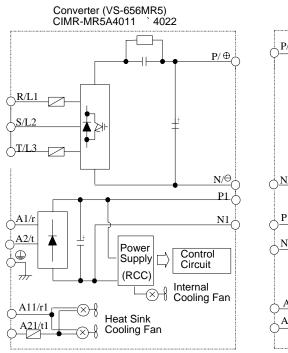
U/T1

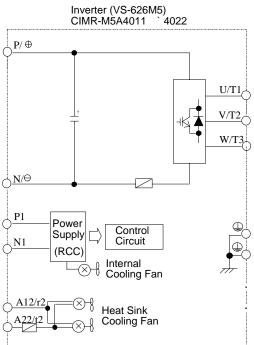
V/T2

W/T3,

(d) 400V class Open Chassis Type







8. Parts Required for Wiring

Table 4.21: 200V Class Converter Power Cable Specifications

			Wire Size			
	Terminal Symbol	Terminal Screw	UL-approved 75 (167°F) temperature-rated copper wire [AWG (mm ²)]	600V vinyl- sheath insulated wire (IV, VV) 60 (140°F) (mm²)	600V crosslinked polyethylene wire (IC) 90 (194°F) (mm²)	600V rubber- insulated cabtyre cable (CT) 60 (140°F) (mm²)
23P7	P/_, N/_	M6		Note	e 1	
	R/L1, S/L2, T/L3	M5	14 (2.1)	2	2	2
	A1/r, A2/t	M5	14 (2.1)	2	2	2
	Φ	M4	10 (5.3)	2	2	2
25P5	P/_, N/_	M6		Note	e 1	1
	R/L1, S/L2, T/L3	M5	12 (3.3)	3.5	2	3.5
	A1/r, A2/t	M5	14 (2.1)	2	2	2
	Φ	M4	10 (5.3)	3.5	2	2
27P5	P/_N, N/_	M6		Note	e 1	1
	R/L1, S/L2, T/L3	M5	10 (5.3)	3.5	2	3.5
	A1/r, A2/t	M5	14 (2.1)	2	2	2
	Φ	M4	10 (5.3)	3.5	2	3.5
2011	P/_, N/_	M6 ~ 2		(Note	e 1)	1
	R/L1, S/L2, T/L3	M6	8 (8.4)	8	3.5	8
	A1/r, A2/t	M4	14 (2.1)	2	2	2
	(1)	M6	8 (8.4)	5.5	3.5	5.5
2015	P/_, N/_	M6 ~ 2		(Note	e 1)	
	R/L1, S/L2, T/L3	M6	6 (13.3)	14	5.5	14
	A1/r, A2/t	M4	14 (2.1)	2	2	2
	Φ	M6	8 (8.4)	8	5.5	5.5
2018	P/_, N/_	M6 ~ 2		(Note	e 1)	
	R/L1, S/L2, T/L3	M6	4 (21.2)	22	8	22
	A1/r, A2/t	M4	14 (2.1)	2	2	2
	•	M6	6 (13.3)	8	5.5	8
2022	P/_, N/_	M6 ~ 2	(Note 1)		1	•
	R/L1, S/L2, T/L3	M6	4 (21.2)	22	14	22
	A1/r, A2/t	M4	14 (2.1)	2	2	2
	Φ	M6	6 (13.3)	14	8	8
2030	P/_, N/_	M6 _~ 2		(Note	e 1)	•
	R/L1, S/L2, T/L3	M8	2 (33.6)	38	22	38
	A1/r, A2/t	M4	14 (2.1)	2	2	2
	•	M8	6 (13.3)	14	8	14
2011 to 2030	A11/r1, A21/t1 (Note 5)	M4	14 (2.1)	2	2	2

- Notes: 1. Connect using exclusive-use connection bus bar.
 - 2. Wire size is selected assuming external suspended wiring of single 3-core cables at an ambient temperature of 30° (86°F).
 - 3. If ambient temperature exceeds 30° (86°F), allowable current of wire may be lowered.
 - 4. Temperature for each wire indicates maximum allowable conductor temperature.
 - 5. For open chassis type only. Not provided for heat sink externally cooling type.

Table 4.22: 400V Class Converter Power Cable Specifications

			Wire Size				
	Terminal Symbol	Terminal Screw	UL-approved 75 (167°F) temperature-rated copper wire [AWG (mm ²)]	600V vinyl- sheath insulated wire (IV, VV) 60 (140°F) (mm²)	600V crosslinked polyethylene wire (IC) 90 (194°F) (mm²)	600V rubber- insulated cabtyre cable (CT) 60 (140°F) (mm²)	
45P5	P/_, N/_	M6		Note	e 1		
	R/L1, S/L2, T/L3	M5	14 (2.1)	2	2	2	
	A1/r, A2/t	M5	14 (2.1)	2	2	2	
	Φ	M4	10 (5.3)	2	2	2	
47P5	P/_, N/_	M6		Note	e 1		
	R/L1, S/L2, T/L3	M5	14 (2.1)	2	2	2	
	A1/r, A2/t	M5	14 (2.1)	2	2	2	
	Φ	M4	10 (5.3)	2	2	2	
4011	P/_N, N/_	M6 ~ 2		Note	e 1		
	R/L1, S/L2, T/L3	M6	12 (3.3)	3.5	2	3.5	
	A1/r, A2/t	M4	14 (2.1)	2	2	2	
	Φ	M6, M6	10 (5.3)	3.5	2	2	
4015	P/_, N/_	M6 ~ 2		Note	e 1		
	R/L1, S/L2, T/L3	M6	8 (8.4)	5.5	3.5	3.5	
	A1/r, A2/t	M4	14 (2.1)	2	2	2	
	Φ	M6	10 (5.3)	5.5	3.5	3.5	
4018	P/_, N/_	M6 ~ 2		Note	e 1		
	R/L1, S/L2, T/L3	M6	10 (5.3)	3.5	2	3.5	
	A1/r, A2/t	M4	14 (2.1)	2	2	2	
	Φ	M6, M6	10 (5.3)	3.5	2	3.5	
4022	P/_, N/_	M6 ~ 2		Note	e 1		
	R/L1, S/L2, T/L3	M6	8 (8.4)	8	3.5	8	
	A1/r, A2/t	M4	14 (2.1)	2	2	2	
	Φ	M6, M6	8 (8.4)	5.5	3.5	5.5	
4030	P/_, N/_	M6 ~ 2		Note	e 1		
	R/L1, S/L2, T/L3	M6	6 (13.3)	14	5.5	14	
	A1/r, A2/t	M4	14 (2.1)	2	2	2	
	Φ	M6, M6	8 (8.4)	8	5.5	5.5	
4037	P/_, N/_	M6 _~ 2		Note	e 1		
	R/L1, S/L2, T/L3	M6	4 (21.2)	22	8	22	
	A1/r, A2/t	M4	14 (2.1)	2	2	2	
	Φ	M6, M6	6 (13.3)	8	5.5	8	

Table 4.22: 400V Class Converter Power Cable Specifications (Continued)

	Terminal Symbol		Wire Size					
		Terminal Screw	UL-approved 75 (167°F) temperature-rated copper wire [AWG (mm ²)]	600V vinyl- sheath insulated wire (IV, VV) 60 (140°F) (mm ²)	600V crosslinked polyethylene wire (IC) 90 (194°F) (mm²)	600V rubber- insulated cabtyre cable (CT) 60 (140°F) (mm²)		
4045	P/_, N/_	M6 ~ 2		Note	e 1			
	R/L1, S/L2, T/L3	M6	4 (21.2)	22	14	22		
	A1/r, A2/t	M4	14 (2.1)	2	2	2		
	Φ	M6, M6	6 (13.3)	14	8	8		
2011 to 2030	A11/r1, A21/t1 (Note 5)	M4	14 (2.1)	2	2	2		

- Notes: 1. Connect using exclusive-use connection bus bar.
 - 2. Wire size is selected assuming external suspended wiring of single 3-core cables at an ambient temperature of 30° (86° F).
 - 3. If ambient temperature exceeds 30° (86°F), allowable current of wire may be lowered.
 - 4. Temperature for each wire indicates maximum allowable conductor temperature.
 - 5. For open chassis type only. Not provided for heat sink externally cooling type.

Table 4.23: 200V Class Inverter Power Cable Specifications

				Wire	Size	
	Terminal Symbol	Terminal Screw	UL-approved 75 (167°F) temperature-rated copper wire [AWG (mm ²)]	600V vinyl- sheath insulated wire (IV, VV) 60 (140°F) (mm²)	600V crosslinked polyethylene wire (IC) 90 (194°F) (mm²)	600V rubber- insulated cabtyre cable (CT) 60 (140°F) (mm²)
23P7	P/_, N/_	M6		Note	e 1	1
	U/T1, V/T2, W/T3	M5	8 (8.4)	5.5	3.5	5.5
	Φ	M5 ~ 2	10 (5.3)	3.5	2	3.5
25P5	P/_, N/_	M6		Note	e 1	
	U/T1, V/T2, W/T3	M5	8 (8.4)	5.5	3.5	5.5
	Φ	M5 ~2	10 (5.3)	3.5	2	3.5
27P5	P/_N, N/_	M6		Note	e 1	1
	U/T1, V/T2, W/T3	M5	8 (8.4)	8	3.5	8
	Φ	M5 ~2	8 (8.4)	5.5	3.5	5.5
2011	P/_, N/_	M6 ~ 2		Note	e 1	
	U/T1, V/T2, W/T3	M8	6 (13.3)	14	8	14
	Φ	M6 ~ 2	8 (8.4)	8	5.5	5.5
2015	P/_, N/_	M6 ~ 2		Note	e 1	
	U/T1, V/T2, W/T3	M8	4 (21.2)	22	14	22
	Φ	M6 ~ 2	6 (13.3)	14	8	8
2018	P/_, N/_	M6 ~ 2		Note	e 1	
	U/T1, V/T2, W/T3	M8	3 (26.7)	30	14	30
	Φ	M6 ~ 2	6 (13.3)	14	8	14
2022	P/_, N/_	M6 ~ 2		Note	e 1	1
	U/T1, V/T2, W/T3	M8	2 (33.6)	50	22	38
	Φ	M6 ~ 2	6 (13.3)	14	8	14
2030	P/_, N/_	M6 ~ 2		Note	e 1	-1
	U/T1, V/T2, W/T3	M8	2/0 (67.4)	80	38	80
	Φ	M6 ~ 2	4 (21.2)	22	14	14
2037	P/_, N/_	M6 ~ 4	Note 1		e 1	•
	U/T1, V/T2, W/T3	M10	3/0 (85)	100	50	100
	Φ	M8 ~ 2, M6	3 (26.7)	22	14	22
2011 to 2030	A12/r2, A22/t2 (Note 5)	M4	14 (2.1)	2	2	2

- Notes: 1. Connect using exclusive-use connection bus bar.
 - 2. Wire size is selected assuming external suspended wiring of single 3-core cables at an ambient temperature of 30° (86° F).
 - 3. If ambient temperature exceeds 30° (86°F), allowable current of wire may be lowered.
 - 4. Temperature for each wire indicates maximum allowable conductor temperature.
 - 5. For open chassis type only. Not provided for heat sink externally cooling type.

Table 4.24: 400V Class Inverter Power Cable Specifications

				Wire Size			
	Terminal Symbol	Terminal Screw	UL-approved 75 (167°F) temperature-rated copper wire [AWG (mm ²)]	600V vinyl- sheath insulated wire (IV, VV) 60 (140°F) (mm²)	600V crosslinked polyethylene wire (IC) 90 (194°F) (mm²)	600V rubber- insulated cabtyre cable (CT) 60 (140°F) (mm²)	
45P5	P/_, N/_	M6		Note	e 1	1	
	U/T1, V/T2, W/T3	M5	12 (3.3)	2	2	2	
	Φ	M5 ~ 2	10 (5.3)	3.5	2	3.5	
47P5	P/_, N/_	M6		Note	e 1	1	
	U/T1, V/T2, W/T3	M5	12 (3.3)	3.5	2	3.5	
	Φ	M5 ~ 2	10 (5.3)	3.5	2	3.5	
4011	P/_N, N/_	M6 ~ 2		Note	e 1	1	
	U/T1, V/T2, W/T3	M6	10 (5.3)	5.5	2	5.5	
	Φ	M5 ~2, M6	10 (5.3)	3.5	2	3.5	
4015	P/_, N/_	M6 ~ 2		Note	e 1	1	
	U/T1, V/T2, W/T3	M6	8 (8.4)	8	3.5	8	
	Φ	M5 ~2, M6	8 (8.4)	5.5	3.5	5.5	
4018	P/_, N/_	M6 ~ 2		Note	e 1	1	
	U/T1, V/T2, W/T3	M6	8 (8.4)	14	5.5	14	
	Φ	M5 ~2, M6	8 (8.4)	8	5.5	5.5	
4022	P/_, N/_	M6 ~ 2		Note	e 1	1	
	U/T1, V/T2, W/T3	M6	6 (13.3)	14	8	14	
	Φ	M5 ~2, M6	8 (8.4)	8	5.5	5.5	
4030	P/_, N/_	M6 ~ 2		Note	e 1	1	
	U/T1, V/T2, W/T3	M8	4 (21.2)	22	14	22	
	Φ	M6 ~ 2, M6	6 (13.3)	14	8	8	
4037	P/_, N/_	M6 ~ 2		Note	e 1	ı	
	U/T1, V/T2, W/T3	M8	3 (26.7)	30	14	30	
	⊕	M6 ~ 2, M6	6 (13.3)	14	8	14	
4045	P/_, N/_	M6 ~ 2	Note 1				
	U/T1, V/T2, W/T3	M8	2 (33.6)	50	22	38	
	Φ	M6 ~ 2, M6	6 (13.3)	14	8	14	
4011 to 4022	A12/r2, A22/t2 (Note 5)	M4	14 (2.1)	2	2	2	

- Notes: 1. Connect using exclusive-use connection bus bar.
 - 2. Wire size is selected assuming external suspended wiring of single 3-core cables at an ambient temperature of 30° (86°F).
 - 3. If ambient temperature exceeds 30° (86°F), allowable current of wire may be lowered.
 - 4. Temperature for each wire indicates maximum allowable conductor temperature.
 - 5. For open chassis type only. Not provided for heat sink externally cooling type. (Models 4030 to 4045 are under development.)

Table 4.25: Closed-loop Connectors

Wire Size mm ²	Terminal Screw	Closed-Loop Connectors	
0.5	M3.5	1.25 - 3.5	
	M4	1.25 - 4	
0.75	M3.5	1.25 - 3.5	
	M4	1.25 - 4	
1.25	M3.5	1.25 - 3.5	
	M4	1.25 - 4	
2	M3.5	2 - 3.5	
	M4	2 - 4	
	M5	2 - 5	
	M6	2 - 6	
	M8	2 - 8	
3.5 / 5.5	M4	5.5 - 4	
	M5	5.5 - 5	
	M6	5.5 - 6	
	M8	5.5 - 8	
8	M5	8 - 5	
	M6	8 - 6	
	M8	8 - 8	
14	M6	14 - 6	
	M8	14 - 8	
22	M6	22 - 6	
	M8	22 - 8	
30 / 38	M8	38 - 8	
50 / 60	M8	60 - 8	
	M10	60 - 10	
100	M10	100 - 10	

9. Control Signal Connectors

Table 4.26: Control Signal Connectors

	Connector	Connector		Connector Type		Applicable	Connector
	Number	Function	Inverter Side	Wiring Side	Pin Numbers	Maximum Wire Size	Manufacturer
Control PC Board (VS-626M5)	51CN	Control signal connector with converter unit	8830E-068- 170LD-32	8822E- 034-171D	34 32 1	Use a special cable.	KEL Corp.
	52CN	Control signal connector with other drive unit					
	1CN	Control signals	10236– 52A2JL	.10136- 3000VE .10336- 52A0-008 (case)	36 19	0.2 mm ²	Sumitomo 3M Ltd.
	2CN	Encoder signal input	10220- 52A2JL	.10120- 3000VE .10320- 52A0-008 (case)	20 10 10 1	0.2 mm ²	Sumitomo 3M Ltd.
	3CN	Digital operator	10214– 52A2JL	.10114- 3000VE .10314- 52A0-008 (case)	14 7 1 1	Use a special cable.	Sumitomo 3M Ltd.
I/O Card (VS-626M5)	6CN	Control signals	10250- 52A2JL	.10150- 3000VE .10350- 52A0-008 (case)	50 25 1	0.2 mm ²	Sumitomo 3M Ltd.
Encoder Method Orientation Card (VS-626M5)	8CN	Load shaft encoder signal input	10220- 52A2JL	.10120- 3000VE .10320- 52A0-008 (case)	10	0.2 mm ²	Sumitomo 3M Ltd.

Table 4.26: Control Signal Connectors (Continued)

	Connector		Connector Type		Connector	Applicable	Connector	
	Number	Function	Inverter Side	Wiring Side	Pin Numbers	Maximum Wire Size	Manufacturer	
	9CN	Load shaft encoder signal output	10214– 52A2JL	.10114- 3000VE .10314- 52A0-008 (case)	14 7 1 1	0.2 mm ²	Sumitomo 3M Ltd.	
Magnetic Sensor Method Orientation Card (VS-626M5)	10CN	Control signals	10214– 52A2JL	·10114- 3000VE ·10314- 52A0-008 (case)	14 7 1 1	0.2 mm ²	Sumitomo 3M Ltd.	
Control PC Board (VS- 656MR5)	5CN	Control signal connector with other drive unit	8831E-034- 170LD	8822E- 034-171D	34 32 1	Use a special cable.	KEL Corp.	
	1CN	Communication cable connector (for factory test prior to shipment)	10214– 52A2JL	.10114- 3000VE .10314- 52A0-008 (case)	14 7 1 1	"Ÿ	Sumitomo 3M Ltd.	

Note: Some of the connectors attached with control PC board and option cards are of the same type.

Therefore, care must be used to mount the cards to the correct connectors, each of which is identified by a device symbol. If an incorrect connection is made, damage to the inverter may occur.

Wiring The Control Circuit

The following tables outline the functions of the control circuit signals.

1. Control Signals

Table 4.27: Control Circuit Signals (1, 2CN)

Connector	Signal	Number	Function	Signal Level
1CN	+24VIN	1	_l	_
	/EXT1	2	_	_
	/EXT2	3	_l	_
	ESP0	4	_l	_
	ESP1	5	_l	_
	ALM+	6	_l	_
	ALM-	7	_	_
	ALMC	8	_	_
	BAT-	9	_	_
	BAT+	10	_	_
	PAO	13	Encoder phase A signal output	RS-422A specification Line driver
	*PAO	14		
	PBO	15	Encoder phase B signal output	
	*PBO	16		
	PCO	11	Encoder phase C signal output	
	*PCO	12		
	SS	17	Shield (0V)	
	0V	18	0V	
	D1 to D12	19 to 30	12-bit digital references 1 to 12	24VDC (Current when closed: 5mA)
	EXTCOM	31	12-bit digital signal common	
	24VCOM	32	12-bit digital signal power supply +24V	
	0VCOM	33	12-bit digital signal power supply 0V	
	VCC	34		_
	MNTR1	35		
	MNTR2	36		

Table 4.27: Control Circuit Signals (1, 2CN) (Continued)

2CN	+5V	4, 5, 6	+5V power supply for encoder	+5V
				Load current: 300mA or
				less
	0V	1, 2, 3	Encoder power supply common	
	PA	16	Encoder phase A signal input	RS-422A specification
				Line receiver
	*PA	17		
	PB	18	Encoder phase B signal input	
	*PB	19		
	PC	14	Encoder phase C signal input	
	*PC	15		
	THSA	8	Motor thermistor signal	_l
	THSB	9		
	SS	7	Shielded wire connection (0V)	_l
	+24V	10	+24V power supply for winding selection	+24V
			device	
	CC	11	Winding selection device power supply	
			common	
	CA1	12	Winding status signal	+24V
				Load current: 10mA or less
	CA2	13		

Table 4.28: Control Circuit Signals (6CN)

Signal	Number	Function	Signal Level	Related Constants
+15V	1	+15V output	+15V Load current: 10mA or less	C1-26, 10, C1-38 bit 5 C1-11, 12
SS	2	Shield (0V)	_l	
SCOM	3	Analog speed reference input	0 to _}10V (Input impedance: 50kf¶)	
0V	4	Analog speed reference 0V	_l	
DAS	5	Digital/analog speed reference selection	24VDC Current when closed: 5mA	C1-36 bit 7
RDY	6	Operation ready		Selected when C1-37 bit 2=0
EMG2		Emergency stop 2		Selected when C1-37 bit 2=1
EMG	7	Emergency stop		_l
FWD	8	Forward run		_l
REV	9	Reverse run		_l
TLH	10	Torque limit H		Selected when C1-36 bit 2=0 C1-26, C1-38 bit 2
TLL	11	Torque limit L		Selected when C1-36 bit 1, 0=00
INC		Incremental		Selected when C1-36 bit 1, 0=10
SSC	12	Soft start cancel		Selected when C1-36 bit 3=0
SV		Servo mode		Selected when C1-36 bit 3=1
RST	13	Fault reset		_l
CHW	14	Winding selection		_l
PPI	15	P control/PI control selection		Selected when C1-36 bit 4=0
ORT	16	Orientation		Selected when C1-40 bit 3=0 C1-39 bit 0
NCORT		NC orientation		Selected when C1-40 bit 3=1
LGR	17	L gear selection		C1-27, 28, 29
MGR	18	M gear selection		
EXTCOM0	19 to 21	Sequence input signal power supply common		_l
24VCOM	22, 23	Sequence input signal power supply 24V		_l
0VCOM	24, 25	Sequence input signal power supply 0V		_l
FC0	26	Fault code 0	Open-collector output Exclusive-use for 24VDC Load current: 50mA or less	_l
FC1	27	Fault code 1		
FC2	28	Fault code 2		

Table 4.28: Control Circuit Signals (6CN) (Continued)

Signal	Number	Function	Signal Level	Related Constants
FC3	29	Fault code 3		
COM2	30	Fault code signal com- mon		
ZSPD	33	Zero-speed	Open-collector output Exclusive-use for 24VDC Load current: 50mA or less	C1-19
AGR	34	Speed agree		C1-20, C1-38 bit 6
SDET	35	Speed detection		C1-21, C1-40 bit 2
TDET	36	Torque detection		C1-23
TLE	37	Torque limit		
ORG	38	Load origin		
ORE	39	Orientation completion		C2-09, 10 or C3-09, 10
CHWE	40	Winding selection completion		_l
FLTL	41	Fault (Open at fault)		
TALM	46	Minor fault		
COM1	42	Sequence output signal common		_l
FLTNO	43	Fault contact output Closed between 43 and 45 at fault Open between 44 and 45 at fault	Relay contact output Exclusive-use for 24VDC Load current: 1A or less	_l
FLTNC	44			
FLTCOM	45			
SM	47	Speedometer output	0 to +10V Load current: 2mA or less	C1-16, 54
0V	48	0V for speedometer	_l	
LM	50	Load ratio meter output	0 to +10V Load current: 2mA or less	C1-17, 54, 18, C1-40 bit 4 C1-38 bit 1, 0 C1-38 bit 7
0V	49	0V for load ratio meter	_l	

Note: 6CN 5 to 18 sequence input signals can be input with 0V common, +24V common or external common. Wiring differs according to input method.

