YASKAWA

YASNAC MRC MAINTENANCE MODE
OPERATOR'S MANUAL

Before initial operation, read these instructions thoroughly, and retain for future reference.

YASKAWA

TOE-C945-408

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1.1 OPERATION MODES FOR MAINTENANCE

YASNAC MRC has five operation modes, which are selected by the rotary switch on the MCP01 board. Set the switch to the desired position before turning ON power.

Rotary Switch Positions and Operation Modes

Position	Operation Mode	Remarks
0	Online mode	
1-3	Reserved	
4	Simulated online mode	
5	Thermostat diagnosis mode	For shipping inspection only
6	Maintenance mode (Jig mode)	For shipping inspection only
7	Maintenance mode (Standard mode)	
8-F	Prohibited	

1.2 ONLINE MODE

Select this mode for normal maintenance. For details of power ON process in this mode, refer to Par. 4, "ALARM OF ONLINE MODE AT POWER ON".

1.3 SIMULATED ONLINE MODE

Select this mode to perform operation check with no manipulator connected to the control panel. Power ON process in this mode is similar to that in standard online mode, except that :

- If an error occurs, the process stops after notifying the error and the next step is started by depressing the CANCEL key.
- Communication with the SERVOPACK and encoder is not performed.
- Machine lock status is retained.
- When the servo power is turned ON, contactor is turned ON but the brake and the base lock are not released.

1.4 THERMOSTAT DIAGNOSIS MODE

This mode is used exclusively for hardware diagnosis of the CPU rack at shipping inspection.

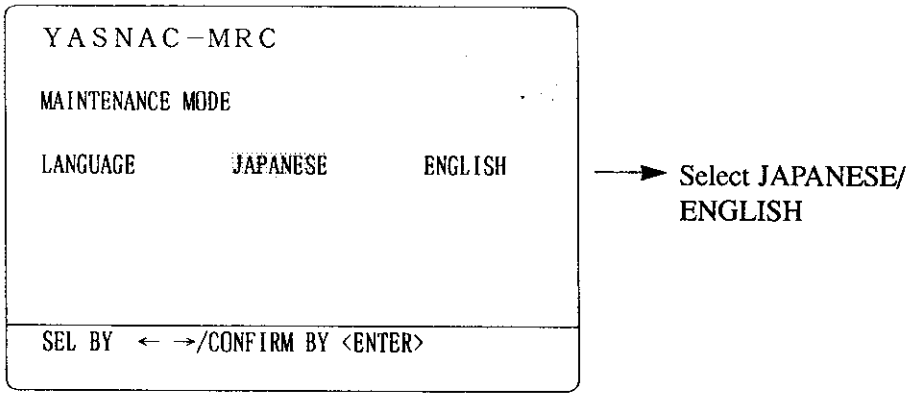
1.5 MAINTENANCE MODE (JIG MODE)

This mode is used exclusively for board check at shipping inspection. It is similar to standard maintenance mode except that jig-requiring tests can be selected.

1.6 MAINTENANCE MODE (STANDARD MODE)

Select this mode to set up or perform maintenance for the robot system.

Set the rotary switch of the MCP01 board to standard maintenance mode and turn ON power. The maintenance mode language select display appears. (This display does not appear in non-bilingual systems.)

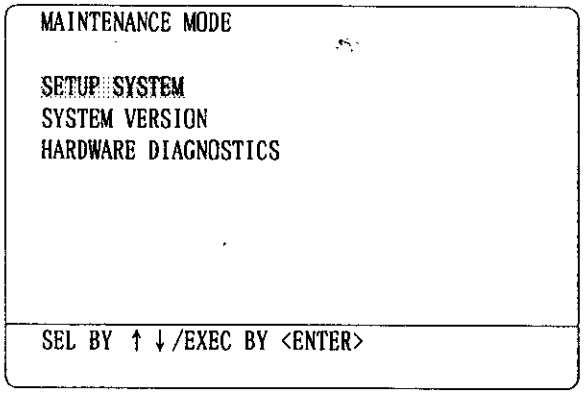


Depress ENTER after selecting either JAPANESE or ENGLISH to assure the language mode.

Notes :

1. When JAPANESE is selected, the display is given in Japanese ; when ENGLISH is selected, it is in English.
2. This display setting is validated only in the maintenance mode and has nothing to do with language 1 or 2 in the online mode.

When the language to be displayed is selected, the following maintenance mode display appears.



In standard maintenance mode, the following functions are available.

(1) System setup : System configuration
File initialization
ROM file initialization
(2) System version display : Board ROM version display
SERVOPACK ROM version display
(3) Hardware diagnosis

Functions (1) and (2) are explained later in this manual.

Using version Vl. 600 or later, standard maintenance mode can be started up while having the rotary switch set to 0 (standard online mode) or 4 (simulated online mode) by the following steps.

Start-up Procedure

Turn ON the control power while holding down the CUSTOMER key on the Programming Pendant.

↓

Select either JAPANESE or ENGLISH on the language select display.

↓

Enter the manufacturer ID on the user ID input display.

↓

The system starts up in the maintenance mode (standard mode).

If power is turned ON with the rotary switch set to 7, the maintenance mode (standard mode) starts up unconditionally, as it did in former versions.

☆ If a user ID is entered instead of the manufacturer ID, it starts up the customer maintenance mode, in which manufacturer-only functions are masked. For details, refer to the "CUSTOMER MAINTENANCE MODE OPERATION