Table 4.29: Control Circuit Signals (8, 9, 10CN)

Connector	Signal	Number	Function	Signal Level	
8CN (option)	+5V	4, 5, 6	+5V power supply for encoder	+5V Load current: 350mA or less	
	0V	1, 2, 3	Encoder power supply 0V		
	СРА	9	_l	RS-422A specification Line receiver	
	*CPA	11			
	СРВ	12			
	*CPB	13			
	CPC	7			
	*CPC	8			
	SPA	16	Encoder phase A signal input	RS-422A specification Line receiver	
	*SPA	17			
	SPB	18	Encoder phase B signal input		
	*SPB	19			
	SPC	14	Encoder phase C signal input		
	*SPC	15			
	SS	20	Shield (0V)	_l	
9CN (option)	SPAO	4	Encoder phase A signal output	RS-422A specification Line driver	
	*SPAO	5			
	SPBO	6	Encoder phase B signal output		
	*SPBO	7			
	SPCO	2	Encoder phase C signal output		
	*SPCO	3			
	SS	1	Shield (0V)	_l	
10CN	SIG+	13	Magnetic sensor signal +	_l	
(option)	SIG-	14	Magnetic sensor signal -	_l	
	+15V	12	+15V power supply for magnetic sensor	+15V Load current: 100mA or less	
	+12V	10	+12V power supply for magnetic sensor	+12V Load current: 50mA or less	
	0V	3, 5	Magnetic sensor power supply 0V	_l	
	SS	1	Shield (0V)	_l	

Table 4.30: Connectors 51CN, 52CN, and 5CN

Connector	Signal	No. (51CN)	No. (52CN, 5CN)	Function
51CN	0V	1, 2	1, 2	0V
52CN 5CN	BAT-	3	4	_l
SCIN	BAT+	5	6	
	S	4	3	_l
	_ - S	6	5	
	0V	7 to 14	7 to 14	OV
	+24V	15 to 22	15 to 22	_l
	AXRUN	23	24	Inverter (servo) running
	CONRST	24	23	Fault reset
	CONRDY	25	26	Converter ready
	CONFLT	26	25	Converter fault
	ALM_}	29	30	_l
	ALMC	27	28	_l
	ESP0	31	32	_l
	ESP1	28	27	_l
	/EXT2	30	29	
	/EXT1	32	31	_
	+24VIN	34	33	_l

2. Terminal Arrangement of Control Signal Connector

51CN				5CN, 52CN			
34	+24V	33		34		33	+24V
32	/EXT1	31	ESP0	32	ESP0	31	/EXT1
30	/EXT2	29	ALM}	30	ALM}	29	/EXT1
28	ESP1	27	ALMC	28	ALMC	27	ESP1
26	CONFLT	25	CONRDY	26	CONRDY	25	CONFLT
24	CONRST	23	AXRUN	24	AXRUN	23	CONRST
22	+24V	21	+24V	22	+24V	21	+24V
20	+24V	19	+24V	20	+24V	19	+24V
18	+24V	17	+24V	18	+24V	17	+24V
16	+24V	15	+24V	16	+24V	15	+24V
14	OV	13	0V	14	0V	13	0V
12	OV	11	0V	12	0V	11	0V
10	OV	9	0V	10	0V	9	0V
8	OV	7	0V	8	0V	7	0V
6	-S	5	BAT+	6	BAT+	5	-S
4	S	3	BAT-	4	BAT-	3	S
2	0V	1	0V	2	0V	1	0V

1CN				6CN			
36	MNTR2	18	OV	50	LM	25	0VCOM
35	MNTR1	17	SS	49	0V	24	0VCOM
34	VCC	16	*PBO	48	0V	23	24VCOM
33	0VCOM	15	PBO	47	SM	22	24VCOM
32	24VCOM	14	*PAO	46	SM	21	24VCOM0
31	EXTCOM	13	PAO	45	FLTCOM	20	EXTCOM0
30	D12	12	*PCO	44	FLTNC	19	COM
29	D11	11	PCO	43	FLTNO	18	MGR
28	D10	10	BAT+	42	COM1	17	LGR
27	D9	9	BAT-	41	FLTL	16	ORT
26	D8	8	ALMC	40	CHWE	15	PPI
25	D7	7	ALM-	39	ORE	14	CHW
24	D6	6	ALM+	38	ORG	13	RST
23	D5	5	ESP1	37	TLE	12	SSC(SV)
22	D4	4	ESP0	36	TDET	11	TLL(INC)
21	D3	3	/EXT2	35	SDET	10	TLH
20	D2	2	/EXT1	34	AGR	9	REV
19	D1	1	24VIN	33	ZSPD	8	FWD
			-	32	_	7	EMG
		2CN		31	_	6	RDY
20	_	10	+24V	30	COM2	5	DAS
19	*PB	9	THSB	29	FC3	4	0V
18	PB	8	THSA	28	FC2	3	SCOM
17	*PA	7	SS	27	FC1	2	SS
16	PA	6	+5V	26	FC0	1	+15V
15	PC	5	+5V				
14	PC	4	+5V				
13	CA2	3	0V				
12	CA1	2	0V				
11	CC	1	OV				

3CN (Option)

14	_	7	+5V
13	_	6	OP1
12	_	5	0V
11	+5V	4	RX
10	_	3	0V
9	+5V	2	TX
8	OP2	1	0V

Note: A terminal arrangement is seen when the connectors on the PC board are viewed from the engaged part (front of the unit).

8CN (Option)

20	SS	10	_
19	*SPB	9	CPA
18	SPB	8	*CPC
17	*SPA	7	CPC
16	SPA	6	+5V
15	*SPC	5	+5V
14	SPC	4	+5V
13	*CPB	3	0V
12	СРВ	2	0V
11	*CPA	1	0V

9CN (Option)

14	_	7	*SPBO
13	_	6	SPBO
12	_	5	*SPAO
11	_	4	SPAO
10	_	3	*SPCO
9	_	2	SPCO
8	_	1	SS

10CN (Option)

14	SIG-	7	_
13	SIG+	6	_
12	+15V	5	0V
11	_	4	_
10	+12V	3	0V
9	_	2	_
8	_	1	SS

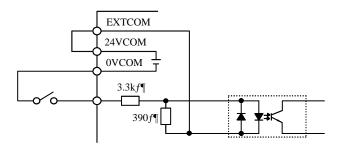
Note: A terminal arrangement is seen when the connectors on the PC board are viewed from the engaged part (front of the unit).

3. Input Method Selection

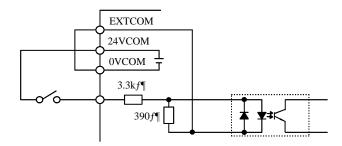
The inverter 1CN 12-bit digital reference and 6CN sequence input signal can be input with 0V common, +24V common, or external common. The wiring differs according to the input method used. For external common, use +24V (20 to 26V) power supply for input signal.

Common connections are possible because the 1CN and 6CN common lines are insulated.

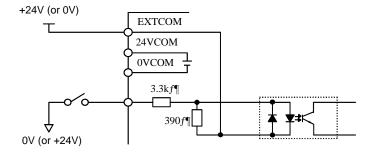
(a) 0V Common



(b) +24V Common



(c) External Common



Signal Name	Pin Number		
Oignai Name	1CN	6CN	
EXTCOM	31	19, 20, 21	
24VCOM	32	22, 23	
0VCOM	33	24, 25	

Figure 4.16: Input Method Selection

4. Precautions on Wiring Power Lines and Control Signal Lines

For proper wiring between devices, pay attention to the following points in the design stage.

• Design the wiring route of the control signal lines (1, 2, 6CN) in such a way that they are separated from the main circuit wiring (R/L1, S/L2, T/L3) or other power lines.

If the power lines are provided with the signal lines (motor encoder signal lines), a malfunction may be caused by the effect of noise generated from the power lines.

• The length of the control signal lines (including the motor encoder signal lines) must be less than 20m.

Excessively long motor encoder signal lines reduce the encoder power supply voltage due to a voltage drop in the signal lines which may cause the inverter to malfunction.

When twisted shielded wires are used for control signal lines, terminate them as shown in the figure below.

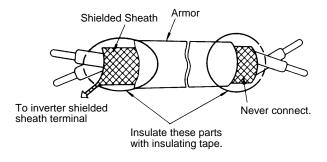


Figure 4.17: Shielded Wire Termination

• Use twisted shielded wires for motor encoder signal lines and connect both ends as shown in the figure below.

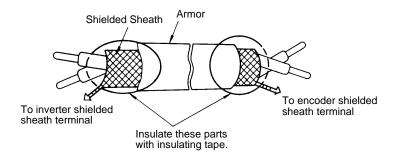


Figure 4.18: Shielded Wire Termination (Shielded at Both Ends)

Wiring Inspection

After completing the installation and wiring, check for the following items. Never use the control circuit buzzer check.

- Wiring is correct
- Wire clippings or screws are not left in the unit
- Screws are securely tightened
- Bare wire in the terminal does not contact other terminals.

4.6 Operation

△ WARNING

- Only turn ON the input power supply after closing the upper and lower covers. Do
 not open the covers while current is flowing. Failure to observe this warning can
 result in an electric shock.
- The **Stop** button can be disabled by a function setting. Therefore, a separate emergency stop switch must be installed. Failure to observe this warning can result in personal injury.

riangle CAUTION

- Never touch the heat sink; the temperature is very high. Failure to observe this caution can result in harmful burns to the body.
- Operation speed can easily be changed from low to high speed. Prior to operation, verify the safe working range of the motor and machine. Failure to observe this caution can result in personal injury.
- Do not check signals during operation. The machine or the unit may be damaged.
- All the inverter parameters have been preset at the factory. Do not change the settings unnecessarily to avoid damaging the machine or the unit.

Test Run

Before turning the power ON, do the following:

- Verify there are no physical obstacles which may prohibit proper operation.
- Notify people in adjacent areas of the test run before starting.

Turn ON the power to the drive system after confirming security around the machines.

To avoid a breakdown in the converter or inverter, turn ON the control power supply before turning ON the main circuit power supply (or turn ON simultaneously). Turn OFF the control power supply after turning OFF the main circuit power supply (or turn OFF simultaneously).

1. Turning ON the Control Power Supply

When the control power supply is turned ON, " $-\mathcal{U}$ " is displayed in the converter 7-segment LED display section and " $-\mathbf{b}$ " is displayed in the inverter 7-segment LED display section. If they do not appear, search for the cause, referring to the list of fault displays.

2. Turning ON the Main Circuit Power Supply

When the main circuit power supply is turned ON, the converter 7-segment LED display is changed to " - b." At the same time, the inverter and the converter CHARGE LEDs are lit in red. If any fault is displayed, search for the cause, referring to the list of fault displays.

When "-U" is displayed continuously on the 7-segment LED of the converter, the main circuit input voltage may be low or an open-phase may be occurring. Check the input supply voltage.

3. Checking the Motor Cooling Fan

When the main circuit power supply is turned ON, the motor cooling fan begins to rotate. Verify that the cooling air for the motor flows in the correct direction. According to the standard specifications, the cooling air enters from the drive end and leaves from opposite the drive end.

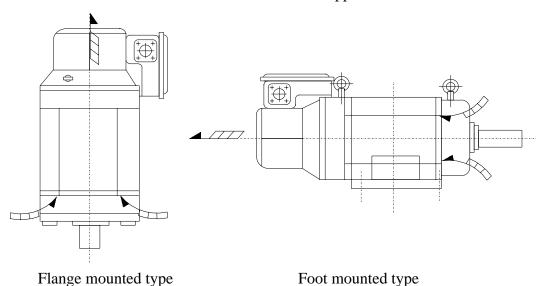


Figure 4.19: Motor Cooling Air Passage

4. Operation

Input a run signal to start the drive unit operation. By inputting a run signal, the converter and inverter 7-segment LED displays are changed to " – Γ ." Gradually increase the speed reference from 0%. The motor begins to rotate.

Verify that the motor is turning in the proper direction. When forward run is commanded (by FWD) and speed reference is positive, the motor shaft turns counterclockwise (CCW) when viewed from the load machine. If the rotation direction is reversed, or if the motor does not turn but only buzzes or vibrates after the run signal is input, phases of the power cable or encoder signal wire may be connected incorrectly. Turn OFF the power, and ensure that the CHARGE LED and 7-segment LEDs are OFF. Then, check the wiring.

When the motor turns in the proper direction, switch forward and reverse run and verify that acceleration and deceleration are smooth in both forward and reverse directions.

At the same time, check for excessive motor vibration or noise. Stationary sounds at several kHz are due to the control method and do not indicate any abnormality.

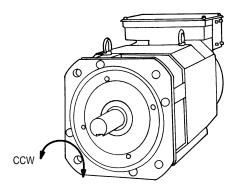


Figure 4.20: Motor Rotation Direction

Run Command			
Run Signal FWD		CCW	CW
REV		CW	CCW

Contents Of 7-segment LED Display

The following describes the contents of the 7-segment LED display of the converter and the inverter.

Display	Description
- 11	Indicates the status at which either the main circuit power supply is not turned ON or the input voltage is lower than the specified value (undervoltage) even if the power supply is ON.
- Ь	Indicates the status at which the inverter is not running.
	Indicates the converter is running.
(Fault occurrence No.)	Fault display. Alternately displays the fault occurrence number and fault contents. (The example indicates the second occurrence fault is overcurrent. When only one fault occurrence is present, the display contains the fault content only.

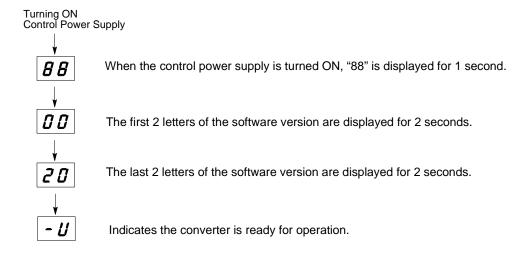
Inverter

Display	Description		
- Ь	Indicates the status at which the run command is not input (base blocked).		
	Indicates the converter is running.		
(Fault occurrence No.)	Fault display. Alternately displays the fault occurrence number and fault contents. (The example indicates the second occurrence fault is a motor thermistor disconnection. When only one fault occurrence is present, the display contains the fault content only.		

(1) Display when Turning ON Converter Control Power Supply

When the control power supply is turned ON, the converter control PC board software version number is displayed on the 2-digit 7-segment LED. (The software version number is displayed from 0 - 20.)

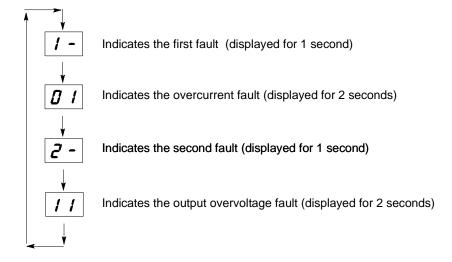
Example: Software version number 0020



(2) Fault Display

When more than two faults are detected by the converter, up to four fault contents are recorded. When more than two faults are detected by the inverter, up to six fault contents are recorded. (The display automatically changes.)

Example: When overcurrent (fault number 01) and output overvoltage (fault number 11) occur, the following is displayed.



4.7 Digital Operator

⚠ WARNING

Disconnect all power before removing the digital operator (JVOP-132). After the
main circuit power supply and the control power supply are disconnected, and all
LEDs of the inverter and the converter are extinguished, wait for the time specified
on the warning labels. Failure to observe this warning can result in an electric
shock.

This section explains the functions, operation method, and control constants of the digital operator (JVOP-132). Be thoroughly familiar with the procedures before turning the power ON.

Mounting Digital Operator

The VS-626M5 can support the optional, multi-functional display digital operator (JVOP-132). The exclusive-use extension cable (72616-W5301 or 72616-W5303) is required to connect the digital operator to the inverter. Use 3CN to mount the digital operator firmly as follows.

- 1 Turn OFF the inverter power supply.
- 2 Connect the extension cable to both the inverter and digital operator sides. (See the figure below.)
- After inserting the connector into the inverter, tighten the two connector screws to prevent the connector from being removed.
- 4 Install the cable holder on the digital operator side with the provided tapping screws to prevent the cable from dropping.

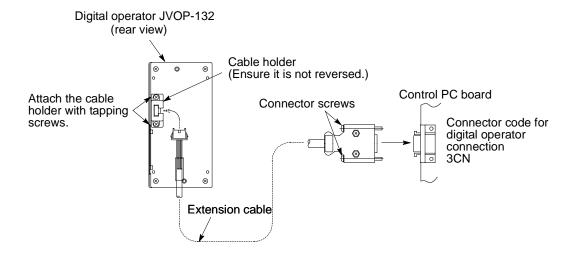


Figure 4.21: Extension Cable Installation

Digital Operator Functions

The digital operator enables the following:

(1) Control Signal Status Display

The status of the control signals for each unit is displayed by monitoring the operation status. For the display items, see APPENDIX 5.

(2) Control Constants Display and Setup

Control constants must be set up for normal operation in compliance with the specifications. APPENDIX 6 lists the control constants.

(3) Protective Functions Display

If an error occurs during operation, protective functions are displayed. (Refer to Tables 18 to 20.) These are not displayed when operation is normal.

(4) Digital Operator Function

Stand-alone operation without sequence input signals or speed reference is possible. This function is effective for the test run of the inverter/converter connected only to a motor.

The figures below show the display section and operation keys of the digital operator, and the LED display status of the RUN and STOP keys. Table 4.31 shows the displayed characters and the corresponding alphabets and numbers, and Figure 4.24 shows the display of bit selection signal.

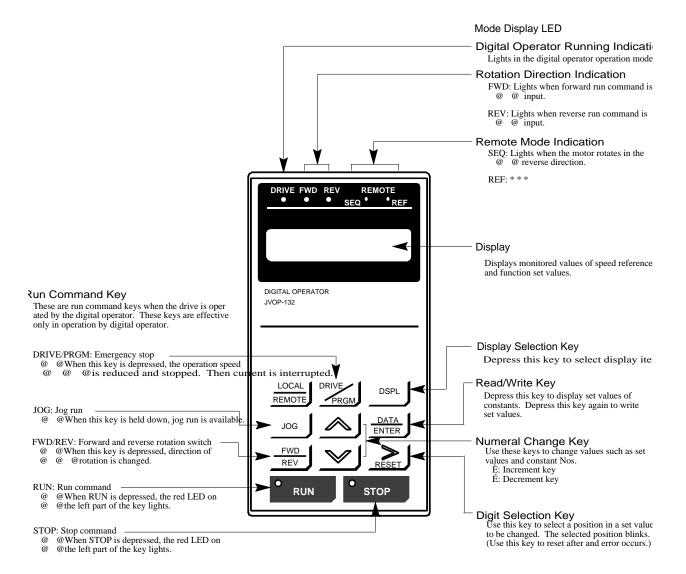


Figure 4.22: Display Unit and Operation Keys of the Digital Operator

RUN and STOP LEDs light, blink, and go OFF depending on the status of operation.

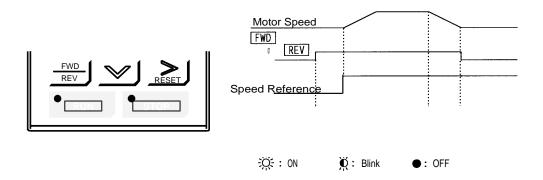


Figure 4.23: LED Display of RUN and STOP Keys

Table 4.31: Indication of Numbers and Letters by 7-segment LED

N	Numbers Letters				
0	Ø	A	R	N	_
1	1	В	Ь	0	_
2	2	С	Ĺ	Р	P
3	3	D	d	Q	_
4	4	E	E	R	
5	5	F	F	S	_
6	Б	G	_	Т	_
7	7	Н	_	U	
8	B	I	_	V	_
9	9	J	_	W	_
		К	_	X	_
		L		Y	_
		М	_	Z	_

Note: "—" is not displayed.

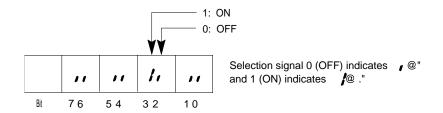


Figure 4.24: Display of Bit Selection Signal

Key Operations And Display

The information below describes how to operate the digital operator keys and display.

(1) Indication at Power-ON

Digital operator display at control power supply ON is shown below.

Description	Digital Operator Display	Remarks
Turn ON control power supply.	_	_
All LEDs light.	88888	Displayed for 1.5 seconds
PROM version number is displayed.	00040	Displayed for 0.5 seconds The lower 5 digits of PROM number are displayed. The example uses PROM number "VSM200040."
U1-01 (motor speed) data is displayed.		Because the motor does not rotate when power supply is turned ON, "0" is displayed.
The fault number. is displayed (when a protective function is activated).	(AL - 42)	AL-42 indicates motor thermistor is disconnected when motor encoder signal 2CN is disconnected.

(2) Switching Display Functions

Depress the **DSPL** key on the digital operator to change the mode of display.

Description	Key Sequence	Digital Operator Display	Remarks
Motor speed (U1-01) data is displayed.	_	<i>D</i>	
Motor speed data number is displayed. (Operation status display has been selected.)	DSPL	<i>U j - D 1</i>	Control signal status of each unit can be monitored.
Control constants display is selected.	DSPL	[[] - [] /	Control constants are displayed/ set.
Digital operator run command display is selected. (Displayed when bits 0 and 1 of control constant C1-37 are set ON.)	DSPL	(d j- 0 1)	Use when operating by digital operator.
The fault number display is selected. (It is displayed when a protective function is activated.)	DSPL	(AL - 42)	Contents of currently occurring fault are displayed. AL-42 indicates motor thermistor disconnection is detected.
Fault record display is selected.	DSPL	IRL 30	Contents of past faults are displayed. 1AL30 indicates the last fault is encoder signal disconnection.
Returns to operation status display.	DSPL	<i>U j - D 1</i>	

(3) Operation Status Display Mode

To check data in operation status display mode, do as follows. The following shows the example where U1-09 (sequence input signal status) is to be changed.

Description	Key Sequence	Digital Operator Display	Remarks
U1-01 is displayed.	_	<i>U j - D 1</i>	_
Move blinking cursor to the data number.	RESET	<i>U 1 - D 1</i>	Depress the [>] key once more to return the blinking cursor.
Select U1-09.	<u> </u>	<i>U 1 - D S</i>	_
Display U1-09 data contents.	DATA ENTER		The display example is the status when [RDY] and [EMG] signals are closed.
Return to operation status number display	DSPL	<i>U 1 - 0 9</i>	_

Note: For explanations of operation status display, refer to APPENDIX 5.

(4) Control Constant Display Mode

To check data or set/change a constant in the control constant display mode, follow the example below, in which C1-10 (soft-start time) is to be changed.

Description	Key Sequence	Digital Operator Display	Remarks
C1-01 is displayed.	_	[[] - []	_
Move blinking cursor to the data number.	RESET	[Depress the [>] key once more to return the blinking cursor.
Select C1-10.	<u> </u>		
Display C1-10 data contents.	DATA_ ENTER	D D D B	_
Select data line to be changed.	RESET	000 6	_
Change set value. (1_"5)	<u> </u>	0005	_
Write-in set value.	_DATA ENTER	End	Displayed for 0.5 seconds *
_	_	0005	Returns to previous display before write-in.
Return to control constant number display.	DSPL		_

* When data outside the input range are set, "End" does not appear on the display and all data lines continue blinking even when the [DATA/ENTER] is held down. To correct this condition, depress the **DSPL** key to return to the data number display and correct the settings. Refer to APPENDIX 6 for contents of control constants.

The following constants cannot be changed during operation: C1-25 _` 59, C2-09 _` 27, C3-09 _` 25. They must be changed when stopped.

The following constants can be changed during operation or when stopped: $C1-01 \ge 24$, $C2-01 \ge 08$, $C3-01 \ge 08$.

(5) Digital Operator Operation Mode

In digital operator operation mode, operation is enabled by commands from the digital operator. The following table shows the operations. Change the lower 2 bits of C1-37 from "•" to "**I" to turn ON the operation mode.

Description	Key Sequence	Digital Operator Display	Remarks
C1-37 is selected.		[[]	_
Display C1-37 data contents.	<u>DATA</u> ENTER	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	_
Select the digit of bit 1 (second place from the right).	RESET	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	_
Change set value. (Turn ON lower two bits.)	<u> </u>		_
Write-in set value.	DATA ENTER	End	Displayed for 0.5 seconds
_	_		Returns to previous display before write-in.
Return to control constants display.	DSPL	[[] -] 7 7 T	Effective for digital operator operation mode.

The table below shows the reference list in digital operator operation. Operation control signals (sequence input) and speed references displayed are handled similarly to constant setup.

Table 4.32: Parameters for Digital Operator Operations

Constant Number	Name	Unit	Contents
d 1-01	Operation signal (Sequence input)	Binary	Bit 9 8 7 6 5 4 3 2 1 0 ,s,k,g ,s,k,k ,r,r,b
d 1-02	Speed reference		Displayed in % for rated speed setting (C1-26)

Set the speed reference in digital operator operation to d1-02.

Description	Key Sequence	Digital Operator Display	Remarks
Select d1-01.	DSPL	d ! - D !	_
Select d1-02.		d 1-022	_
Display d1-02 data contents.	DATA ENTER	D D D B D	_
Set speed reference (25%).	RESET	0 2 <u>\$</u> & 0	The speed reference is displayed as a percentage of rated speed settings (C1°26). For a rated speed of 6000rpm, 25% reference becomes 1500rpm reference.
_		I	_
Write-in set value.	DATA ENTER	End	Displayed for 0.5 seconds
_	_	02500	Returns to previous display before write-in.

The following table shows the keys used in the digital operator operation mode. Rotating direction is selected with the **FWD/REV** key and run/stop by the **RUN** or **STOP** key.

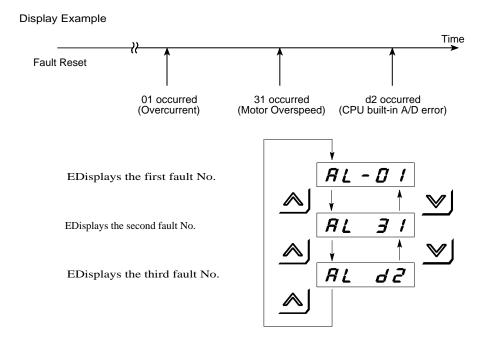
Table 4.33: Key Operations in Digital Operator Operation Mode

Key	Name	Function
DRIVE	Emergency stop key	When the key is depressed, the current is shut off after decelerating to a stop.
JOG	Jog run key	Jog run can be performed when the key is held down. [Runs at 5% reference of rated speed setting (C1-26).]
FWD REV	FWD/REV run key	FWD/REV run is switched when the key is depressed. (FWD/REV LED lights alternately.)
RUN	Run command key	Depress the key to start operation. (Red LED on the left lights during run.)
• STOP	Stop command key	Depress the key to stop operation. (Red LED on the left lights during stop.)

To return to operation mode using a regular external run command, change the lower 2 bits of C1-37 from "*/" to "**."

(6) Fault Display Mode

If a protective function is activated because of a fault, the fault code is displayed. Up to six faults are recorded, and may be viewed to determine the order of a series of faults.



Notes on resetting faults

- To reset a fault by the digital operator after removing the cause, depress the RESET key in the fault display mode. In other modes, the RESET key cannot reset the fault.
- Before resetting, turn OFF the run command signals (FWD, REV, ORT) that are input externally.

(7) Fault Record Display Mode

Up to six faults can be displayed in order, from the most recent to the oldest.

Displays the last fault number

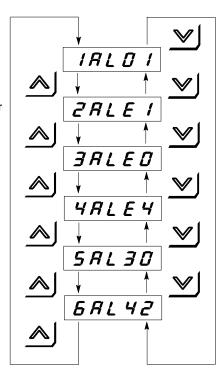
Displays the second most recent fault number

Displays the third most recent fault number

Displays the fourth most recent fault number

Displays the fifth most recent fault number

Displays the sixth most recent fault number



- Fault record data are not erased by fault reset or turning OFF power supply. (The data does not affect operation.)
- To erase fault record data, turn ON bit 0 of C1-57 (right end) and turn OFF control power supply. When power is turned ON again, data is erased and bit 0 of C1-57 is automatically turned OFF.

4.8 Maintenance And Inspection

⚠ WARNING

- Never touch high-voltage terminals in the inverter and the converter. Failure to observe this warning can result in an electric shock.
- Close the upper and lower covers before powering up the inverter or the converter.
 Shut OFF the molded-case circuit breaker prior to opening the covers. Failure to observe this warning can result in an electric shock.
- Perform maintenance or inspection only after verifying that the CHARGE LED and 7segment LED go OFF, after the main circuit power supply and control power supply are turned OFF. The capacitors are still charged and can be dangerous.
- Only authorized personnel are permitted to perform maintenance, inspections or parts replacement.
- Remove all metal objects (watches, bracelets, etc.) before operation. Use tools
 which are insulated against electric shock. Failure to observe this warning can result
 in an electric shock.

- The control PC board employs CMOS ICs. Do not touch the CMOS elements. They are easily damaged by static electricity.
- Do not connect or disconnect wires or connectors while power is applied to the circuit. Failure to observe this caution can result in personal injury.

This chapter describes basic maintenance and inspection procedures for the VS-626M5 and the VS-656MR5.

Periodic Inspection

The VS-626M5 and the VS-656MR5 function longer if they are kept clean, cool and dry, while observing the precautions listed in Par. 2.1. Check for tightness of electrical connections, discoloration, or other signs of overheating or aging. Use the table below as your inspection guide. Before servicing, turn OFF the AC main circuit power and ensure that the CHARGE LED and 7-segment LED are OFF.

Table 4.34: Periodic Inspection

	Component	Check	Corrective Action
Inverter/	External Terminals,	Loose screws	Tighten.
Converter	Unit Mounting Bolts, Connectors, etc.	Loose connectors	Tighten.
	Heat Sink	Build-up of dust and dirt	Blow with dry compressed air of 39.2_10 ⁴ to 58.8_10 ⁴ Pa (4 to 6kg_cm ²) pressure.
	Printed Circuit Board	Accumulation of conductive dust or oil	Blow with dry compressed air of 39.2_10 ⁴ to 58.8_10 ⁴ Pa (4 to 6kg_cm ²) pressure. If dust and oil cannot be removed, replace the board.
	Cooling Fan	For abnormal noise and vibration Whether the cumulative operation time exceeds 20,000 hours or not.	Replace the cooling fan.
	Power Elements	Accumulation of dust and dirt	Blow with dry compressed air of 39.2_10 ⁴ to 58.8_10 ⁴ Pa (4 to 6kg_cm ²) pressure.
	Smoothing Capacitor	Discoloration or odor	Replace the capacitor or converter unit.
Related to Bearing	Bearing Noise	Abnormal noise or increase of noise level	Replace the bearing.
	Vibration	Abnormal vibration	
	Bearing Temperature	Abnormal temperature rise	
	Grease	No leakage	Remove the cause to recover.
Motor Cooling Fan	Operation Status	Normal operation	Remove the cause of fan halt or replace the fan if a fault is found.

Parts Replacement Schedule (Guidelines)

Replace the following parts periodically, for a long, safe, trouble-free working life of the VS-626M5 and VS-656MR5.

Table 4.35: Parts Replacement Schedule

	Parts	Interval (Approx.)	Remarks
Inverter/	Cooling Fan	2 to 3 years	Replace.
Converter	Smoothing Capacitor	5 years	Inspect to determine whether replacement is required.
	Breakers or Relays	æ	Inspect to determine whether replacement is required.
	Fuse	10 years	Replace.
	Aluminum Electrolytic Capacitor on PC Board	5 years	Inspect to determine whether replacement is required.
Motor	Bearing	12,000 hours or 2 years	Disassemble and replace worn items or provide necessary maintenance.
•	Cooling Fan	15,000 hours or 2 years	Replace the fan.
	Overhaul	20,000 hours or 5 years	Contact your Yaskawa customer service representative.

Note: Operating conditions are as follows:

Ambient temperature: 30°C (86°F) yearly average

Load factor: 80% or below

Operation rate: 20 hours or below /day

4.9 Troubleshooting

This chapter describes the inverter and converter fault display, the fault contents caused by motor malfunctions, and the corrective actions to be taken.

When the VS-626M5 or the VS-656MR5 detects a fault, the fault number is displayed on the 7-segment LED, the fault contact output is activated, and the motor coasts to a stop. Check the cause and take corrective actions.

If the inspections or corrective actions described cannot solve the problem, contact your Yaskawa customer service representative immediately.

To restart, turn ON the reset input signal, depress the **RESET** key, or shut OFF the main circuit power supply once to reset the stop status.

Notes on resetting faults

- To reset a fault by the digital operator after removing the cause, depress the RESET key in fault display mode. In other modes, the RESET key cannot reset the fault.
- Before resetting, turn OFF run command signals (FWD, REV, ORT) that are input externally.

List Of Converter Faults

If a fault occurs during operation, protective functions are activated (depending on the fault) and operation is stopped. The contents of the faults are displayed on the 7-segment LED in numbers.

Table 4.36: Fault Diagnosis and Corrective Actions of Converter

Fault No. 22	Name	Contents	Corrective Actions
<i>B</i> /	Overcurrent	Output current exceeded over- current detection level.	Check the wiring. Check the input supply voltage. Check the AC reactor. Check the load shaft (inverter, servo) capacity.
<i>0</i> 4	Main circuit fuse blown	Main circuit fuse was blown.	Check for damaged transistor, load side short circuit, grounding, etc.
<i>0</i> 5	Overload	Output current exceeded overload level.	Reduce the load. Check the load shaft (inverter, servo) capacity.
1 1	Output overvoltage	Output voltage exceeded overvoltage level. Detection level: 200V class: Approx. 400V 400V class: Approx. 800V	Check the input supply voltage. Check the load shaft (inverter, servo) capacity.
12	Main circuit under- voltage	Main circuit input voltage became lower than undervoltage detection level.	Check the input supply voltage.
13	Control circuit under- voltage	Control circuit power supply became lower than undervoltage detection level.	Check the control supply voltage.
14	Servo unit power supply fault	Control supply voltage supplied to servo unit was not normal.	_
15	Power supply frequency fault	Excessive power supply frequency deviation (50Hz or 60Hz ±5%)	Check the input power waveform.
16	Initial charging fault	Charging of main circuit capacitor was not completed within set time.	Replace the unit.

Table 4.36: Fault Diagnosis and Corrective Actions of Converter (Continued)

Fault No. 22	Name	Contents	Corrective Actions
23	Built-in MC operation fault	Magnetic contactor did not function.	_
43	Heat sink overheat 1	Heat sink temperature exceeded upper limit (minor fault).	Check the ambient temperature for effective cooling.
44	Heat sink overheat 2	Heat sink temperature over upper limit continued for one minute or longer.	_
45	Heat sink thermistor disconnection	Thermistor for heat sink temperature detection was disconnected.	Replace the unit.
		The ambient temperature is low [-20°C (-4°F) or below].	Raise the ambient temperature to above -20°C (-4°F).
46	Control PC board temperature fault 1	Control PC board temperature exceeded +80°C (176°F) (minor fault).	Check the ambient temperature for effective cooling.
47	Control PC board temperature fault 2	Control PC board temperature exceeded +85°C (185°F).	_
d 2	CPU built-in A/D error	Built-in A/D converter error	Replace the control PC board.
F 🛭	ROM error	Memory (PROM) error	_
F 1	EEPROM error	Memory (EEPROM) error	_
F 5	CPU error	CPU error	_
	Control PC board fault	WDT time exceeded.	_

List Of Inverter Faults

If a fault occurs during operation, protective functions are activated (depending on the fault) and operation is stopped. The contents of the faults are displayed on the digital operator (option) in AL codes and on the 7-segment LEDs in numbers.

Fault codes are output as signals to pins $26 \sim 29$ of 6CN as shown in the figure below .



Figure 4.25: Fault Code Output

Table 4.37: Fault Diagnosis and Inverter Corrective Actions

Fault Number	Name	Contents	Corrective Action	Fault Code
AL -0 1	Overcurrent	Output current exceeded overcurrent detection value, or inverter output (load) was short-circuited.	Check for loose wires.	_œ_œ_œ_œ
AL -02	Ground fault	Inverter output side ground current exceeded grounding detection level.	Check the motor for deterioration of insulation. Check the wiring between inverter and motor.	_œ_œ_œ_œ
AL -04	Main circuit fuse blown	DC circuit fuse was blown.	Check for damage to transistor, short-circuits on load side, ground fault, etc. Check the inverter output wiring.	_œ_œ_œ_œ
AL -05	Inverter output overload	Output current of 120% of 30- minute rating runs for over one minute.	Reduce the load. Check the load shaft (inverter, servo) capacity.	_œ_œ_œ_œ
AL -06	Motor overload	Motor overload capacity exceeded.	Reduce the load.	_œ_œ_œ_œ
AL - 10	Converter fault	A fault occurred in the converter unit.	Check fault contents by using converter LED.	_œ_œ_œ_›
AL - 11	Main circuit over- voltage	Main circuit DC bus voltage exceeded the overvoltage set value.	Check the input supply voltage. Check the load shaft (inverter, servo) capacity. Check the control constants.	_ce_ce_ce_>
AL - 12	Main circuit under- voltage	Main circuit DC bus voltage became lower than undervoltage detection level during run.	Check the input supply voltage.	_œ_œ_œ_›
AL - 13	Control circuit und- ervoltage	Control circuit power supply became lower than undervoltage detection level.	Check the control supply voltage.	_œ_œ_œ_›
AL -20	Winding selection fault	Winding selection was not completed within set time.	Check the control constant C1- 25. Check magnetic contactor wir- ing for winding selection.	_œ_œ_›_œ
AL -2 1	Emergency stop fault	Inverter did not stop within 10 seconds after emergency stop command.	Check control constant C1-25. Check the setting of control constant C1-24 and whether external torque limit signals TLL and TLH are input.	_œ_œ_›_œ
AL - 30	Encoder signal cable disconnection	Motor encoder signal was disconnected or connected improperly.	Check the wiring of encoder signal lines.	_œ_œ_›_›
AL - 3 /	Motor overspeed	Motor speed exceeded 120% of set rated speed.	Check that encoder signal lines are separated from main circuit or other power lines. Check the control constants.	_œ_œ_›_›

Table 4.37: Fault Diagnosis and Inverter Corrective Actions (Continued)

Fault Number	Name	Contents	Corrective Action	Fault Code
AL - 32	Excessive speed deviation	Speed falls to less than 50% of reference value.	Check that the load is heavy or a tool is jammed. Check whether external torque limit signals TLL and TLH are input. Check the control constants. Check the wiring of encoder signal lines.	_œ_œ_>_>
AL - 33	Load fault	Inverter output (U/T1, V/T2, W/T3) was disconnected.	Check inverter output wiring.	_œ_œ_›_›
AL -40	Motor overheat 1	Motor temperature exceeded upper limit (minor fault).	Check the wiring. Check that motor cooling air is normal with power ON. Check that the fan is not clogged with dust or oil. Check the wiring of motor thermistor signal lines.	_œ_>_œ_œ
AL -4 /	Motor overheat 2	Motor temperature over upper limit continued for over one minute.		_œ_›_œ_œ
AL -42	Motor thermistor disconnection	Motor temperature detection thermistor was disconnected.	Check the motor thermistor signal wiring. Check the motor ambient temperature. [Raise the temperature to above -10°C (14°F) or more.]	_œ_>_œ_œ
AL - 43	Heat sink overheat 1	Heat sink temperature exceeded upper limit (minor fault).	Check the ambient temperature for effective cooling.	_œ_>_œ_œ
AL -44	Heat sink overheat 2	Heat sink temperature over upper limit continued for one minute or longer.		_œ_>_œ_œ
AL -45	Heat sink ther- mistor disconnec- tion	Thermistor for heat sink temperature detection was disconnected. The ambient temperature is low [-20°C (-4°F) or below].	Replace the unit. Raise the ambient temperature to above -20°C (-4°F).	_œ_>_œ_œ
AL -46	Control PC board temperature fault 1	Control PC board temperature exceeded +80°C (176°F) (minor fault).	Check the ambient temperature for effective cooling.	_œ_>_œ_œ
AL -47	Control PC board temperature fault 2	Control PC board temperature exceeded +85°C (185°F).		_œ_>_œ_œ
AL - 48	Internal cooling fan fault	Inverter internal cooling fan is stopped.	Replace the internal cooling fan.	_œ_>_œ_œ
AL -60	Tune-up incomplete (Encoder method orientation)	Orientation command was input before tuning up (minor fault).	Perform orientation tune-up.	_œ_>_>_œ

Table 4.37: Fault Diagnosis and Inverter Corrective Actions (Continued)

Fault Number	Name	Contents	Corrective Action	Fault Code
AL -6 /	Phase C signal detection error	Phase C signal could not be detected during tuning up.	Check the wiring of encoder signal lines.	_œ_>_>_œ
AL -62	Phase C signal width error	Phase C signal width exceeded 100 pulses.	Check that encoder signal lines are separated from main circuit or other power lines.	_œ_>_>_œ
AL-63	Fault of number of pulses per rotation (Encoder method orientation)	Number of pulses per rotation exceeded 4096 _} 1 during tuning up.	Verify that motor and inverter are grounded. Replace the orientation card. Replace the encoder.	_œ_>_>œ
AL -64	Position detection signal cable disconnection	Position detection encoder signal cable was disconnected or connected improperly.	Check the wiring of load shaft encoder signal lines. Replace the load shaft encoder. Replace the orientation card.	_œ_>_>_œ
AL -65	INC signal error (Encoder method orientation)	INC signal input timing error (minor fault)	After carrying out absolute positioning, change circuit to command INC signal.	_ce_>_>_ce
AL - 70	Tune-up incomplete (magnetic sensor method orientation)	Orientation command was input before tuning up (minor fault).	Perform orientation tune-up.	_œ_>_>
AL -7 /	Magnetic sensor signal detection error	Incorrect magnetic sensor signal voltage level during tuning up.	Check the wiring of magnetic sensor signal lines. Replace the magnetic sensor or magnetizer.	_œ_>_>
AL -73	Fault of number of pulses per rotation (magnetic sensor method orienta- tion)	Number of motor pulses per spindle rotation (4096 speed gear ratio) exceeded}6% during tuning up.	Check control constants C1-27, 28, 29. Check the wiring of motor encoder signal lines.	_œ_›_›
FL - 74	Magnetic sensor signal disconnection	Magnetic sensor signal cable was disconnected or connected improperly.	Check the wiring of magnetic sensor signal lines. Replace the magnetic sensor or magnetizer. Perform tune-up again.	_œ_>_>
AL -75	INC signal error (Magnetic sensor method orienta- tion)	INC signal input timing error (minor fault)	After carrying out absolute positioning, change circuit to command INC signal.	_0e_>_>
AL-d1	Speed reference A/D converter error	I/O card speed reference A/D converter error	Replace the I/O card.	_>_>_œ_>
AL -d2	CPU built-in A/D converter error	CPU built-in A/D converter error	Replace the control PC board.	_>_>_œ_>
AL -d3	Phase U A/D converter error	Phase U current detection A/D converter error		_>_>_œ_>
AL - 44	Phase W A/D converter error	Phase W current detection A/D converter error	Replace the control PC board.	_>_>_œ_>

Table 4.37: Fault Diagnosis and Inverter Corrective Actions (Continued)

Fault Number	Name	Contents	Corrective Action	Fault Code
AL-d5	Control circuit I/O fault 1	Data transmission error between CPUs.	Replace the control PC board.	_>_>_œ_>
AL -d6	Control circuit I/O fault 2			_>_>_œ_>
AL-d7	Control circuit I/O fault 3			_>_>_œ_>
AL -EO	Motor code selection error	Selected motor code (C1-25) does not match inverter capacity (C1-56).	Check motor model, motor code (C1-25), inverter model and inverter capacity selection (C1-56).	_>_>_œ
FL-E1	Motor code unrecorded	Motor code set in C1-25 is not recorded.	Check motor model and motor code (C1-25). Check setting list for correct PROM version of motor code (C1-25).	_>_>_œ
AL-EZ	Constant setting range error	Memory (EEPROM) data exceeded upper/lower limit.	Check that rated speed (C1-26) is within setting range. Check control constants. Replace the control PC board.	_>_>_oe
AL-E3	Orientation card mismatch	Selected orientation bit does not match orientation card.	Check orientation card model and orientation selection signal (bit 0 of C1-39). Replace the orientation card.	_>_>_oe
AL -E4	Inverter capacity selection error	Selected inverter capacity (C1-56) does not match the unit.	Check inverter model and inverter capacity selection (C1-56).	_>_>_oe
FL-FD	ROM error	Memory (PROM) error	Replace the control PC board.	_>_>_>
AL -F 1	EEPROM error 1	Memory (EEPROM) error		_>_>_>
AL -FZ	EEPROM error 2			_>_>_>
AL-F3	EEPROM error 3			_>_>_>
AL-F4	EEPROM error 4			_>_>_>
CPF00	Control circuit fault 1 (operator trans- mission error)	Transmission between the inverter and the digital operator cannot be established until 5 seconds after supplying power. Built-in memory fault, WDT activated.	Insert the digital operator connector again. Check the wiring of power supply signal line of 1CN. Replace the control PC board.	_\
CPFO I	Control circuit fault 2 (operator trans- mission error)	Transmission between the inverter and the digital operator is established once after supplying power, but later transmission fault continues for more than 2 seconds. WDT time exceeded.		_\

Motor Faults And Corrective Actions

If any of the following faults occurs in the motor, check the cause and provide the relevant corrective actions.

Table 4.38: Motor Faults and Corrective Actions

Fault	Cause	Corrective Action
Motor does not rotate.	Protective function has been activated.	Check fault number. and carry out appropriate steps.
	Converter main circuit power is not turn ON.	Turn ON power supply. Check supply voltage.
	Inverter output disconnection, improper connection	Check the wiring between inverter and motor.
	Control signal does not function.	Check sequence input signal on operation status display (U1-09) (RDY, EMG, FWD and REV). Check if speed reference is input or not on operation status display (U1-02).
	Torque limiting	Check whether external torque limit signals TLL or TLH is input on operation status display (U1-09).
	Motor winding wire disconnection	Check resistance between motor terminals (a circuit tester necessary). Replace the motor.
	Motor fault (rotor and stator rub together, broken bearing)	Check motor shaft rotation manually. Replace the motor.
	Control PC board fault	Replace the control PC board.
Motor rotates slowly or vibrates with no rotation.	Inverter output disconnection, improper connection	Check the wiring between inverter and motor.
	Encoder signal line disconnection, improper connection, loose connector	Check the wiring of encoder signal line.
	Motor encoder fault	Check for abnormal changes in motor speed on speedometer or operation status display (U1-01). Replace the encoder or the motor.
	Speed reference signal disconnection, improper connection	Check the wiring of speed reference signal.
	Torque limiting	Check whether external torque limit signals TLL or TLH is input on operation status display (U1-09).
	Control PC board fault	Replace the control PC board.
Motor rotates in reverse direction.	Improper connection of inverter output or motor encoder signal line	Check the wiring according to the connection diagram.

Table 4.38: Motor Faults and Corrective Actions (Continued)

Fault	Cause	Corrective Action
Motor does not rotate at commanded speed.	Speed reference signal error	Check speed reference on operation status display (U1-02). Readjust master speed reference function.
	Motor speed adjustment error	Check motor speed on operation status display (U1-01) and adjust the speed using control constant C1-12.
	Speed is controlled by P control.	Check if PPI signal is input or not on operation status display (U1-09).
	Torque limiting	Check whether external torque limit signals TLL or TLH is input on operation status display (U1-09).
	Control PC board fault	Replace the control PC board.
Extended accel/decel time	Soft starter time setting error (Set time is too long.)	Check the setting of control constant C1-10.
	Motor code selection error	Check the setting of control constant C1-25 on the setting list.
	Torque limiting	Check whether external torque limit signals TLL or TLH is input on operation status display (U1-09).
	Excess load on load machine	Check load status on the load factor meter for loss and inertia moment of the load machine. Increase the capacity of inverter and motor.
	Control PC board fault	Replace the control PC board.
Heavy motor noise,	Inverter output disconnection	Check wiring between inverter and motor.
vibration	Grounding error of motor or inverter	Check continuity of motor and inverter to see if they are securely grounded.
	Malfunction due to noise (Poor encoder characteristics)	Check that encoder signal lines are separated from inverter output wiring or other power lines. Check encoder cable specifications (whether the cable is a twisted pair shielded wire).
	Control constant setting error (especially speed control proportional gain)	Check control constants on the setting list.
	Motor installation error	Check for loose mounting bolts.
	Unbalanced motor	Check if rotor is balanced. Replace the motor.
	Motor fault	Run a motor alone to check if noise and vibration are
	(Motor bearing fault, rotor fault)	within specifications. Replace the motor.
	Defective load machine coupling or centering	Confirm that coupling and centering are appropriate according to the connection with load machine.
	Insufficient strength of load machine	Check the load machine for deformations or resonance.
	Loose foundation bolts	Check for loose foundation bolts on load machine.
	Control PC board fault	Replace the control PC board.
Motor does not stop.	Control signal does not operate.	Check that operation signal (FWD or REV) is open on operation status display (U1-09).
	Control PC board fault	Replace the control PC board.

Table 4.38: Motor Faults and Corrective Actions (Continued)

Fault	Cause	Corrective Action
Motor does not stop at orientation. (encoder method orientation)	Orientation signal ORT is not input.	Check that orientation signal ORT is closed on operation status display (U1-09).
	Encoder signal line disconnection, improper connection, loose connector	Check the wiring of encoder signal lines.
	Encoder fault	Check for abnormal changes in motor speed on the speedometer or operation status display (U1-01). Replace the encoder or the motor.
	Fault of orientation card or control PC board	Replace the orientation card or the control PC board.
Motor does not stop at orientation. (magnetic sensor method orientation)	Orientation signal ORT is not input.	Check that orientation signal ORT is closed on operation status display (U1-09).
	Incorrect transmission ratio setting	Verify the machine data for transmission ratio values (C1-27 to 29).
	Magnetic sensor signal line disconnection, improper connection, loose connector	Check the wiring of magnetic sensor signal lines.
	Fault of magnetic sensor or magnetizer	Rotate the load shaft and verify that ORG signal lights once per rotation on operation status display (U1-10).
	Fault of orientation card or control PC board	Replace the orientation card or the control PC board.
Stop position differs from commanded posi-	Incorrect setting of stop position reference	Check whether the position reference is correct on operation status display (U2-04).
tion. (encoder method orientation)	Incorrect selection of binary/BCD reference or incorrect setting of BCD reference resolution	Check the setting of control constants C2-22 bit 3 and C2-12.
	Incorrect selection of reference point at incremental positioning	Check the setting of control constant C2-22 bit 5.
	Improper setting of load shaft zero- point position	Perform positioning at zero-point to measure position accuracy. Perform tune-up again to set the load shaft zero-point.
	Incorrect selection of reference point at incremental positioning	Check the setting of control constant C2-22 bit 5.
	Improper setting of load shaft zero- point •/"à•¶24 position	Perform positioning at zero-point to measure position accuracy. Perform tune-up again to set the load shaft zero-point.
	Encoder signal line disconnection, improper connection, loose connector	Check the wiring of encoder signal lines.
	Malfunction due to noise (Poor encoder characteristics)	Check that encoder signal lines are separated from inverter output wiring or other power lines. Check encoder cable specifications (whether the cable is a twisted pair shielded wire).
	Control PC board fault	Replace the control PC board.
Stop position differs from commanded posi- tion. (magnetic sensor method orientation)	Magnetic sensor signal line disconnection, loose connector	Check the wiring of magnetic sensor signal lines.
	Fault of orientation card or control PC board	Replace the orientation card or the control PC board.

Table 4.38: Motor Faults and Corrective Actions (Continued)

Fault	Cause	Corrective Action
Orientation completion signal is not output.	Orientation signal ORT is not input.	Check that orientation signal ORT is closed on operation status display (U1-09).
	Incorrect setting of selection signal (Completion signal is not output at tuning of initial setting.)	Set tune-up operation selection signal (C2-22 or C3-22, bit 4) to "1."
	Incorrect speed changing ratio setting	Verify the machine data for transmission ratio values (C1-27 to 29).
	Position control proportional gain is high.	Check that no vibration occurs in the forward and reverse directions near the stop position. Lower position control proportional gain to reduce vibration.
	Position control proportional gain is low.	Check that the load shaft has reached the stop position on operation status display (U2-03 or U3-03). Increase position control proportional gain to reach the commanded position.
	Fault of orientation card or control PC board	Replace the orientation card or the control PC board.

Chapter 5: Adjustments

The table below provides the adjustment procedures necessary following installation of the YASNAC PC NC.

Table 5.1 Adjustment Procedures

Location	Explanation
Interior and exterior of control cabinet	 Examine the exterior of the control panel for contamination/damage. Verify the module connections inside the cabinet are tight. Examine the cables and lead bundle inside the cabinet are not damaged.
Screw terminals	Check the following screw terminals for tightness: Power input unit terminal block Power ON/OFF button switches on MDI and CRT unit Control power transformer terminal block Check all terminal block covers for dislocation.
External cables	 Verify that the cable shield is connected to the ground block through a clamp. Verify that a protective ground wire is installed between the NC and machine tool. Verify that the protective ground wire is of a one-point ground type.
Power input cable	Prior to connecting the power input cable, verify that the power input terminals R, S, and T inside the unit are not shorted.
Connector and module locations and insertions	 Verify that the screws on the module clamps are tightened on the CPU rack. Verify that the clamp claws on the Honda connectors are tightened and that the clamp screws are securely in place. Verify that the clamp claws on the power supply connectors are in place. Verify that the clamp claws on the flat cables are in place.
Setting	 Verify that the control power transformer setting corresponds to the input power supply voltage.
Input power supply voltage and frequency	 Verify that the power supply voltage and frequency meet the ratings. Verify that the input power supply capacity is high enough for power consumption of the control unit.
Composite power supply unit	Verify that the composite power supply unit outputs are not short-circuited. Check for short-circuits between: +5V and 0V +12V and 0V +24V and 0V -12V and 0V

Table 5.1 Adjustment Procedures (Continued)

Location	Explanation		
Output voltage	Verify the output voltage after initially applying the power. Press the POWER ON button for the first power application, and verify the following: • Normal air flow from the cooling air exhaust port • Sufficient output voltage of the composite power supply unit, as noted below		
	Rated Output	Output Voltage Range	
	+5V	4.75 to 5.25V	
	+12V	11.87 to 13.12V	
	-12V	-11.87 to -13.12V	
	+24V	20.4 to 27.6V	
I/O signals	Verify the I/O signals between the	e NC and machine tool are sufficient.	
Emergency stop	Verify that the second power supply (i.e., servo power supply) is turned off and that the alarm display "3002: Emergency Stop" appears when the emergency stop is activated.		
Axis movement	Observe movement on each axis during manual feed, and verify the following: • Machine tool properly corresponds to movement made by the handle or step feed. • Machine stops following detection of an overtravel alarm, following activation of the OT limit switch during manual jog feed. • Machine tool accurately follows in the entire feed rate range in manual jog and rapid traverse rate.		
All NC functions	Verify that all NC functions activate successfully.		

Chapter 6: Module/Unit Replacement

6.1 CPU Rack





To remove the NC board, follow the steps below.

- 1. Verify the main power is off and the power supply switch on the rack is in the "O" position.
- 2. Remove all connectors and cables from the NC card.
- 3. Remove the NC card cover plate by loosening the top/bottom thumbscrews.
- 4. Loosen the two mounting screws from the top card mounting brackets.
- 5. Gently pull the card.

To install an NC card, follow the steps below.

- 1. Insert the NC card in line with the card guides of the CPU rack unit. Make sure that the edge connector of the card is properly inserted in the ISA slot.
- 2. Tighten the two mounting screws for the top card mounting brackets.
- 3. Attach the NC card cover plate and tighten the top/bottom thumb-screws.

- 4. Insert all connectors and cables in their original locations.
- 5. Return the power supply switch for the CPU rack to the "I" position and power up to restart the control unit.
- 6. Change the NC controller serial number.
- 7. Follow the NC board data set-up procedures.

Following NC board installation, verify functions as follows.

- 1. Ensure that the +5V and +24V status lamps on the NC card are lit.
- 2. Verify that the NC card operates normally by looking at the moving pattern of status lights 1, 2, 3, 4.
- 3. Verify that the NC operates normally after the SERVO ON switch is pressed and that no alarms show on the MMI screen.
- 4. Verify that the NC starts the shutdown sequence after the SHUT DOWN switch is pressed.

Hard Disk Drive Unit



Removal of the hard disk drive unit is performed as follows.

- 1. Turn the main power off; set the power supply switch for the rack to the "O" position.
- 2. Remove the rack door by first loosening the top/bottom thumb-screws and removing the data (HD DATA) and power (HD PWR) cables from the hard disk drive. Push the door upward to disengage side-pins from the door hinges.
- 3. Place the door assembly on a flat, steady surface and remove the

hard disk drive assembly cover by loosening the four mounting lock nuts.

 Loosen the four top/bottom-mounting screws from the hard disk drive assembly mounting plate and remove the hard disk drive assembly.

Install a hard disk drive unit by following the steps below.

- 1. Install the new hard disk drive assembly and tighten the four top/bottom-mounting screws.
- 2. Attach the hard disk drive assembly cover and tighten the four mounting lock nuts.
- 3. Attach the door to the CPU rack by inserting the side-pins into the door hinges.
- 4. Plug hard disk drive data (HD DATA) and power (HD PWR) cables into their original locations.
- 5. Close the door and tighten the top/bottom thumbscrews.
- 6. Return the power supply switch of the CPU rack to the "I" position and power up to restart the control unit.
- 7. Change the Windows NT serial number.
- 8. Follow the HD data set-up procedures.

Following replacement of the hard disk drive, verify functions as follows.

- 1. Verify that the hard disk drive unit type is displayed correctly on the BIOS screen at boot-up.
- 2. Verify that Windows NT boots up correctly.
- 3. Verify that the NC operates normally after the SERVO ON switch is pressed and that no alarms show on the MMI screen.

CPU Cooling Fan



Follow the steps below to remove the CPU cooling fan.

- 1. Turn the main power off; set the CPU rack power supply switch to the "O" position.
- 2. Open the rack door by loosening the top/bottom thumbscrews. Remove the data and power cables from the hard disk drive, if necessary, to facilitate CPU fan removal.
- 3. Disconnect the fan power connector from the motherboard receptacle labeled FAN1.
- 4. Remove the CPU fan/heatsink by pushing and unlocking the metal clip from the CPU socket locking tabs. A small, flat screwdriver may be used to help unlock the clip; however, use caution to avoid damage to the CPU socket and other motherboard components.

Install a CPU cooling fan by following the steps below.

- 1. Apply additional heatsink compound to the CPU chip surface to assure proper heat transfer between the CPU and the heatsink.
- 2. Attach the new fan/heatsink to the CPU chip by first securing the bottom clip lock in place.
- 3. Lock the metal clip by pushing the clip into the socket top lock tab.
- 4. Connect the fan power connector to motherboard receptacle FAN1.

5. Plug the hard disk drive data and power cables into their original locations, if necessary.

Following installation of the CPU cooling fan, verify functions as follows.

- 1. Return the CPU rack power supply switch to the "I" position and power up to restart the control unit.
- 2. Visually check the CPU fan operation. The fan should rotate counter-clockwise, blowing air into the heatsink.
- 3. Shut down the system and switch the main power OFF.
- 4. Close the door and tighten the top/bottom thumbscrews.
- 5. Power up to restart the control unit.
- 6. Check for any CPU temperature-related alarms.
- 7. Wait for a few minutes and check the CPU Monitor screen on the MMI to verify that the CPU temperature is within a normal range (below 30° C).





Follow the steps below to remove the CPU rack cooling fan unit.

- 1. Verify that the main power is off and that the rack power supply switch is in the "O" position.
- 2. Remove the center cover plate of the rack by loosening the top/bottom thumbscrews.
- 3. Open the rack door by loosening the top/bottom thumbscrews to facilitate removal of the CPU fan unit.

- 4. Disconnect the fan power connector from the motherboard receptacle labeled FAN3, and remove fan wires from the wire clip.
- 5. Remove the complete CPU rack fan assembly by loosening the two bottom mounting screws.

Install a CPU rack cooling fan unit by following the steps below.

- 1. Attach the new CPU rack fan assembly to the CPU rack and tighten the two bottom mounting screws.
- Insert the fan power connector into the FAN3 receptacle and place the fan wires inside the wire clip. Lock the wire clip by pushing in the tab.
- 3. Close the door and tighten the top/bottom thumbscrews.
- 4. Install the center cover plate and tighten the top/bottom thumb-screws.

Following installation, verify functions as follows.

- 1. Return the CPU rack power supply switch to the "I" position and power up to restart the control unit.
- 2. Check that the CPU rack fan is operating properly. The fan should blow air tot he outside of the CPU rack.
- 2. Check for any CPU rack fan-related alarms.
- 3. Check the CPU Monitor screen on the MMI to verify the fan is working properly. The fan speed readout should be approximately 2500rpm.

CPU Rack Unit

When the internal CPU rack components (other than the CPU rack cooling fan and the hard disk drive) are defective, the entire CPU rack unit must be replaced. To remove the CPU rack unit, follow the steps below.

- 1. Verify that the main power is OFF and that the power supply switch for the rack is in the "O" position.
- 2. Remove all cables and wiring from the CPU rack unit.

- 3. Remove the NC board, as explained above.
- 4. Remove the CPU rack door/HDD assembly by first loosening the top/bottom thumbscrews and then remove the data (HD DATA) and power (HD PWR) cables from the hard disk drive. Push the door upward to disengage the side-pins from the door hinges.
- 5. Remove the CPU rack unit by loosening the four mounting screws located at the top and bottom of the unit. The CPU rack unit can be removed without completely removing the mounting screws.

Install a CPU rack unit as follows.

- 1. Mount the new CPU rack on the existing location and tighten the mounting screws.
- 2. Attach the door/HDD assembly to the CPU rack by inserting the side-pins into the door hinges.
- 3. Plug the hard disk drive data (HD DATA) and power (HE PWR) cables in their original locations.
- 4. Close the door and tighten the top/bottom thumbscrews.
- 5. Install the NC board as described above.
- 6. Install all the CPU rack cables and wiring in their original locations.

Following installation, verify proper functioning as follows.

- 1. Return the CPU rack power supply switch to the "I" position and power up to restart the control unit.
- 2. Verify that the hard disk drive unit type is displayed correctly on the BIOS screen at boot-up.
- 3. Verify that Windows NT boots up correctly.
- 4. Verify that the +5V and +24V status lamps on the NC card are lit.
- 5. Verify that the NC card operates normally by looking at the moving pattern of the status lights 1, 2, 3, 4.

- 6. Verify that the NC operates normally after the SERVO ON switch is pressed and no alarms show on the MMI screen.
- 7. Determine whether there are any CPU rack fan related alarms.
- 8. Wait a few minutes and then check the CPU Monitor screen on the MMI to determine whether the CPU temperature is within the normal range (i.e., below 30° C).
- 9. Check the CPU Monitor screen on the MMI to determine whether the CPU rack fan is working properly. The fan speed readout should be approximately 2500rpm.
- 10. Verify that the NC starts the shut-down sequence after the SHUT DOWN switch is pressed.

6.2 CRT Display Unit





Remove the CRT display unit as follows.

- 1. Verify that the main power is off.
- 2. Remove all connectors and wiring from the back of the display unit.

- 3. Remove the CRT display unit from the machine operation box.
- 4. Place the unit upside down on a flat, steady surface.
- 5. Loosen the four CRT bottom-mounting screws.
- 6. Remove the display unit frame from the CRT by pulling upwards.

Install the CRP display unit as follows.

- 1. Place the new CRT upside down on a flat, steady surface.
- 2. Place the display unit frame on top of the CRT.
- 3. Align the four mounting holes on both the CRT and the CRT mounting bracket and tighten the four CRT mounting screws.
- 4. Mount the CRT display unit on the machine operation box.
- 5. Insert all connectors and wiring in their original locations.

Following installation, verify functions as follows.

- 1. Power up the control.
- 2. Verify the CRT display unit is working properly.
- 3. Adjust brightness, contrast, screen size, and position of the CRT, if necessary.
- 4. Recalibrate the touch screen from the PC Settings screen.

Touch Screen

Remove the touch screen by following the steps below.

- 1. Verify that the main power is off.
- 2. Remove all connectors and wiring from the back of the display unit.
- 3. Remove the CRT display unit from the machine operation box.
- 4. Place the unit on a flat, steady surface.

- 5. Remove the flat cable from the touch screen controller.
- 6. Remove the tie wrap (or any other kind of strain relief) holding the SERVO ON/SHUT DOWN cable assembly wires.
- 7. Loosen the six front bezel-mounting screws and carefully remove the bezel assembly from the CRT display unit.
- 8. Place the bezel assembly on a flat, steady surface.
- 9. Remove the touch screen mounting bracket (P/N: USP00370-1) by loosening the ten mounting screws.
- 10. Remove the touchscreen from the bezel assembly.
- 11. Remove leftover debris (if any) inside the display unit from the damaged touch screen (such as broken glass, plastic residue, etc.).

Install the touch screen as follows.

- 1. Carefully set the new touch screen assembly in its original location. Ensure that the touch surface and the flat cable are placed correctly.
- 2. Place the touch screen mounting bracket (P/N: USP00370-1) on its original position and tighten the ten mounting screws. To prevent damage to the touch screen glass, do not overtighten.
- 3. Attach the front bezel assembly to the display unit and tighten the six mounting screws. To prevent damage to the bezel, do not overtighten.
- 4. Insert the touch screen flat cable into the controller board and add tie wrap (or original strain relief) to hold the SERVO ON/SHUT DOWN cable assembly wires as in the original assembly.
- 5. Mount the CRT display unit on the machine operation box.
- 6. Insert all connectors and wiring in their original locations.

Following replacement, verify functions as follows.

- 1. Power up the control.
- 2. Verify that the touch screen is working properly.
- 3. Recalibrate the touch screen from the PC Settings screen.

Touch Screen Controller Board



Remove the touch screen controller board by following the steps below.

- 1. Verify that the main power is off.
- 2. Remove all connectors and wiring from the back of the display unit.
- 3. Remove the CRT display unit from the machine operation box.
- 4. Place the unit on a flat, steady surface.
- 5. Remove the touch screen controller cover by loosening the four mounting screws.
- 6. Remove all connectors from the touch screen controller board.
- 7. Remove the controller board by loosening the four hex spacers.

Install the touch screen controller board as follows.

- 1. Install the new controller board in its original location and tighten the four hex spacers.
- 2. Insert all board connectors in their original locations.
- 3. Add the controller board cover and tighten the four mounting screws.
- 4. Mount the CRT display unit on the machine operation box.
- 5. Insert all connectors and wiring in their original locations.

Following installation of the touch screen controller board, verify functions as follows.

- 1. Power up the control.
- 2. Verify that the touch screen is working properly.
- 3. Recalibrate the touch screen from the PC Settings screen.





Remove the unit switches by following the steps below.

- 1. Turn the main power off.
- 2. Remove all connectors and wiring from the back of the display unit.
- 3. Remove the CRT display unit from the machine operation box.

- 4. Place the unit on a flat, steady surface.
- 5. Remove the tie wrap (or any other kind of strain relief) holding the SERVO ON/SHUT DOWN cable assembly wires.
- 6. Remove the SERVO ON/SHUT DOWN connector from the connector plate by pushing the side connector lock tabs towards the center of the connector and pulling the connector out. If necessary, carefully use a small, flat screwdriver to avoid damage to the locking tabs.
- 7. Loosen the six front bezel-mounting screws and carefully remove the bezel assembly from the CRT display unit.
- 8. Place the bezel assembly on a flat, steady surface.
- 9. Remove the switch assemblies from the bezel. First, firmly pull the contact blocks from the switch actuator (the use of a dismantling tool is not necessary because the damaged switches are being replaced). Then remove actuators from bezel by loosening lock nuts and pulling actuator out from the bezel/lens side.

Install the unit switches as follows:

- 1. Install each new switch assembly on its original location on the bezel. First, insert switch actuator/lens assemblies and tighten the actuator lock nuts. Then insert the contact block firmly into the actuator. Make sure that both switches are working properly.
- 2. Attach the front bezel assembly to the display unit and tighten the six mounting screws. To prevent damage to the bezel, do not over-tighten.
- Attach the SERVO ON/SHUR DOWN connector in the connector plate by inserting the connector in the opening. Ensure that the connector is securely locked and cannot be removed by pulling.
- 4. Insert the touch screen flat cable in the controller board, in its original location.
- Add the tie wrap (or original strain relief) to hold the SERVO ON/SHUT DOWN cable assembly wires as in the original assembly.

- 6. Mount the CRT display unit on the machine operation box.
- 7. Insert all connectors and wiring in their original locations.

Following installation, verify functions as follows.

- 1. Power up the control.
- 2. Verify that the NC operates normally after the SERVO ON switch is pressed, and that no alarms show on the MMI screen.
- 3. Verify that the NC starts the shutdown sequence after the SHUT DOWN switch is pressed.

Bezel Assembly

Remove the unit bezel by following the steps below.

- 1. Turn the main power off.
- 2. Remove all connectors and wiring from the back of the display unit.
- 3. Remove the CRT display unit from the machine operation box.
- 4. Place the unit on a flat, steady surface.
- 5. Remove the touch screen flat cable from the touch screen controller.
- 6. Remove the tie wrap (or any other kind of strain relief) holding the SERVO ON/SHUT DOWN cable assembly wires.
- 7. Remove the SERVO ON/SHUT DOWN connector from the connector plate by pushing the side connector lock tabs towards the center of the connector and pulling the connector out. If necessary, use a small, flat screwdriver, being careful to avoid damage to the locking tabs.
- 8. Loosen the six front bezel-mounting screws and carefully remove the bezel assembly from the CRT display unit.
- 9. Remove leftover debris (if any) inside the display unit from damaged components (i.e., touch screen) such as broken glass, plastic residue, etc.

Install the bezel assembly as follows.

- 1. Attach the new bezel assembly to the display unit and tighten the six mounting screws. To avoid damage to the bezel, do not overtighten.
- Attach the SERVO ON/SHUT DOWN connector in the connector plate by inserting the connector in the opening. Ensure that the connector is securely locked and cannot be removed by pulling.
- 3. Insert the touch screen flat cable in the controller board, in its original location.
- 4. Add a tie wrap (or original strain relief) to hold the SERVO ON/SHUT DOWN cable assembly wires as in the original assembly.
- 5. Mount the CRT display unit on the machine operation box.
- 6. Insert all connectors and wiring in their original locations.

Following installation of the bezel assembly, verify functions as follows.

- 1. Power up the control.
- 2. Verify that the touch screen is working properly.
- 3. Verify that the NC operates normally after the SERVO ON switch is pressed and that no alarms show on the MMI screen.
- 4. Go to the PC Settings screen and re-calibrate the touch screen.
- 5. Verify that the NC starts the shutdown sequence after the SHUT DOWN switch is pressed.

CRT Mounting Bracket Assembly

Remove the CRT mounting bracket assembly as follows.

- 1. Turn the main power OFF.
- 2. Remove all connectors and wiring from the back of the display unit.
- 3. Remove the CRT display unit from the machine operation box. Place the unit on a flat, steady surface.

- 4. Remove the 14" color CRT and the bezel assembly as explained above.
- 5. Place the bezel assembly on a flat, steady surface, ensuring that no internal or external parts can be damaged.
- 6. Remove the touch screen controller board as explained above.
- 7. Remove the touch screen controller power connector from the connector plate by pushing the side connector lock tabs towards the center of the connector and pulling the connector out. If necessary, use a small, flat screwdriver with care to avoid damage to the locking tabs.
- 8. Remove the touch screen controller data cable from the connector plate by removing the mounting hardware (nuts, washers, and screwlocks) and pulling the connector out.
- 9. Discard the damaged CRT mounting bracket assembly.

Install a new CRT mounting bracket assembly as follows below.

- 1. Set the new CRT mounting bracket assembly on a flat, steady surface.
- Attach the touch screen power connector in the connector plate by inserting the connector in the opening. Ensure that the connector is securely locked and cannot be removed by pulling.
- 3. Attach the touch screen data connector to the connector plate by inserting the connector in the opening. Secure the connector using the original mounting hardware (nuts, washers, and hex screwlocks).
- 4. Install the touch screen controller board, bezel assembly, and 14" color CET as explained above.
- 5. Mount the CRT display unit on the machine operation box.
- 6. Insert all connectors and wiring in their original locations.

Following installation of the CRT mounting bracket assembly, verify functions as follows.

- 1. Power up the NC.
- 2. Verify that the NC operates normally after the SERVO ON switch is pressed, and that no alarms show on the MMI screen.
- 3. Verify that the NC starts the shut-down sequence after the SHUT DOWN switch is pressed.

6.3 Floppy Disk Drive Unit



Remove the floppy disk drive as follows.

- 1. Turn the main power off.
- 2. Remove the data and power connectors from the floppy disk drive unit.
- 3. Open the floppy disk unit drive-access door.
- 4. Loosen the four mounting screws from the front of the unit and remove the unit from the mounting panel.

Install a floppy disk drive as follows.

- 1. Install a new floppy disk drive unit into the same location as the original unit.
- 2. Open the floppy disk unit drive-access door.

- 3. Tighten the four mounting screws.
- 4. Insert the floppy disk drive data and power connectors in their original locations.

Following installation, verify functions as follows.

- 1. Power up the CPU rack.
- 2. Verify that the floppy disk drive is displayed on the BIOS screen at boot-up.
- 3. Insert a floppy disk in the floppy disk drive unit and test access to the floppy disk drive from the MMI to verify proper function.

6.4 NC Power Supply



Remove the numeric control power supply as follows.

- 1. Turn the main power off.
- 2. Remove all connections from the power supply terminal block.
- 3. Remove the power supply.

Install the numeric control power supply as follows.

- 1. Mount a new power supply to the same location as the original unit.
- 2. Tighten the mounting screws.
- 3. Connect all wires into their original locations.

Following installation, verify correct functioning as follows.

- 1. Verify that the 24V status lamp on the power supply is lit.
- 2. Verify that the 24V status lamp on the NC board is lit.
- 3. Verify that the NC operates normally after the SERVO ON switch is pressed and that no alarms show on the MMI screen.

6.5 Handheld Remote Machine Pendant



Remove the handheld remote machine pendant as follows.

- 1. Turn the main power off.
- 2. Disconnect the remote machine pendant from the machine operation box connector.

Install the remote machine pendant as follows.

1. Attach the new remote machine pendant to the machine operation box connector.

Following installation of the remote machine pendant, verify functions as follows.

- 1. Verify that the remote machine pendant LCD display and status lamps are working correctly.
- 2. Verify that the NC operates normally after the SERVO ON switch is pressed and that no alarms show on the MMI screen.

6.6 Noise Filter



Remove the noise filter as follows below.

- 1. Turn the main power OFF and ensure that the rack power supply switch is in the "O" position.
- 2. Disconnect all the wires from the noise filter.
- 3. Remove the noise filter by loosening the two mounting screws.

Install a new noise filter as follows.

- 1. Mount the new noise filter on the existing location and tighten the two mounting screws.
- 2. Connect all the noise filter wires on their original locations.

Following installation of the noise filter, verify functions as follows.

- 1. Return the CPU rack power supply switch to the "I" position and power up to restart the control unit.
- 2. Verify that Windows NT boots up correctly.
- 3. Verify that the +5V and +24V status lamps on the NC card are lit.
- 4. Verify that the NC card operates normally by looking at the moving pattern of the status lights 1, 2, 3, 4.
- 5. Verify that the NC operates normally after the SERVO ON switch is pressed and no alarms show on the MMI screen.

Chapter 7: Memory Option

Standard equipment on the YASNAC PC NC includes 32MB of RAM (SDRAM 168 pin DIMM). If additional memory is to be added, follow the installation instruction in this chapter.

7.1 Part Numbers

Yaskawa recommends the use of generic RAM.DIMMs



7.2 RAM DIMM Installation

Prior to installing the RAM chip, ensure that the YASNAC PC NC is powered OFF and the person performing the installation is properly grounded. Unplug the power cord to the CPU rack. Open the CPU rack and look for the memory banks (slots) into which the RAM DIMMs are placed. The current RAM DIMM should be in bank DIMM1, which is indicated on the motherboard next to the banks. The new

RAM DIMM should be installed into bank DIMM2 (the middle slot shown below).



Ensure that the DIMM is fitted securely in the slot and that the latches to the left and right of the DIMM are fully upright. To remove the DIMM, the latches must be pressed down, which releases the DIMM from the slot. The DIMM can then be easily pulled out. DO NOT pull the DIMM without first pressing the latches. Then, close the CPU rack, plug the power cord into the CPU rack, and power ON. A memory count of the total RAM size then appears on the screen.

Chapter 8: Fixed File Operations

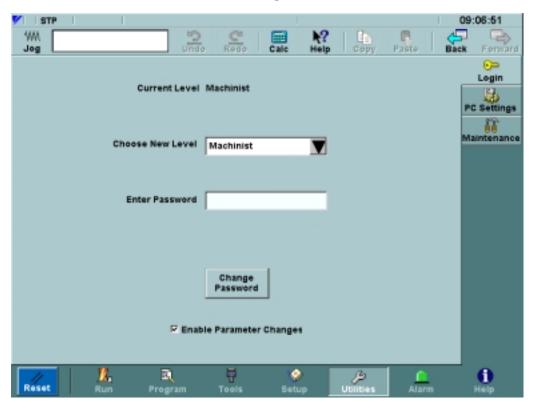
8.1 NC Data Handling

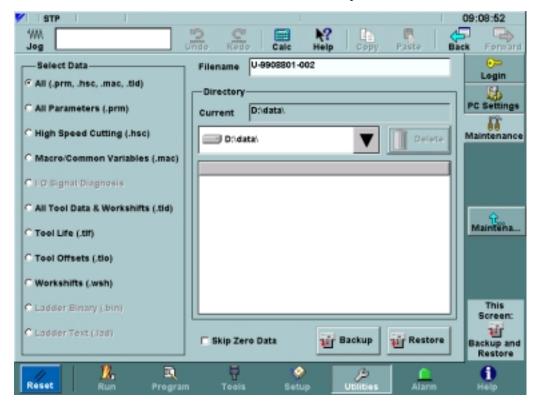
NC Data Backup

This section explains how to back up and restore CMOS NC data to the hard disk or floppy disk.

NC Parameter Backup

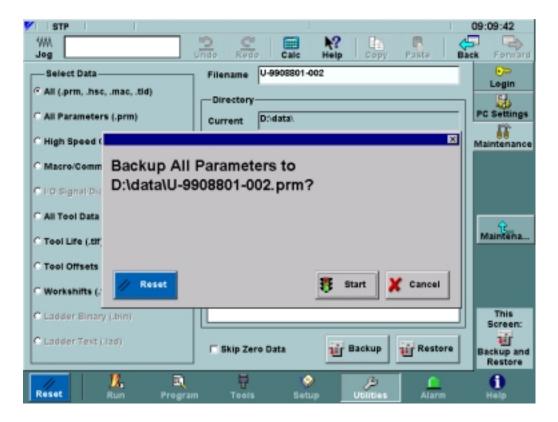
- 1. Go to the *Utilities: Login* screen and log in at Machinist level or higher.
- 2. While at the *Utilities: Login* screen, ensure that the **Enable Parameter Changes** box is checked.



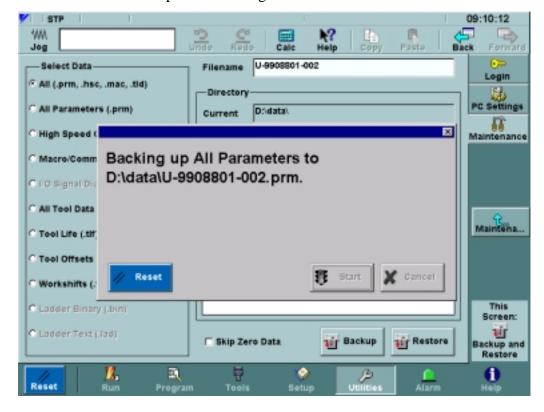


3. Switch to the *Utilities: Backup and Restore* screen.

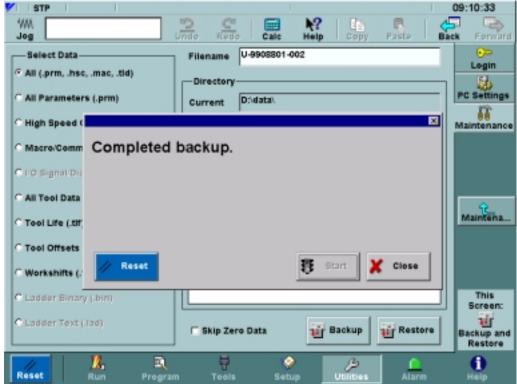
- 4. Select **All** from the **Select Data** list on the left.
- 5. The default value shown in the **Filename** field is the CNC serial number, but this may be changed if desired. Parameter data can also to be backed up to a floppy disk. To select the floppy disk drive, touch the current directory drop down menu and select 'a:\'.
- 6. Check the **Skip Zero** box to avoid backing up any *parameter* data with a value of zero. However, checking **Skip Zero** is not recommended.
- 7. Touch the **Backup** button.
- 8. A dialog box appears to confirm that the backup process must be performed. To continue, press the **Start** button.



9. The text in the dialog box changes, indicating that the backup process has begun.

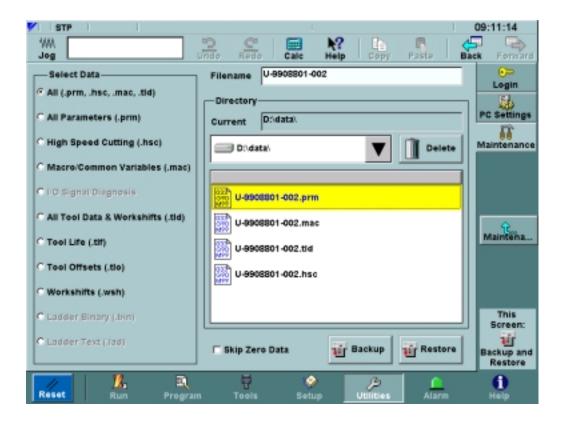


10. The dialog box indicates when the backup process is complete. At this point, select the **Close** button.



11. When the All option is selected, PC NC creates four files, shown in the file list at the bottom right. These files all have the same filename, but with different extensions that indicate the file type.

File extension	Meaning
.prm	all parameters
.mac	macro and common variables
.tld	tool data and workshift values
.hsc	high speed cutting data



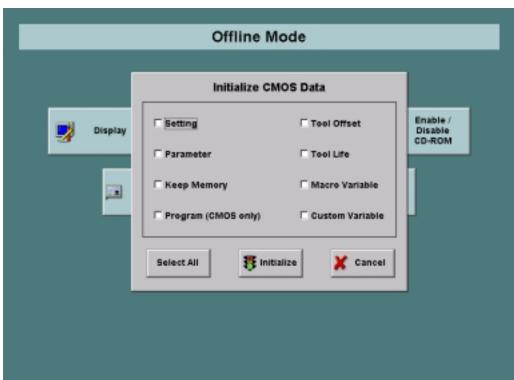
NC CMOS Initialization

Initializing CMOS

- 1. Power OFF the PC NC.
- 2. Set the JFC10 system number switch to 'E'.

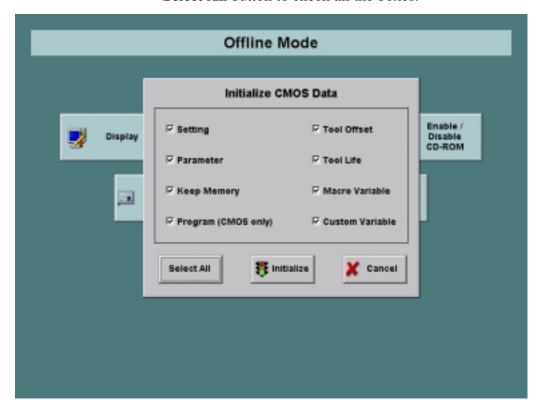


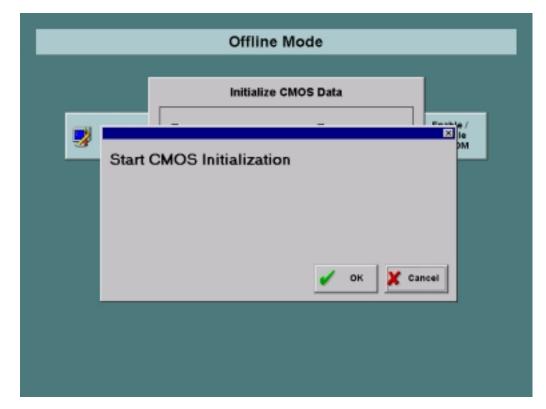
3. Power ON the PC NC. The *Offline Mode* screen appears.



4. Touch the **Initialize CMOS Data** button.

5. A dialog box listing types of CMOS data appears. Touch the **Select All** button to check all the boxes.





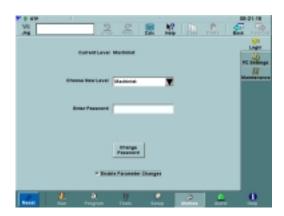
6. Touch the **Initialize** button to start CMOS data initialization.

- 7. A second dialog box appears to confirm. Select the **OK** button.
- 8. When initialization is complete, touch the **Cancel** button.
- 9. Click on the **Shut Down** button on the CRT/TFT panel.
- 10. Change the JFC10 system number switch to '2'. The system number switch is set to '2' so that the data can be restored, as described in the next section.

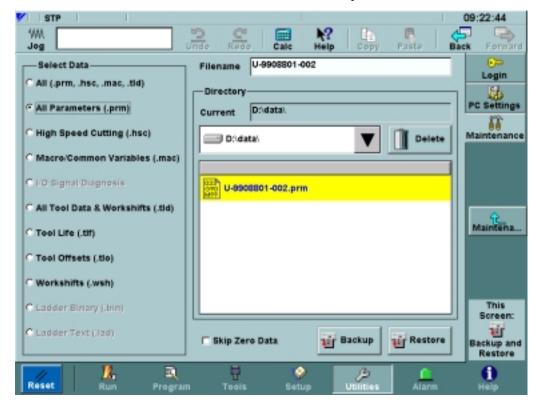
NC Data Restoration

Restoring NC Data

- 1. Power OFF the PC NC.
- 2. Set the JFC10 system number switch to '2'. If the system number switch is '0', the NC cannot read all the parameter files.

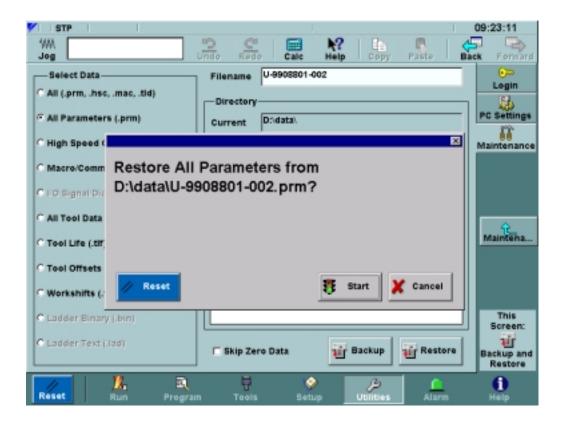


- 3. Power ON the PC NC.
- 4. Go to the *Utilities: Login* screen and log in at Machinist level or higher.
- 5. While at the *Utilities: Login* screen, ensure that the **Enable Parameter Changes** box is checked.
- 6. Switch to the *Utilities: Backup and Restore* screen.

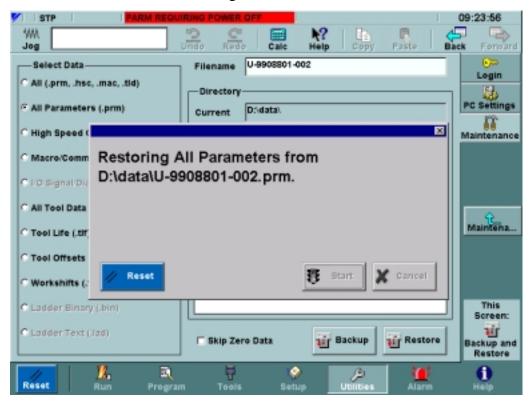


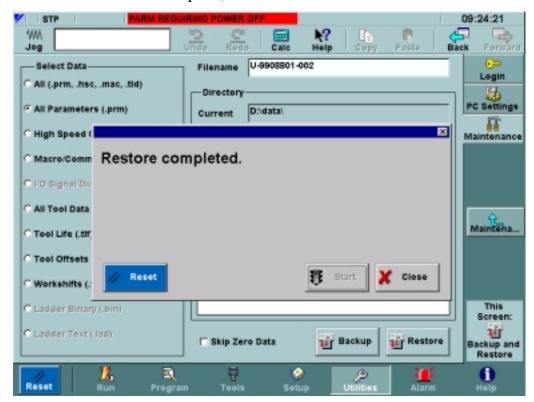
7. Select **All Parameters** from the **Select Data** list on the left. (At first, *only* parameters should be restored.)

- 8. The file list at the bottom right shows the name of the parameter file to be restored.
- 9. Make sure the parameter file to restore is selected by touching it in the list. The filename has the format '*****.prm'. When selected, the background is yellow.
- 10. Touch the **Restore** button.
- 11. A dialog box appears to confirm that the restore process must be performed. To continue, press the **Start** button.



12. The text in the dialog box changes, indicating that the restore process has begun.

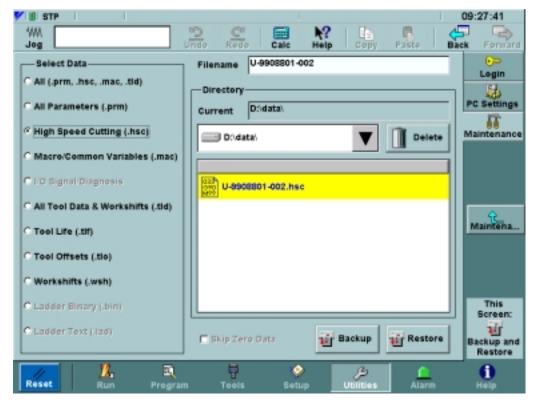




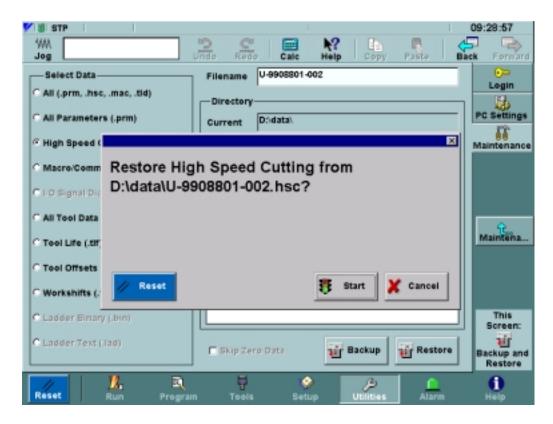
13. The dialog box indicates when the restore process is complete. At this point, select the **Close** button.

- 14. Shut down the PC NC.
- 15. Power ON the PC NC.
- 16. Go to the *Utilities: Login* screen and log in at the Machinist level or higher.
- 17. While at the *Utilities: Login* screen, ensure that the **Enable Parameter Changes** box is checked.
- 18. Switch to the *Utilities: Backup and Restore* screen.
- 19. Select **High Speed Cutting** from the **Select Data** list on the left.

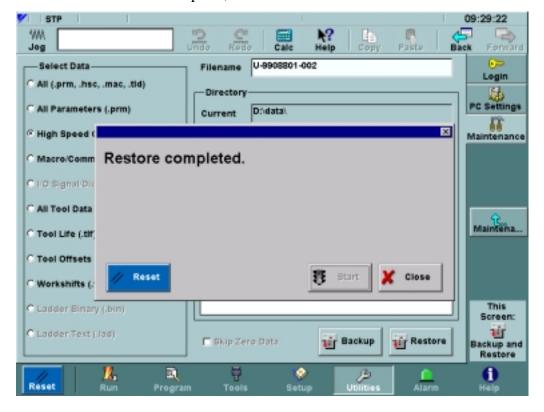
20. Ensure the parameter file to restore is selected by touching it in the list. The filename has the format '****.hsc'. When selected, the background is yellow.



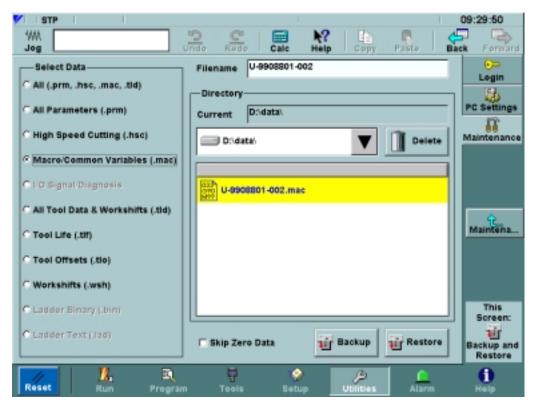
- 21. Touch the **Restore** button.
- 22. A dialog box appears to confirm that the restore process must be performed. To continue, press the **Start** button.

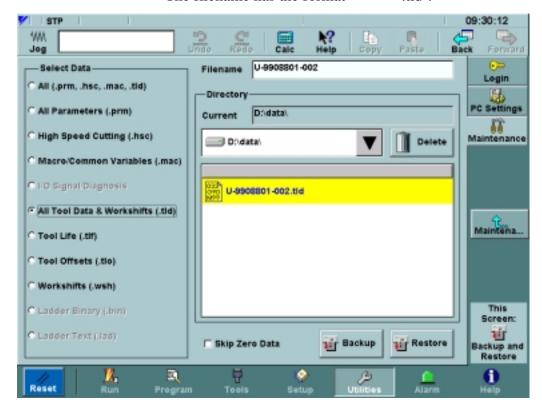


23. The dialog box indicates when the restore process is complete. At this point, select the **Close** button.



24. Use the same process to restore the Macro/Common Variable files. The filename has the format '****.mac'.





25. Repeat the process to restore the All Tool Data & Workshifts file. The filename has the format '*****.tld'.

- 26. Power OFF the PC NC.
- 27. Set the JFC10 system number switch to '0'.

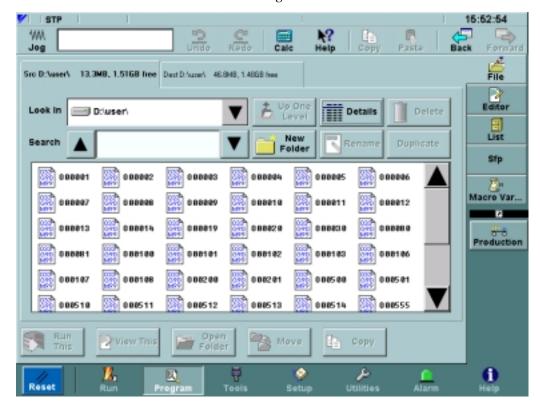
HD Data Handling

NC Program Backup and Restore

This section discusses how to use the *Program: File* screen to back up and restore all NC programs to a floppy disk or FlashPath (TOSHIBA FlashPath PDR-FLP1 and TOSHIBA Smart Media PDR-SM16 (16MB), which can be purchased from a local vendor). Also covered is how to check the total memory used by programs in the *Program: File* screen. All programs are stored on the hard disk. The program directory is d:\ user for all CNC programs and d:\ macro for all macro programs.

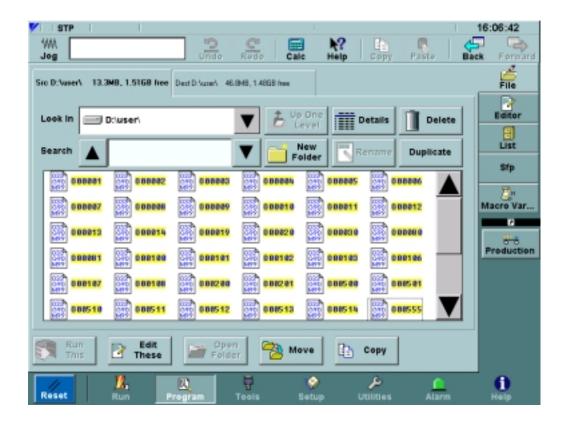
To make a copy of program files, follow the steps below.

1. Switch to the *Program: File* screen.



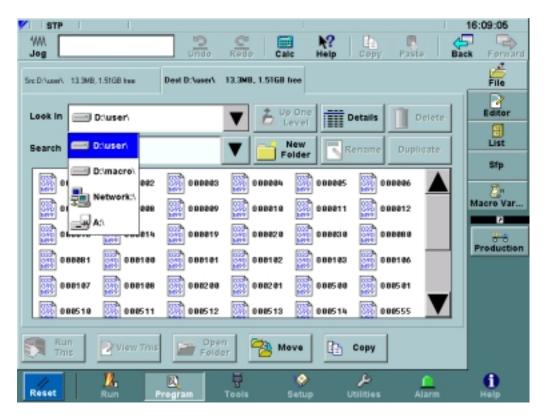
- 2. Look at the **Src** tab to see how much memory is required to back up all the programs in the current directory. In this example case, the total size of all the programs is 13.3MB. Therefore, 16MB FlashPath (described above) or a network computer is necessary to back up all of these programs.
- 3. Insert the empty device (floppy disk or FlashPath) into the floppy disk drive unit.

4. Touch the name of the program to back up. If backing up multiple files, there are two ways to select them: (1) press and hold the **Ctrl** key while touching the desired program names or (2) touch the first program, press and hold the **Shift** key, and touch the last program. All the programs between the first and last are selected.

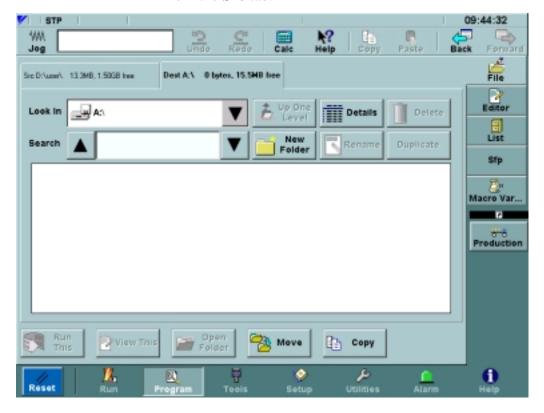


- 5. Files to copy are highlighted in yellow.
- 6. To set the destination directory, touch the **Dest** tab at the top of the screen.

7. Touch the **Look In** drop down menu and select the 'A:\ 'drive.



8. The **Dest** tab now displays the amount of free space on the A:\
drive. Ensure this is larger than the size of programs to be copied from the **Src** tab.



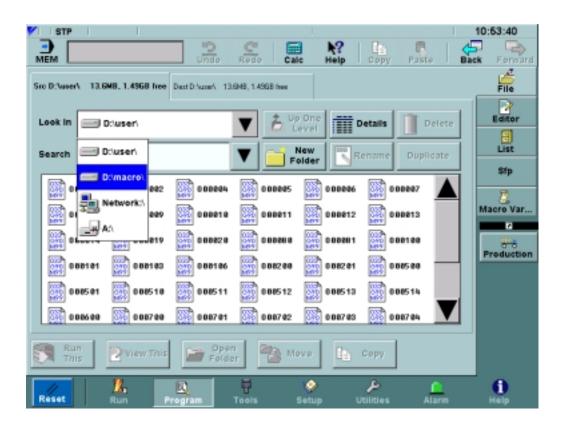
- 9. Touch the **Copy** button to begin copying files.
- 10. Ensure all programs are copied onto the device.

Macro Program Backup and Restore

This section explains how to back up and restore macro programs to a floppy disk or FlashPath.

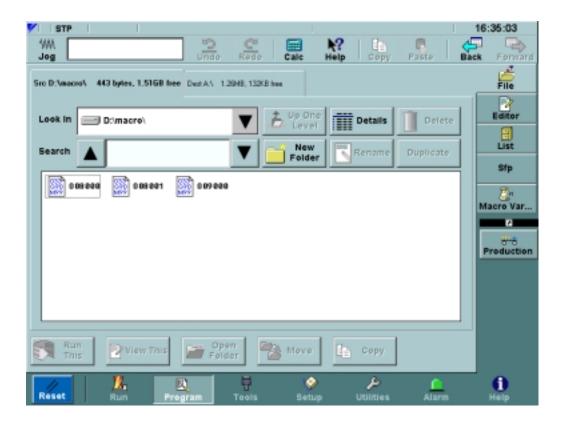
To back up macro programs, follow the steps below.

First ensure there are some macro programs in the 'D:\ Macro' directory. If there are no macro programs, a backup copy is not necessary. To check for macro programs, go to the *Program: File* screen. Touch the **Look In** drop down menu and select 'D:\ Macro\'.



- 2. Power OFF the PC NC.
- 3. Change the JFC10 system number switch to '2'. The system switch is set to '2' to disable Macro Lock, to enable macro programs to be copied.
- 4. Power ON the PC NC.
- 5. Insert the empty device (floppy disk or FlashPath).

- 6. Go to the *Program: File* screen.
- 7. Touch the **Look In** drop down menu and select 'D:\ macro\'.



- 8. Select all the programs to be backed up.
- 9. Touch the **Dest** tab at the top.
- 10. Touch the **Look In** drop down menu and select 'A:\'.
- 11. Touch the **Copy** button.

12. The screen shows the copied programs in the A:\ drive.



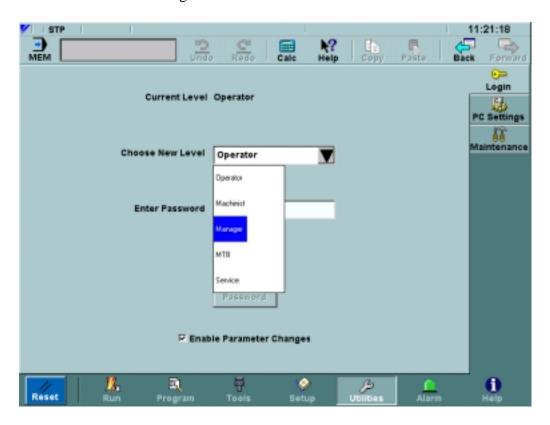
CNC programs and macro programs can also be backed up using Windows Explorer; please refer to the following section for further details.

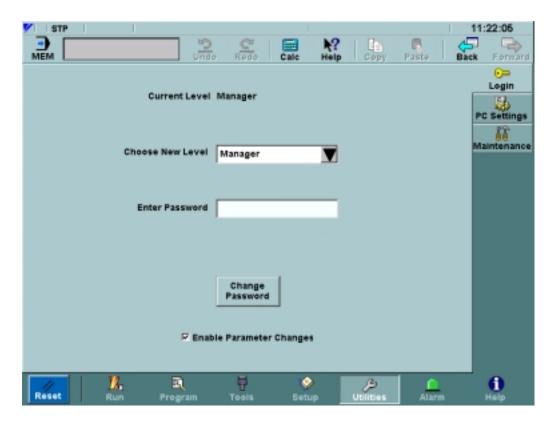
Backup/Restore for Parameters and Offsets Already Backed Up

This section explains how to back up and restore parameter, offset and workshift data that are already backed up to the hard disk. This requires Windows Explorer.

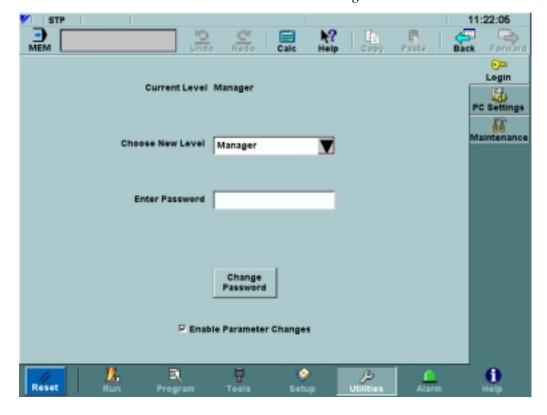
To back up data, follow the steps below.

1. Go to the *Utilities: Login* screen and log in at Manager level or higher.





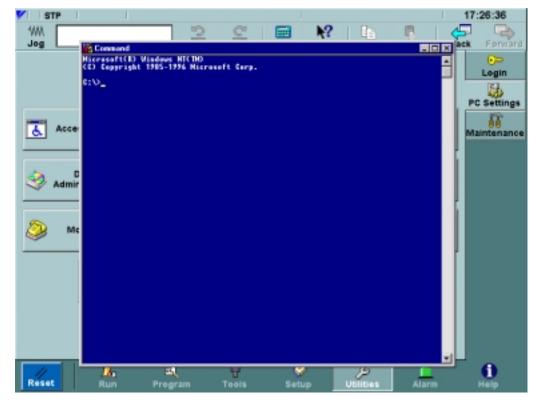
2. Go to the *Utilities: PC Settings* screen.



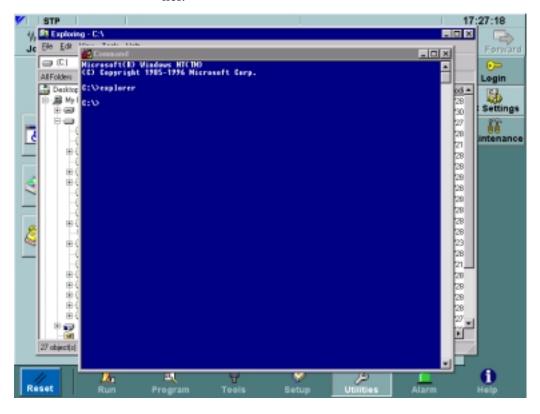
3. Touch the **Console Window** button. A DOS window appears.



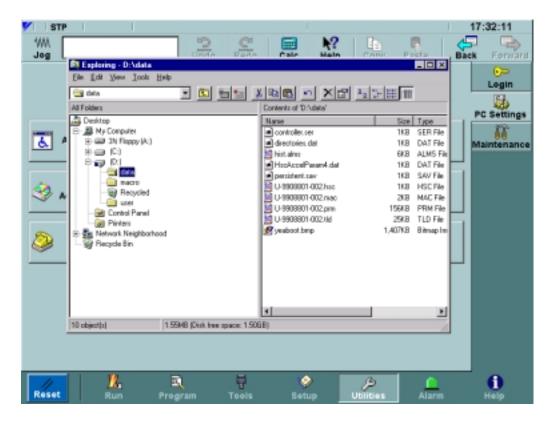
4. At the DOS prompt, type in 'explorer' and press the Enter key.



- 5. A Windows Explorer window appears behind the DOS window.
- 6. Close the DOS window by clicking on the **X** in the top right corner.

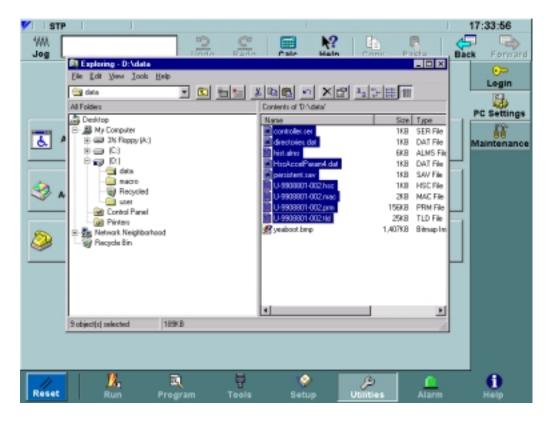


7. In the Explorer window, double-click the 'D:' drive to open it, then double-click the 'data' directory to open it.



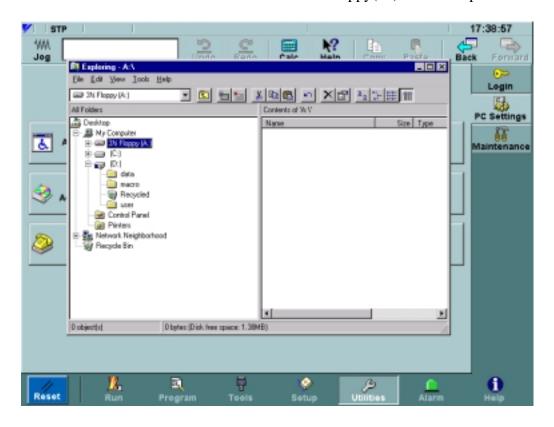
8. Insert a blank floppy disk into the floppy disk drive unit.

9. Select all files in the directory 'D:\ data' except for the '.bmp' file.

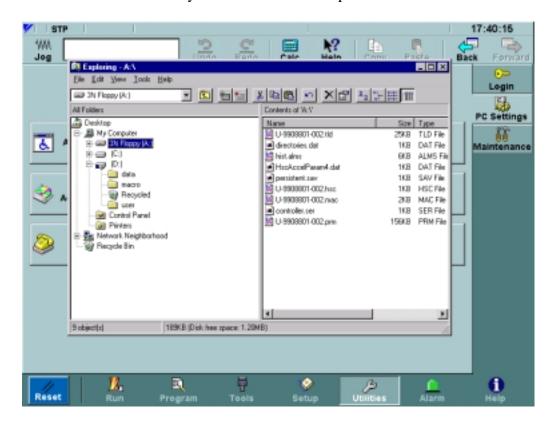


10. Press the **Copy** button on the Explorer tool bar, or select 'Copy' from the Edit menu.

11. Double-click on '3-1/2 Floppy(A:)' drive to open it.



12. Click on the **Paste** button in the Explorer tool bar, or select 'Paste' from the Edit menu. Explorer then copies all the selected files to the floppy disk. The copied files now appear in the directory contents list in the Explorer window.



This procedure can also be used to copy CNC programs and macro programs. CNC programs are stored in the 'D:\ user\' directory, while macro programs are stored in the 'D:\ macro\' directory.

Hard Disk Restore Kit Option (UUX000046)

General Information

The PC NC Hard Disk Restore Kit Option is used to restore a hard disk image during emergencies. With this option, an original hard disk image may be created in the event the hard disk crashes or exhibits any other problems. However, this kit cannot repair physical hard disk hardware problems. Please contact Yaskawa customer service if the PC NC cannot run after using this tool. If a hard disk crash does occur, all CNC programs and high speed parameters will be lost; therefore, making backup copies is very important.

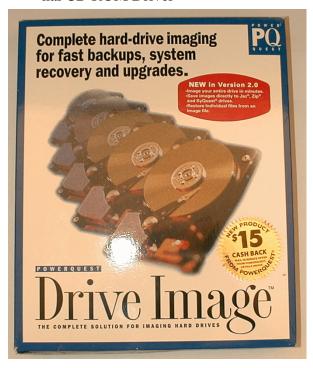
Restore Kit Contents

- 1. External CD ROM Drive
 - EXP computer, INC CD-865



2. Power Quest Drive Image (Version 2.0 or later)

Floppy disk containing Drive Image Version 2.2 with EXP External CD ROM Driver



- 3. Yaskawa PC NC Gold CD
 - PC NC HD image and latest update file



Procedure

This procedure is useful only when the PC NC hard disk has some serious or startup problems. This procedure clears the hard disk and creates a new

disk image from CD. CNC parameters, tool offsets, and work shift data on the motion control card remain.

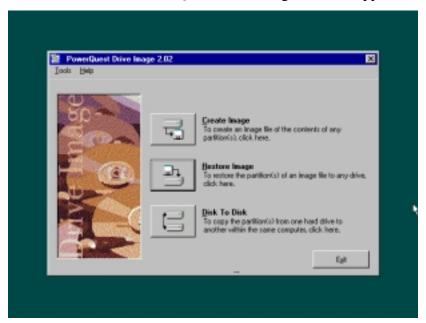
Restoring an Image

- 1. Power OFF the PC NC.
- 2. Connect the EXP External CD ROM Drive to the PC NC Printer connector LPT1.



- 3. Connect the EXP External CD ROM Drive Power adapter to a 120V plug.
- 4. Power ON the EXP External CD ROM Drive using the switch at the back of the unit.
- 5. Insert the Yaskawa PC NC Gold CD into the EXP External CD ROM Drive.
- 6. Insert the Power Quest Drive Image Version 2.2 with EXP External CD ROM Driver floppy disk into the PC NC floppy disk drive unit.
- 7. Power ON the PC NC.
- 8. To boot-up from floppy disk, follow the procedure below.
 - When the *Boot-up BIOS* screen appears, press the **DEL** or **Delete** key from the keyboard to enter the *BIOS Setup* screen.

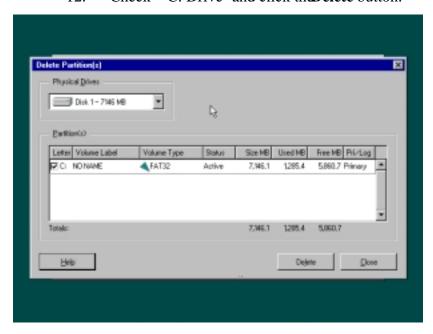
- Select "BIOS FEATURES SETUP". Press the **Enter** key.
- Select "Boot Sequence" item. The default setting is "C,A,SCSI". Change this setting to "A,C,SCSI" using the "Page Up" or "Page Down" keys.
- Press the **Esc** key to return to the *Main Setup* screen.
- Select SAVE & EXIT SETUP and press the **Enter** key.
- Press the Y key to save the BIOS setup changes and exit the BIOS setup utility.
- The system automatically reboots from the floppy disk.
- 9. The PowerQuest Drive Image window appears.

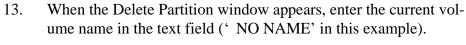


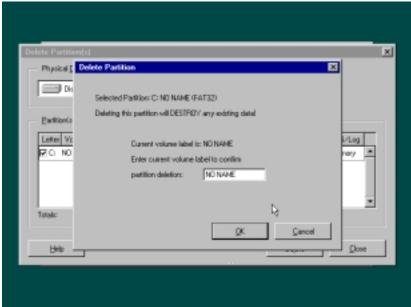


10. Select Delete Partition(s) from the **Tools** menu.

- 11. The current hard disk partitions are shown. All of these partitions must be deleted, and the PC NC hard disk image is to be cleared. Before executing this procedure, ensure there are backup copies of all CNC program files.
- 12. Check 'C: Drive' and click the Delete button.





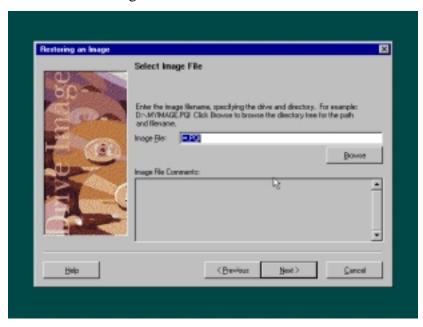


- 14. Click the **OK** button. When the confirmation window pops up, click the **OK** button again.
- 15. Check 'D: Drive' and click the Delete button.
- 16. When the Delete Partition window appears, enter the current volume name in the text field (' NO NAME' in this example).
- 17. Click the **OK** button. When the confirmation window appears, click the **OK** button again.
- 18. Check 'Extended Drive' and click the Delete button.
- 19. Click the **OK** button. When the confirmation window appears, click the **OK** button again.
- 20. At this point, only the "Free Space" partition should be visible.
- 21. Click the **Close** button to return to the main menu.

22. Click the **Restore Image** button.



23. Click the **Browse** button to pop a file selector dialog where an image can be selected.



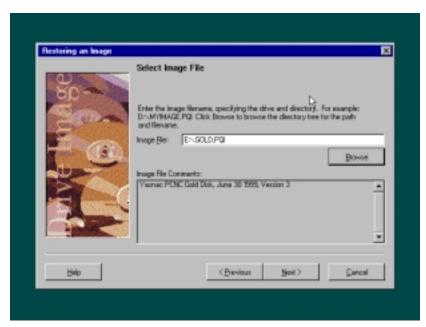
24. Select the 'E:' drive from the **Drive** drop-down menu. If the screen does not show the 'E:' drive, make sure the External CD drive is ready, and redo from the beginning.



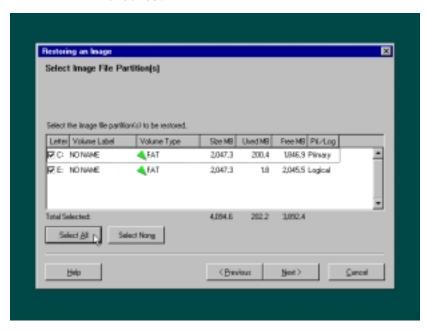
25. Select the file 'GOLD.PQI' from the list of files and click the **OK** button.



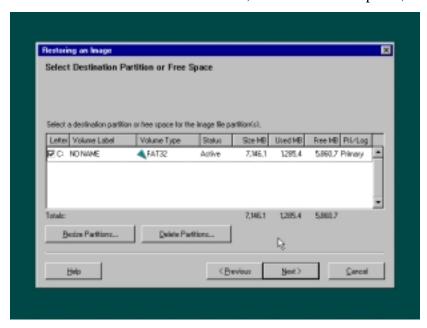
26. Click the **Next** button.



27. Click the **Select All** button. The 'C:' and 'E:' drive boxes are checked.



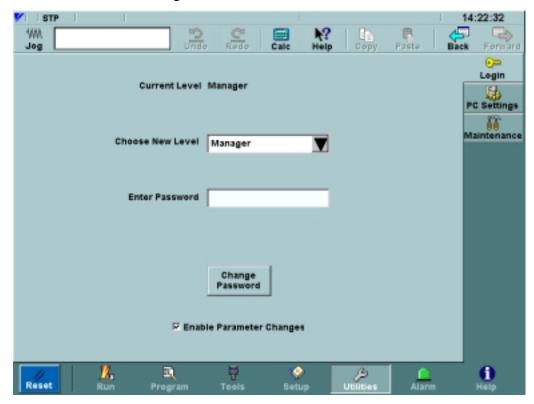
- 28. Click the **Next** button.
- 29. The Destination drive, which is 'Free Space', is shown.



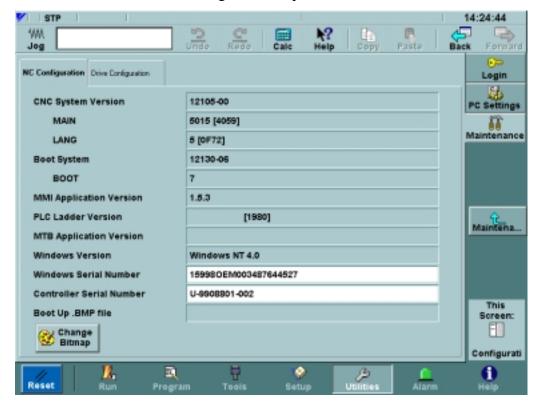
- 30. Ensure the check box is checked and click the **Next** button.
- 31. If the **Resize Option** pop-up menu is visible, select the option 'Leave remaining free space', then click**OK**.
- 32. Set the **Disk Write Mode** to 'Fast'.
- 33. When the final confirmation data is shown, click the **Finish** button.
- 34. Restoration of the image begins. This process takes a few minutes.
- 35. Pop up the result of image restoration. If there is an error, try again. If the error is persistent, a defective hard disk may be the cause.
- 36. Click **No** to view the result.
- 37. Go back to the main menu. Click the **Exit** button to close the Drive Image window.
- 38. Click the **Reboot** button. Do not take out the Drive Image floppy disk.

- 39. The PC NC begins to reboot and the Drive Image program restarts.
- 40. Click the **Exit** button to close the Drive Image window.
- 41. Exit to the DOS prompt.
- 42. Insert the Power Quest SID Changer disk into the floppy disk drive unit.
- 43. Using the keyboard, type 'sidchngr 0 \ winnt /and press Enter.
- 44. The SID changer begins changing SID in Windows NT.
- 45. Return to the DOS prompt when SID has been changed.
- 46. Power OFF the PC NC.
- 47. Take the SID changer floppy out of the floppy disk drive unit. Remove the external CD ROM drive unit from the LPT1 port.
- 48. Power ON the PC NC.
- 49. The PC NC screen should come up. If the screen does not appear, the hard disk may be defective; contact Yaskawa customer service.

50. Go to the Utilities: Login screen and log on as Manager level or higher.



51. Type in the Windows NT serial number from the *Microsoft Windows NT Certificate of Authenticity* book. Type in the Product ID using this example format: '12345-OEM-1234567-12345'.



52. Enter the CNC controller serial number from the PC NC CPU unit using this example format: 'U-9908801-002'.

- 53. Restore the CNC programs and High Speed Cutting parameters. Please refer to the previous sections for details on restoring these parameters.
- 54. Go to the Maintenance: Configuration screen and check the MMI application version. If this version is older than the Gold CD version, then a PC NC HMI software update is necessary. This process updates the PC NC system to use the latest HMI software version.
- 55. Change the BIOS setting to boot-up from the hard disk again, as follows below.
 - Power OFF the PC NC then Power ON the PC NC.
 - When the Boot-up BIOS screen appears, press the DEL or the Delete key from the keyboard to enter the BIOS setup screen.
 - Select "BIOS FEATURES SETUP" then press the **Enter** key.
 - Select "Boot Sequence". The setting shows "A,C,SCSI". Change this setting to "C,A,SCSI" using the Page Up or Page Down keys.
 - Press the **Esc** key to return to the Main Setup screen.
 - Select the "SAVE & EXIT SETUP" and press the **Enter** key.

- Press the Y key to save the BIOS setup changes and exit the BIOS setup utility.
- The system automatically reboots from the hard disk thereafter.

There are two components to the PC NC software. One is the PC NC HMI software on the hard disk, and the other is the PC NC motion card software on the motion board. This section explains how to update the PC NC HMI software on the hard disk.

Normally, it is not necessary to update the HMI software; however, this operation may be done if a software problem occurs or a software function update is required. Please contact a Yaskawa customer service representative to obtain the latest version of the software. Also, if continuing from the section on Hard Disk Restore Kit Option (UUX000046), this process is needed to update to the latest software.

There are two ways to update the HMI software. One is by using the External CD ROM Drive which is part of the Restore Kit option (UUX000046). The other method uses Toshiba Flash Path and Smart Media.

Parts information

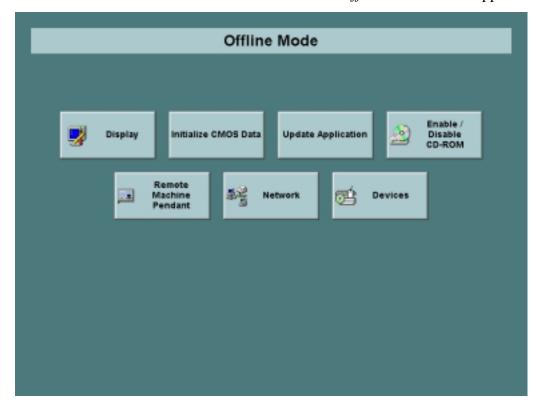
- * External CD ROM Drive EXP computer, INC CD-865 Yaskawa can supply this part. Restore Kit Option (UUX000046).
- * FlashPath
 TOSHIBA FlashPath PDR-FLP1
 TOSHIBA Smart Media PDR-SM16 (16MB)
 This can be purchased from a local vendor

When Using an External CD ROM

Software Update Using CD ROM:

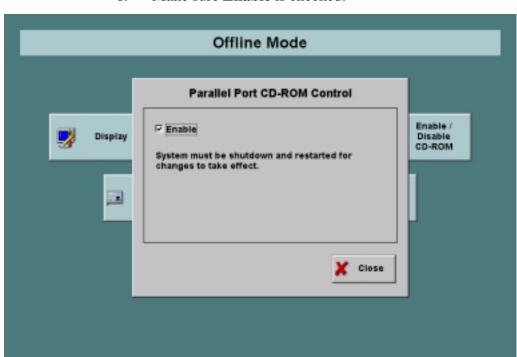
- 1. Power OFF the PC NC.
- 2. Change the JFC10 system number switch to 'E'.
- 3. Connect the external CD ROM drive to the CPU rack LPT1 port.

4. Power ON the PC NC. The *Offline Mode* screen appears.



5. Touch the **Enable/Disable CD-ROM** button.

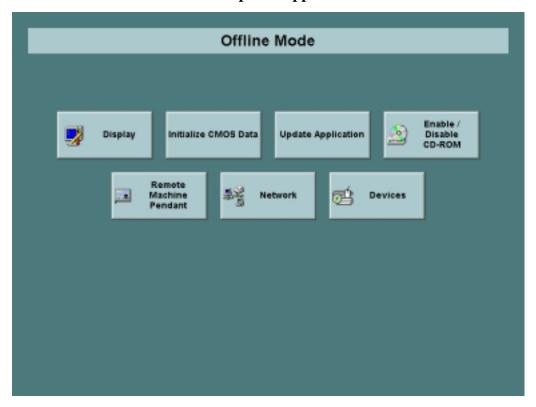




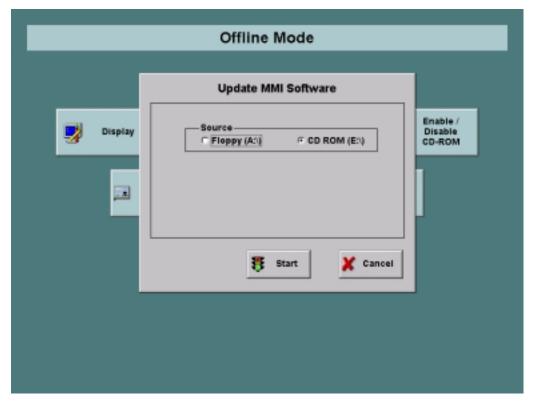
6. Make sure **Enable** is checked.

- 7. Touch the **Close** button.
- 8. Shut down the PC NC. Power OFF the PC NC. Power ON the PC NC.
- 9. Insert the YASANC PC NC Gold CD into the CD ROM.

10. Touch the **Update Application** button.



11. Select **CD ROM** (**E:**\) in the **Source** selection box.

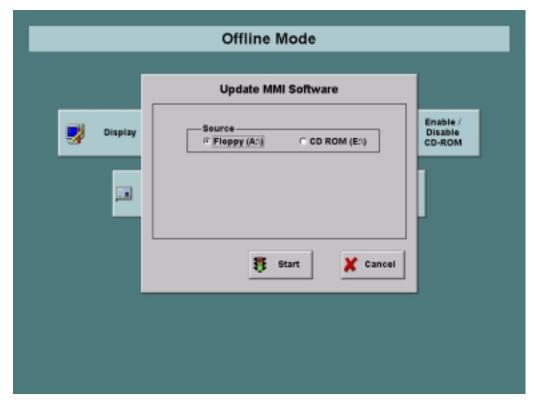


12. Touch the **Start** button

When Using FlashPath

Software Update Using FlashPath:

- 1. Call Yaskawa customer service to get the Yaskawa FTP site address, user name and password.
- 2. Access the Yaskawa PC NC FTP site and download the PC NC HMI software update.
- 3. Copy the file to the FlashPath. (A FlashPath driver is needed.) Copy all files in the root directory of FlashPath.
- 4. Power OFF PC NC.
- 5. Change the JFC10 system number switch to 'E'.
- 6. Insert FlashPath into the PC NC floppy disk drive unit.
- 7. Power ON the PC NC.
- 8. Touch the **Update Application** button.

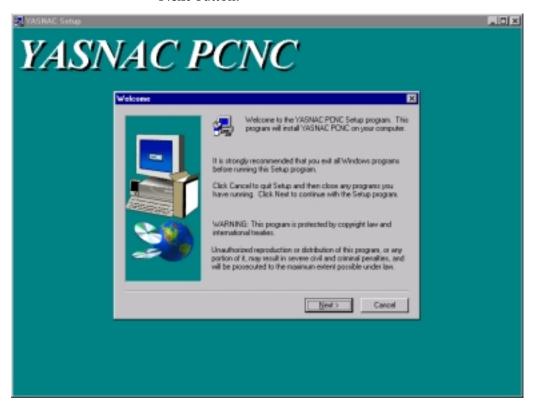


9. Select **Floppy** (**A:**\) in the **Source** selection box.

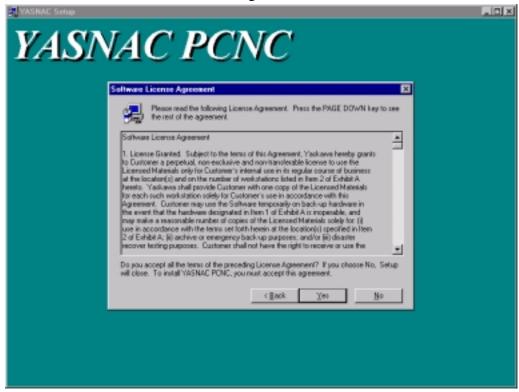
- 10. Touch the **Start** button.
- 11. Go to the Common Instructions section.

Common Instructions

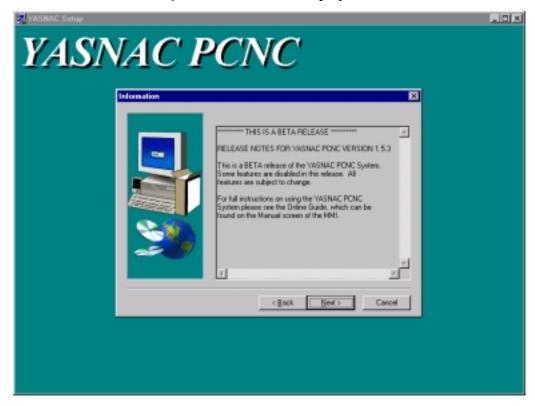
1. The YASANC PC NC Welcome window is displayed. Select the **Next** button.



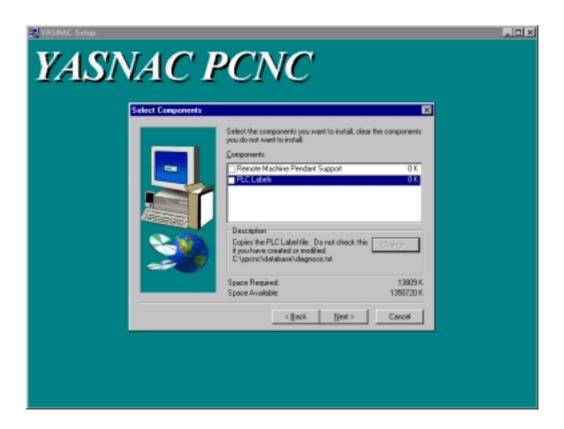
2. The *Software License Agreement* screen is displayed. Click the **Yes** button to agree.



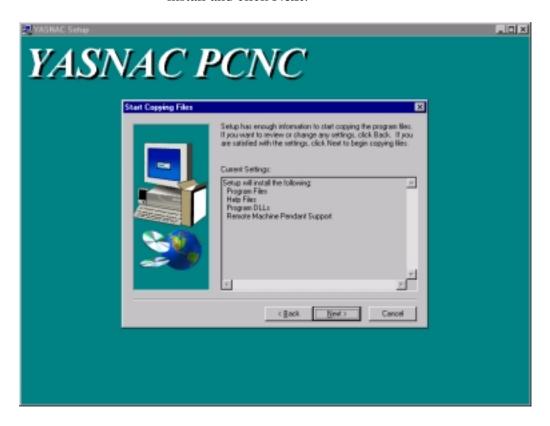
3. An *Information* screen is displayed. Select the **Next** button.



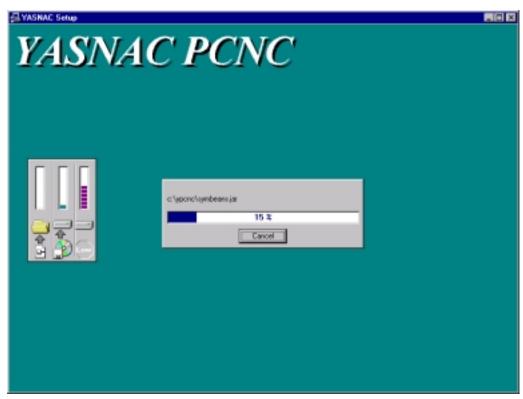
- 4. The *Select Components* screen is displayed. There are two selections:
 - * Remote Machine Pendant Support this is for support of the YASNAC Remote Machine Pendant option. If there is a Remote Machine Pendant, check this box.
 - * **PLC Labels** this is for the *PLC Diagnosis* screen I/O signal label file. If this box is checked, the Installer installs the standard Yaskawa PLC label file. If there is a customized PLC label file supplied by an MTB, that file will be lost.



5. The *Start Copying Files* screen is shown. Check the items to install and click **Next**.



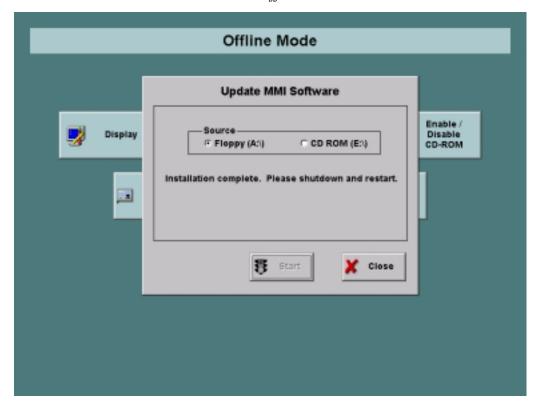
6. The Installer begins to install the software. Wait until it finishes.

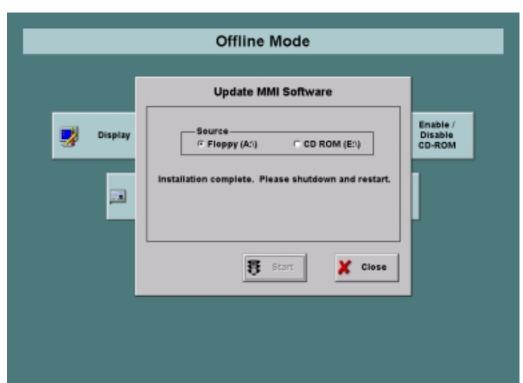


7. The *Setup Complete* screen is displayed. Click the **Finish** button.



8. Go back to the *Offline Mode* screen.





9. Touch the **Close** button. Touch the **Enable/Disable CD-ROM** button and uncheck the **Enable** check box.

- 10. Select the **Close** button. If the external CD enable switch is not turned off, the PC NC displays a Windows NT error during the next startup.
- 11. Select the Shut Down switch and power OFF the PC NC.
- 12. Change the JFC10 system number switch to '0'.

8.2 Yasnac PC NC CPU Rack BIOS Setup

The following procedure describes the necessary steps to properly set up the BIOS (Basic Input Output System) of the Yasnac PC NC CPU rack motherboard.

The following setup and setup screens apply to the AOpen AX5TC motherboard with BIOS version R1.2.

Starting the BIOS Setup

When power is applied to the CPU rack, the motherboard starts (boot-up) and the BIOS initially shows the following *POST* (*Power-On Self Test*) screen:



This screen shows the BIOS version (release), processor type, amount of memory and hard disk drive model.

The motherboard BIOS version should be R1.2, which appears in the upper-left corner of the initial *POST* screen at boot-up. The version starts with an R and is found between the motherboard model name and the BIOS release date (as shown in the line "AX5TC R1.20 Jul.30.1998

AOpen Inc."). The CPU rack reports the use of one of the following processor types:

- Cyrix 6x86MX-PR200 processor. BIOS reports "6x86MX-PR200 CPU Found" (the BIOS may also report "Cyrix M II/IBM 6x86MX-200 CPU Found").
- Intel Pentium MMX 233Mhz processor. BIOS reports "PENTIUM-MMX CPU at 233MHz".

Press the **DEL** or **Delete** key to enter the *BIOS Main Setup* screen. This screen is available for only a few seconds; press the key as soon as this screen is shown. If the key is not pressed in time, please power the unit OFF and ON to reboot the system, or press the **Ctrl-Alt-Del** keys simultaneously to start the reboot.

Note: The mouse and touchscreen are inoperable while the CPU rack is in the BIOS setup mode. Use only the keyboard for BIOS setup.

The arrows shown on the side of some lines on the screens are to 'point-out' a particular line or area on the screen and are not part of the actual screen.

BIOS Main Setup Screen

The following screen appears after pressing the **DEL** or **Delete** keys at boot-up. This screen shows several setup options, but the BIOS automatically selects the first available option (Standard CMOS Setup).

Start the setup with this selection by pressing **Enter** on the keyboard. The BIOS changes to the *Standard CMOS Setup* Screen.



Standard CMOS Setup Screen

This screen is used to set-up the system time and date, as well as the hard disk and floppy disk drive type. To move between the available options, use the cursor keys to select the desired item. To modify each option, use the **Page Up** and **Page Down** keys to scroll through all the available selections. These and other functions are shown in the area at the bottom of the screen.

- Start by setting the correct date in mm:dd:yy format (month, day, year). The day of the week is automatically set depending on the date.
- Set the correct time in hh:mm:ss format (hour, minute, second).
- Set the Primary Master hard disk type and mode to 'AUTO', as shown.
- Set the rest of the hard disk types to 'None'. Mode is automatically set to '-----'.
- Set the Drive A floppy disk drive to 1.44M, 3.5 in.
- Set the Drive B floppy disk drive to None.
- Set video type to EGA/VGA.
- Set Halt On to:
 - * 'All Errors' for systems in which a keyboard is permanently attached to the CPU rack, so BIOS can detect the keyboard at boot-up (standard setup).
 - * 'All But Keyboard' for systems without a keyboard, so BIOS boot-up does not stop and report an error if a keyboard is not attached to the CPU rack (optional setup).
- Press the **Esc** key to return to the *Main Setup* screen.

BIOS Features Setup Screen

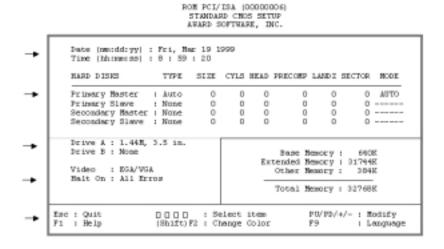
From the *Main Setup* screen, use the cursor keys to select the BIOS features setup option and press the **Enter** key.

- Press the **F7** key (Load Turbo defaults option).
- The BIOS displays the following message:

Load Turbo Defaults for this page(Y/N) ? N

- Press the Y key to allow the loading of the turbo defaults.
- Using the cursor keys, select the Boot Sequence option.
- Change this option from "A,C,SCSI" to "C,A,SCSI" using the Page Up or Page Down keys.

- Ensure all the options are set as desired.
- Press the **Esc** key to return to the *Main Setup* screen.,



Chipset Features Setup Screen

From the *Main Setup* screen, use the cursor keys to select the CHIPSET FEATURES SETUP option and press the **Enter** key.

- Press the **F7** key (Load Turbo defaults option).
- The BIOS displays the following message:

Load Turbo Defaults for this page(Y/N) ? N

- Press the Y key to allow the loading of the turbo defaults.
- Ensure all the options are set as desired.
- Press the **Esc** key to return to the *Main Setup* screen.

ROM PCI/ISA (000000006) CHIPSET FEATURES SETUP AWARD SOFTWARE, INC.

```
Auto Configuration
                           : Enabled
DRAM Timing
                           : 60ns
DRAM Leadoff Timing
                           : 10/6/3/3
DRAM Read Burst (EDO/FP)
                           : x222/x333
DRAM Urite Burst Timing
                           : x222
Fast EDO Lead Off
                           : Disabled
Refresh RAS# Assertion
                          : 5 Clks
DRAM Page Idle Timer
                          : 6 Clks
DRAM Enhanced Paging
                           : Enabled
SDRAM(CAS Lat/RAS-to-CAS) : 3/3
                        : Disabled
SDRAM Speculative Read
System BIOS Cacheable
                           : Enabled
Video RAM Cacheable
                          : Enabled
                                                            0000 : Select item
                                         Esc : Ouit
8 Bit I/O Recovery Time
                           : 4
                                         F1 : Help PU/PD/+/- : Modif
F5 : Old values (Shift)F2 : Color
                                                           PU/PD/+/- : Modify
16 bit I/O Recovery Time : 1
Newory Hole At 15M-16M : Dismbled
                                        F6 : Load Setup Defaults
PCI Passive Release
                           : Disabled
                                       F7 : Load Turbo defaults
F9 : Switch Language
PCI Delayed Transaction
                           : Disabled
Mem. Drive Str. (MA/RAS)
                          : 16mk/10mk
```

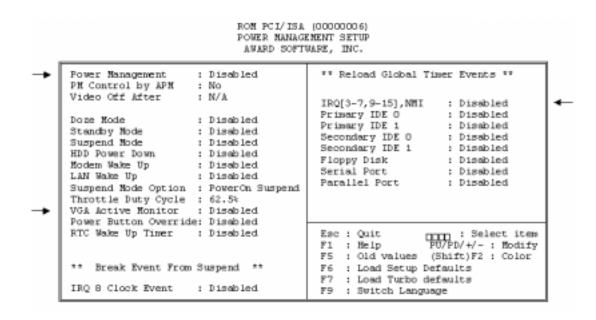
Power Management Setup Screen

From the *Main Setup* screen, use the cursor keys to select the POWER MANAGEMENT SETUP option and press the **Enter** key.

- Press the **F7** key (Load Turbo defaults option).
- The BIOS displays the following message:

Load Turbo Defaults for this page(Y/N) ? N

- Press the Y key to allow the loading of the turbo defaults.
- Using the cursor and Page Up/Page Down keys, select and modify the following options as shown:
 - * **Power Management** option from "User Define" to "Disabled".
 - * PM Control by APM option from "Yes" to "No"
 - * Video Off After option from "Standby" to "N/A"
 - * VGA Active Monitor option from "Enabled" to "Disabled"
 - * Power Button Override option from "Enabled" to "Disabled"
 - * IRQ[3-7,9-15],NMI option from "Enabled" to "Disabled"
- Ensure all the options are set as desired.
- Press the **Esc** key to return to the *Main Setup* screen.



PNP/PCI Configuration Screen

From the *Main Setup* screen, use the cursor keys to select the "PNP/PCI CONFIGURATION" option and press the **Enter** key.

- Press the **F7** key (Load Turbo defaults option).
- The BIOS displays the following message:

```
Load Turbo Defaults for this page(Y/N) ? N
```

- Press the Y key to allow the loading of the turbo defaults.
- Using the cursor keys, select the "IRQ-9 assigned to" option.
- Change this option from 'PCI/ISA PnP' to 'Legacy ISA' using the Page Up or Page Down keys.
- Ensure all the desired options are set.
- Press the **Esc** key to return to the *Main Setup* screen.

ROM PCI/ISA (000000006) PNP/PCI CONFIGURATION AWARD SOFTWARE, INC.

```
PCI IDE IRQ Map To
PNP OS Installed
                                                                  : PCI-AUTO
Resources Controlled By : Manual
                                            Primary IDE INT#
                                                                  : 4
Reset Configuration Data : Disabled
                                            Secondary IDE INT#
                                                                  : B
IRQ-3 assigned to : Legacy ISA
                                           Use MEM base addr
                                                                  : NA
IRQ-4 assigned to : Legacy ISA
IRQ-5 assigned to : PCI/IS& PnP
IRQ-7 assigned to : PCI/ISA PnP
                                           PCI Slot1 IRQ (Right) : Auto
IRQ-9 assigned to : Legacy ISA
                                           PCI Slot2 IRQ : Auto
IRQ-10 assigned to : PCI/ISA PnP
                                           PCI Slot3 IRQ
                                                                  : Auto
IRQ-11 assigned to : PCI/ISA PnP
                                           PCI Slot4 IRQ (Left) : Auto
IRQ-12 assigned to : PCI/ISA PnP
IRQ-14 assigned to : PCI/ISA PnP
IRQ-15 assigned to : PCI/ISA PnP
                                                           OCCO : Select item
DNA-D assigned to : PCI/ISA PnP
                                           Esc : Quit
                                           Fi : Help PU/PD/+/- : Modify
F5 : Old values (Shift)F2 : Color
DMA-1 assigned to : PCI/ISA PnP
DMA-3 assigned to : PCI/ISA PnP
DMA-S assigned to : PCI/ISA PnP
                                           F6 : Load Setup Defaults
DMA-6 assigned to : PCI/ISA PnP
                                               : Load Turbo defaults
DMA-7 assigned to : PCI/ISA PnP
                                           F9 : Switch Language
```

Integrated Peripherals Setup Screen

From the *Main Setup* screen, use the cursor keys to select the INTE-GRATED PERIPHERALS option and press the **Enter** key.

- Press the **F7** key (Load Turbo defaults option).
- The BIOS displays the following message:

```
Load Turbo Defaults for this page(Y/N) ? N
```

- Press the Y key to allow the loading of the turbo defaults.
- Using the cursor keys, select the USB IRQ Released option.
- Change this option from 'No' to 'Yes' using the age Up or Page Down keys.
- Using the cursor keys, select the 'Parallel Port Mode' option.
- Change this option from 'SPP' to 'ECP+EPP' using the Eage Up or Page Down keys. The line "ECP Mode Use DMA: 3" appears in the upper right-hand corner of the screen.
- Ensure all the options are set as desired.
- Press the **Esc** key to return to the *Main Setup* screen.

ROM PCI/ISA (00000006) INTEGRATED PERIPHERALS AWARD SOFTWARE, INC.

```
IDE HDD Block Mode
                         : Enabled
                                           ECP Mode Use DMA
                                                                     : 3
IDE Primary Master PIO
IDE Primary Slave PIO
                         : Auto
                         : Auto
IDE Secondary Master PIO : Auto
IDE Secondary Slave PIO : Auto
IDE Primary Master UDMA : Auto
IDE Primary Slave UDMA : Auto
IDE Secondary Master UDMA: Auto
IDE Secondary Slave UDMA: Auto
On-Chip Primary PCI IDE: Enabled
On-Chip Secondary PCI IDE: Enabled
USB Legacy Support
                         : Disabled
USB IRQ Released
                         : Yes
                                                             DDDD : Select item
PU/PD/+/- : Modify
Onboard FDC Controller : Enabled
                                           Esc : Quit
Onboard Serial Port 1
                         : 3FB/IRQ4
                                           F1 : Help
Onboard Serial port 2
                         : 2FB/IRQ3
                                                              (Shift) F2 : Color
                                           F5 : Old values
Onboard UART 2 Mode
                         : Standard
                                           F6 : Load Setup Defaults
                         : 378/IRQ7
Onboard Parallel Port
                                           F7
                                               : Load Turbo defaults
Parallel Fort Mode
                         : ECP+EPP
                                           F9 : Switch Language
```

BIOS Setup Save

From the *Main Setup* screen, use the cursor keys to select SAVE & EXIT SETUP and press the **Enter** key.

• The BIOS displays the following message:

```
Save to CMOS and EXIT (Y/N) ? N
```

- Press the Y key to save the BIOS setup changes and exit the BIOS setup utility.
- The system automatically reboots and the BIOS setup is finished.

Note: Do not press any keys after the BIOS setup is finished, until the system reboots.

BIOS Boot Message

After the system boot process has been completed and the initial boot screen appears, the BIOS generates the following screen showing the current device and resource settings. Depending on the type of processor used, the screen shows one of the following settings for CPU type and CPU clock:

• For Cyrix 6x86MX-PR200 processor:

CPU Type: 6x86MX CPU Clock: PR200

For Intel Pentium MMX 233Mhz processor:

CPU Type: PENTIUM-MMX

CPU Clock: 233MHz



8.3 PLC Label in Diagnosis and Parameter Screens

Diagnosis Screen

Labels for the *Utilities: PLC Diagnosis* screen are stored in the text file 'c:\ ypcnc\ database\ diagnosis.txt.



The file has an entry for each labelled bit, and the entry contains address, label, and detail. For example, the selected bit may have the following entry in the labels file:

• #30042 STLK ; Start Interlock

Each line must begin with a '#', followed by the 4 digit byte number, then the bit number. If the address is byte data, there is no need to specify the bit number, and byte labels are displayed in the bit 0 position. Bit numbers range from 0 to 7, not 1 to 8. Next, there are two spaces, then the label that appears about the bit. Bit labels can contain up to 7 characters. Finally, a semicolon is used to show the start of any details string that may appear in the Details box at the bottom right corner of the window. If none of this

information is present, both details and labels are blank. For example, the entry in the label file for the fourth bit in that row appears as below.

• #30043

As a final example, the label file entries for byte 3002 appear below.

```
#30020 JV1 ; Manual Jog Feedrate Selection
#30021 JV2 ; Manual Jog Feedrate Selection
#30022 JV4 ; Manual Jog Feedrate Selection
#30023 JV8 ; Manual Jog Feedrate Selection
#30024 JV16 ; Manual Jog Feedrate Selection
#30025 MP1 ; Manual Pulse Multiplication Ratio
#30026 MP2 ; Manual Pulse Multiplication Ratio
#30027 MP4 ; Manual Pulse Multiplication Ratio
```

The labels for the addresses in the following ranges are PC NC specific. These labels must remain in the labels file, and they may not be edited:

- #3000~#3159
- #3500~#3749

The addresses in the following ranges are for MTB signals; an MTB can customize their labels.

- PLC Input from Machine #1000~#1077
- PLC Output to Machine #1100~#1175
- Internal Relay #1200~#1299
- Internal Relay #1400~#1699
- Internal Relay #1800~#2999
- Timer #1700~#1799
- Timer #1300~#1399
- Keep Relay #7100~#7999
- Keep Memory #8000~#9999

PLC Parameters Screen

The labelling scheme for the *Utilities: PLC Parameters* screen is similar to that for the *Utilities: PLC Diagnosis* screen. Labels for the *Utilities: PLC Parameters* screen are stored in the text file 'c:\ ypcnc\ database\ plc_param.txt'.



The file has an entry for each labelled bit, and the entry contains address, label, and detail.

Below is an example of a typical label file.

- ; This file is for PLC parameter label table for PLC parameter screen.
- ; Specify the PLC parameter number by pound code and 5 digit address.
- ; Specify the address name up to 7 characters.
- ; ; is for comment.
- ; Example
- #70000 ATC 8 #70001 ATC16 #70002 APC op

#70003 Robot

- ; ATC 8 pot
- ; ATC16 pot
- ; APC option
- ; Robot option

8.4 CNC Card Software Update

The JZNC-JFC10 card (JFC20+JCP20) in the PC NC CPU rack is the CNC card. This card contains flash memory that is used for CNC system software. This memory needs to be updated when the CNC software is updated.

There are two ways to update CNC software. One method uses the external CD ROM drive which is in the Restore Kit option (UUX000046). The other method is to use Toshiba Flash Path and Smart Media.

Before updating CNC system software, back-up all CNC parameters, tool offsets, work shifts, and pitch error data. This data can then be restored at any time.

Updating CNC software may create software compatibility problems. Most software is designed for backwards compatibility, but sometimes new software requires other new software, such as HMI software. Please do not update NC software without first confirming with the Yaskawa customer service. Also, since the MTB ladder code is not a Yaskawa product, please contact MTB service if updating the machine ladder.

Using External CD ROM

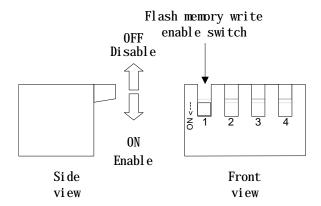
- 1. Power OFF the PC NC.
- 2. Change the JFC10 system number switch to 'E'.
- 3. Connect the external CD ROM drive to the CPU rack LPT1 port.
- 4. Power ON the PC NC.
- 5. Touch the **Enable/Disable CD-ROM** button.
- 6. Verify **Enable** is checked.
- 7. Touch the **Close** button.
- 8. Shut down the PC NC. Power OFF the PC NC. Power ON the PC NC.
- 9. Go to the Common Part section on the following page.

Using Flash Path

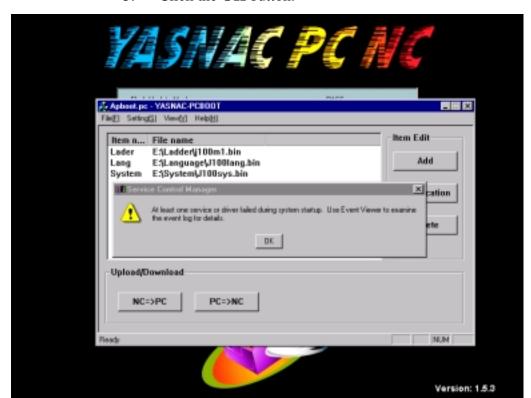
- 1. Call Yaskawa customer service to obtain the Yaskawa FTP site address, user name, and password.
- 2. Access the Yaskawa PC NC FTP site and download the PC NC CNC software update.
- 3. Copy the file to the FlashPath. (A FlashPath driver is needed.)
- 4. Go to the Common Part section below.

Common Part

- 1. Power OFF the PC NC.
- 2. Change the JFC10 CNC card DIP switch on the JCP20 side SW1 bit 1 to on.



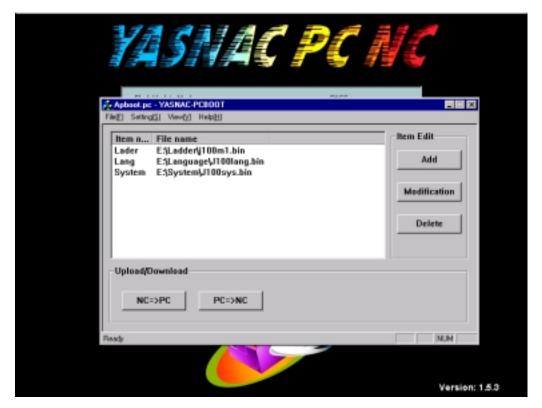
- 3. Power ON the PC NC.
- 4. The PC NC boots up and displays a Windows error message.



5. Click the **OK** button.

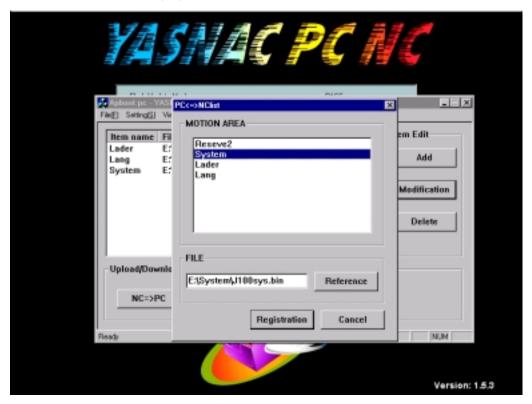
- 6. Insert the Gold CD into the external CD ROM or the Toshiba FlashPath into the floppy disk drive unit.
- 7. The PC NC displays a flash memory utility called 'Apboot'.
- 8. Touch the item named 'System'. A default file, 'E:\System\J100sys.bin', is selected for the external CD ROM. If using an external CD ROM, go to step 15.

9. If using FlashPath, the directory must be changed. Select 'System' and click the **Modification** button.



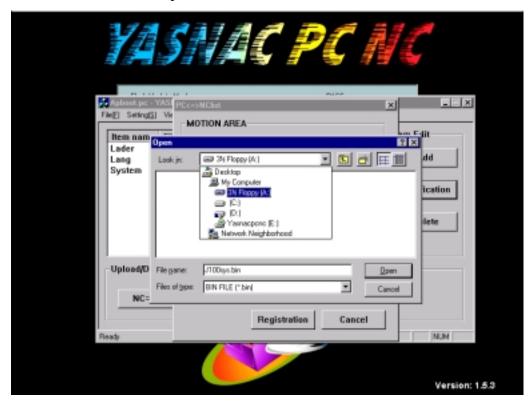
10. Click the **Reference** button to pop up the file browser.

11. Touch the **Look In** drop down menu and select ' 3 1/2 Floppy (A:)'.



- 12. Select the J100 System file for uploading.
- 13. Touch the **Open** button so the 'A:' drive file is selected to upload.

14. Touch the **Registration** button to register the file location to Apboot.



Version: 1.5.3



15. Select 'System' from the list, then touch the PC=>NC button.

Version: 1.5.3

Setting[S] Vie m Edit Lader E/L Item System Add Lang Ε/μ System A:M FILE NAME A:JJ100sys.bin **Medification** MONITOR ERROR Delete no error 0179 / 3072 [KBYTE] I Upload/Downl PROM [HEX] NC=>PC PAUSE NUM

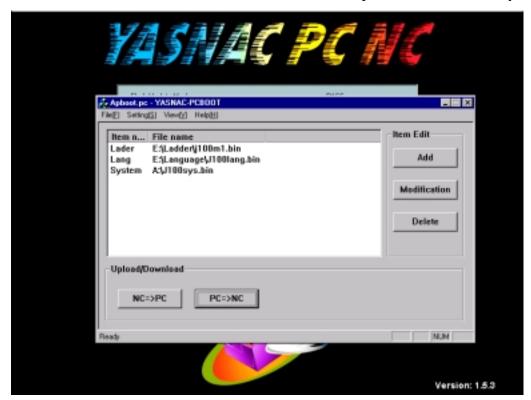
16. Apboot begins uploading the CNC system to the CNC card flash memory. Progress is shown in the status bar.

- 17. When Apboot has finished, it displays the total check sum.
- 18. Click the **End** button to go back to the Apboot main menu.

19. Continue uploading 'Lang' and 'Ladder' if necessary. 'Lang' is the NC card language system and 'Ladder' is the PLC ladder program of the machine.



20. Click the **Close** button in the upper right corner to close Apboot.



21. Click the **Shut Down** button on the screen. (Note: The **Shut Down** button on the CRT/LCD panel does not currently work.)

- 22. Power OFF the PC NC.
- 23. Change the JFC10 CNC card DIP switch on JCP20 side SW1 bit 1 to off.
- 24. If this software update has finished using an external CD drive, do not forget to turn off the external CD drive. Change the JFC10 system number switch to 'E'.
- 25. Power ON the PC NC. Touch the **Enable/Disable CD-ROM** button and uncheck the **Enable** check box.
- 26. Select the **Close** button. Click the **Shut Down** button on the CRT panel.

8.5 Manual Page Customization

Setting the Help Page for the Machine Manual

Manual pages are all done in HTML. Machine tool builders can customize the manual pages by linking to their own documentation. Before setting the HTML files to be used for the machine manual, ensure that the files are stored in the 'htmlroot' directory.

Setting the starting page of the manual:

- 1. Determine the location of the help home page, which is saved in the 'home' variable defined in the 'trouble.properties' file.
- 2. Open the help home page file to view the source code.
- 3. Search for any occurrences of "authoring.html"
- 4. If the phrase "Machine Manual" appears near a matching line, replace the string 'authoring.html' with the URL to be used for the user manual.
- 5. To replace the table of contents, search in the help home page file again for "authoring.html", but this time look for a line with the phrase 'Table of Contents'. Replace the string 'authoring.html' with the url to be used for the table of contents.
- 6. To replace the index, search in the help home page file again for "authoring.html", but this time look for a line with the word 'Index'. Replace the string 'authoring.html' with the url to be used for the index.

Context Sensitive Help

Context sensitive help is the pop-up help associated with some of the user interface components of the PC NC MMI. In 'application.properties', the file that stores all the HTML links for context sensitive help is defined as 'helpFile'. The file of link is most likely named 'help.text'.

The 'help.text' file contains information to link specific components on the screen to portions of the help documentation. Currently, not all items on the screen have specific help files associated with them. A typical entry in the 'help.text' file may look like this:

FileManager.renameButton|Rename|Pops rename dialog|man-ual/UserManual-6.html#RenameMarker

Each line consists of several pieces of data separated by a ' |'. The first item listed is the object descriptor. This is of the format screen.widget_name, where widget_name is defined in the code. The next item is the title that is shown at the top of the pop-up help. Following that is a string that gives a short description of the component's functionality. The final item is an HTML link that determines what is shown if the user requests more information on a particular component. Help for screens is quite similar. Below is a typical entry:

RunProveout.screen | Run Proveout Screen | Run Proveout Screen | manual / UserManual - 5.html #RunProveoutMarker

To customize the help for a particular component or screen, the final item, in this case 'manual/UserManual-5.html#RunProveoutMarker', is replaced with a link to the new html help page.

8.6 Properties File Customization

Each screen in the PC NC MMI may have a properties file with which it is associated. This allows the screen to have modifiable properties without code changes. Some examples are:

- fileManager.properties defines directory choices in file manager drop down.
- tempSensor.properties defines limits for CPU temperature and fan speed.
- Button parameter screens, such as Offline Mode or Utilities: PC Settings screens - each screen is a shared instance of the same screen object but with different properties.

Environment Variables and Directories

Many items in the properties files use environment variables instead of directory names. Environment variables are defined in the 'application.properties' file. When a environment variable is referenced in another properties file, is flanked by '%' to indicate that is an environment variable. For example, the following environment variable, MMIDATABASE, is defined in the 'application.properties' file as follows:

```
MMIDATABASE = C:\\ypcnc\\database
```

Now other things may be defined using this macro. For example, if the help file is 'C:/ypcnc/database/help.text', a properties file entry may be:

```
helpFile = %MMIDATABASE%\\help.text
```

Macros may be defined using other macros:

```
MMIDRIVE = C:

MMIROOT = %MMIDRIVE%\\ypcnc

MMIDATABASE = %MMIROOT%\\database
```

When defining subdirectories, note that ' \setminus ', not ' /', is required between subdirectory names.

Properties File Entries For Menus

Some properties files have entries that are used to specify what items are shown in a drop-down menu on a particular screen. These files all use the same format to describe the drop-down menu entries. For each item in the drop-down menu, a text value and image must be specified.

Drop-down Menu Information

Variable	Meaning
menultemCount	Number of items in the drop-down menu
menultemPrefix	Prefix used when listing menu items in this file

For example, a drop-down menu may contain three items. Which are indicated in the properties file as ' foo'? The properties file has the following entries:

```
menuItemCount = 3
menuItemPrefix = foo

foo1 = %MMIDATA%\\
foo1.image = file/disk.gif

foo2 = A:\\
foo2.image = file/floppy.gif
```

Property File Entries for Buttons

When buttons are shown on a screen, such as the Offline Mode or Utilities: PC Settings screens, there is a common format used in properties files that is used to specify all the information about the functionality and appearance of the button. For example, below is a properties file entry for the **Console Window** button.

```
button1 = console
console.label = Console Window
console.image = system/msdos.gif
console.disimage = system/msdos_dis.gif
console.executable = %MMIBIN%\\command.lnk
console.windowName = Command
console.security = 4
```

When there are multiple buttons defined in a file, they are listed as button1, button2, etc. The first item defines the variable name used for button1 (i.e., "console"). This variable name is used when setting the properties for that button.

Button Properties

Variable	Meaning
label	Label on button
image	Image shown when button is enabled
disimage	Image shown when button is disabled.
executable	Location of executable associated with this button
windowName	Name of the window, which is shown in the title bar
security	Controls which user levels (such as Manager, MTB, etc.) can access this button. If the current user is below the specified level, the button is disabled

File 'application.properties'

The 'application.properties' is the file to which all directory paths are set. Also specified are items such as environment variables and locations for programs and backup data.

Application Properties

Variable	Meaning
menus	Sets the name of the menus file. Normally it is com.yaskawa.winnc.properties.menus; however, it can be set to a different file.
diagmode	Diagnostic mode. If set to 1, the diagnostic panel stays up after startup.
autopop	If set to nonzero, the diagnostic panel auto pops. This only affects realmode = 1. Auto pop is always off in fake mode
developerFlag	To enable Alt-F4, set developerFlag = 1.
watchdogFlag	This flag signals the MMI to start watchdog timers monitoring the polling loops. If a watchdog timer times out then the application shuts down, so when developers are debugging the application they should set this to 0.
NumberField.pad- RightZeros	If padRightZeros is set to 1, YNumberFields always show 3 decimal places in metric mode and 4 in inch mode. If set to 0, padding on the right is not done while the user is typing. In either case, all decimal places are shown when the field is not in focus.
Grid.style	Style of grids in the MMI (always 3).
helpFile	The location of the help file.
defaultHelpString	The default string for the help manager, which appears if no help is defined for a specific component.
persistenceFile	The location of the persistent data file.

Environment Variables

Variable	Meaning
MMIDRIVE	All execution files related to the mmi are on the same drive
MMIDATADRIVE	All user files are on a different drive
MMIROOT	Root directory name for the mmi
MMIRUN	Startup directory for the mmi
MMIDIR	Root for the mmi development files
MMIGCODE	Root location for user gcode files
MMIMACRO	Location of gcode macro files
MMIBIN	Location of binaries
MMIDATA	Location of persistent information files and parameter backups
MMIDATABASE	Location of database files for labels
MMIHTML	HTML root

File 'diagnosis.properties'

The 'diagnosis.properties' file has one entry, which is used to specify the location and name of the label file for the *Utilities: PLC Diagnosis* screen. The entry appears as:

```
label_file = %MMIDATABASE%\\diagnosis.txt
```

where MMIDATABASE is an environment variable defined in the 'application.properties' file. Note that ' \setminus ', not '/', is required between subdirectory names.

File 'fileManager.properties'

The 'fileManager.properties' file is used to define which directories are available in the **Look In** drop-down menu of the *Program: File* screen. Also affected are drop-down menus in the Save As and New File dialogs accessible from the Program: File and Program: Editor screens. In addition to a directory name and image, each item in the menu can also have an associated access level. This is done by setting the access property of the item to either 'full' or 'copy'. A simple fileManager.properties file may appear as below.

```
# number of menu items
menuItemCount = 2

# menu item prefix
menuItemPrefix = item

item1 = %MMIGCODE%\\
item2 = A:\\
item1.access = full
item2.access = copy

item1.image = file/disk.gif
item2.image = file/floppy.gif
```

File 'jnc.properties'

The 'jnc.properties' file contains the following jnc specific parameters:

Variable	Meaning
realmode	The default jnc mode. To use "fake mode" (no J100 card), set realmode = 0
runmode	Run mode. If set to 0, the jnc thread is not started. Default is 1.
ipaddress openmode	Address and mode for the jnc
diagmode	Diagnostic mode. If set to 1, the diagnostic panel stays up after startup.
hscDataFile	High speed cutting data file
dirDataFile	Directory data file
start_directory	Start directory
file_proc	Second process. These are the file servers to choose from: file_proc = %MMIBIN%\\vbTestd2.exe file_proc = %MMIBIN%\\fileProc.exe file_proc = %MMIBIN%\\fileWinProc.exe

File 'maintConfig.properties'

The 'maintConfig.properties' file is used to define which directories are available in the *Change Bitmap* dialog's drop-down menu when the **Change Bitmap** button on the **NC Configuration** tab of the *Maintenance: Configuration* screen is clicked. A simple 'maintConfig.properties' file may contain:

```
# number of menu items
menuItemCount = 1

# menu item prefix
menuItemPrefix = item

item1 = %MMIDATA%\\
item1.image = file/disk.gif
```

File 'menus.properties'

The menu tree is determined by the text file "menus.properties". An arbitrary number of screens are supported and the menus can be two or more deep. The first level menu items appear at the bottom of the screen. The second level menu items appear on the right. The third and higher level menu items appear as button screens. When showing the screen, the menu text and image are shown on the bottom right. The *MMI Map* screen is generated directly from the 'menus.properties' file.

Each node of the menu tree consists of an entry containing the node name and node properties:

Variable	Meaning
label	The node label (required)
image	The associated gif (not required)
class	The screen associated with this menu item (this is a subclass of com.yaskawa.winnc.framework.Screen) (required)
properties	The property file for the screen (not required)
shared	A flag to indicate if the screen is shared (not required)
column	The column for the menu item for third and higher level menus. (not required)
labelBefore	The label to put above the column for third and higher level menus (not required)

The menus.properties entry for the top level Run menu and the first second level screen, Run: Production appears below.

```
menu1 = run

run.label = Run

run.image = mmi/Run.gif

run.menu1 = production

run.production.label = Production

run.production.class = com.yaskawa.winnc.screens.RunProduction

run.production.image = mmi/production.gif
```

Menus and submenus in the file are listed as menu1, menu2, etc. The Screen Manager searches first for menu1 = firstname, then for firstname.menu1 = firstsubname. The next top level menu is menu2 = second-

name. The first line sets the name of menu1 to 'run', which is used to set properties in subsequent lines.

A shortcut entry is associated with a node and contains the shortcut name and shortcut properties:

Variable	Meaning
label	The shortcut label (required)
image	The shortcut image (not required)
usl	The shortcut usl (required). USL = "Universal Screen Locator". It is the fully qualified name of the screen node as defined in the menus file. Examples are 'run', 'run.production' and 'utils.maint.NCparameters.machine.servo.vibration'

Below is an example of shortcuts in the properties file:

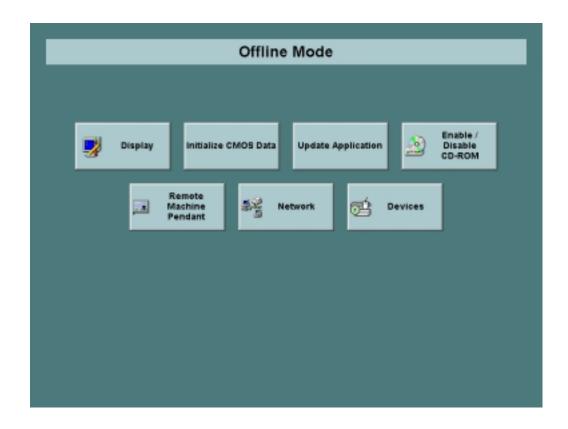
```
run.production.shortcut1 = offsets
run.production.offsets.label = Offsets
run.production.offsets.image = mmi/offset00.gif
run.production.offsets.usl = tools.offsets

run.production.shortcut2 = open
run.production.open.label = File
run.production.open.image = mmi/filefolder.gif
run.production.open.usl = program.open
```

File 'offline.properties'

Properties for the Offline Mode screen are set in 'offline.properties':

Variable	Meaning
logOff	Log Off Flag. If logOff = 1, Windows closes when the Shutdown button is pressed.
apboot.executable	Location of apboot executable



The applications accessible by clicking buttons on this screen are also defined within this file. Each offline application is started by pressing a button. The application can be a separate process designated by the "executable" field. When this application is created, the MMI waits until the application is finished before processing any other events. An application may also create a class designated by the "class" field. This class is created every time the button is pressed; typically this class creates a modal dialog box. If neither a process nor a class is designated, the button is disabled.

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Field	Meaning
label	The label appearing on the button
image	The image appearing on the button (optional)
executable	The process to start when the button is pressed (optional)
class	The name of the class to be created on each button press (optional)
systemSwitch[#]	Number of the system switch for which the button is enabled (optional)
windowName	The Microsoft Windows window name (window title)
windowClassName	The MS windows window class name (from AfxRegisterClass lpszClassName)

Microsoft Windows can find windows by using the class name, the title, or both. Depending on how the application registers its name (i.e., through AfxRegisterClass), either the class name or the window name must be used. The easiest way to determine this is by using the Spy++ program and experimenting with setting one or both names.

A button may be defined in the 'offline.properties' file as follows:

- button1 = display
- display.label = Display
- display.image = system/display.gif
- display.executable = rundl132 shel132.dll,Control_RunDLL C:\\WINNT\\SYSTEM32\\Desk.cpl
- display.windowName = Display Properties
- display.windowClassName = #32770 (Dialog)

File 'option.properties'

The 'option.properties' file has one entry, which is used to specify the location and name of the label file for the options screen. The entry appears as:

```
label_file = %MMIDATABASE%\\option.txt
```

where MMIDATABASE is an environment variable defined in the 'application.properties' file. Note that ' \setminus ', not '/', is required between subdirectory names.

File 'plc.properties'

The plc.properties file has one entry, which is used to specify the location and name of the label file for the *Utilities: PLC Parameters* screen. The entry appears as:

```
label_file = %MMIDATABASE%\\plc_param.txt
```

where MMIDATABASE can be an environment variable defined in the application.properties file. Note that ' $\$ \', not ' $\$ \', is required between subdirectory names.

File 'programsOpened.properties'

The 'programsOpened.properties' file defines which directories are available from drop-down menus in dialogs popped from the *Program: List* screen. A simple 'programsOpened.properties' file may appear as:

```
# number of menu items
menuItemCount = 3

# menu item prefix
menuItemPrefix = item

item1 = %MMIGCODE%\\
item2 = %MMIMACRO%\\
item3 = A:\\
item1.image = file/disk.gif
item2.image = file/disk.gif
item3.image = file/floppy.gif
```

File 'softwareSwitch.properties'

The 'softwareSwitch.properties' file has two entries, which are used to specify the locations and names of the label files for the *Run: NC Switch* screen. The entry appears as below:

```
cnc_file = %MMIDATA%\\ncsw.txt
machine file = %MMIDATA%\\machsw.txt
```

where MMIDATA can be an environment variable defined in the application.properties file. Note that ' $\$ \', not ' $\$ \', is required between subdirectory names.

File 'system.properties'

The 'system.properties' file is used to define which buttons are available on the *Utilities: PC Settings* screen. In addition to the button properties described in that section, each item button has two other properties associated with it that control the behavior of the pop-up window when the button is clicked. These are 'topmost' and 'pause'.

Setting topmost to 1 causes the window to stay in front of the MMI until it is closed. This may be useful for control panel objects and other dialogbox type applications. If the window is not to be topmost, and there are problems with the window being hidden when the application is launched, try setting the ' pause' property.

The pause property sets the number of extra milliseconds to wait after launching the application and before bringing its window to the top. This is useful for programs such as the Disk Administrator that displays a small initial window before the main window displays. Without the pause, the main window is hidden behind the MMI when the small window disappears. A non-zero pause is not necessary if the 'topmost' property is set to 1.

The 'system.properties' file may contain the following:

```
button1 = access
access.label = Accessibility
access.image = system/access.gif
access.disimage = system/access_dis.gif
access.executable = rundll32 shell32.dll,Control_RunDLL
C:\\WINNT\\SYSTEM32\\access.cpl
```

```
access.windowName = Accessibility Properties
access.security = 2
access.topmost = 1
access.pause = 0

button2 = console
console.label = Console Window
console.image = system/msdos.gif
console.disimage = system/msdos_dis.gif
console.executable = C:\\WINNT\\SYSTEM32\\cmd.exe
console.windowName = Command
console.security = 4
```

File 'tempSensor.properties'

This file stores values used in the *Maintenance: CPU Monitor* screen, which are used to monitor fan speed and temperature for the CPU.

Items in tempSensor.properties File

Variable	Meaning
temperatureAlarm	A warning is generated whenever the CPU temperature reaches temperature- Alarm.
temperatureAlarm	When the CPU temperature reaches temperatureAlarm an alarm occurs.
temperatureHysterisis	The temperatureHysterisis is used to control when an alarm disappears after the temperature starts to decrease. Once the temperature starts to drop, the alarm continues until the CPU temperature reaches (temperatureAlarm – temperatureHysterisis).
fanWarning	The system generates a warning when the fan RPM falls under fanWarning.
fanAlarm	An alarm occurs when the fan speed drops below fanAlarm.

File 'trouble.properties'

The 'trouble.properties' file contains URL links for the troubleshooting help page:

Items in trouble.properties File

Variable	Meaning
home	This defines the home page. Clicking the Home button returns to the home page.
start	This defines the starting page.
htmlroot	Specifies the directory where html files are stored.

File 'utilsBackup.properties'

The utilsBackup.properties file is used to define which directories are available in the drop-down menu on the *Utilities: Backup and Restore* screen. A simple utilsBackup.properties file may appear as below.

```
# number of menu items
menuItemCount = 2
# menu item prefix
```

```
menuItemPrefix = item

item1 = %MMIDATA%\\
item1.image = file/disk.gif

item2 = A:\\
item2.image = file/floppy.gif
```



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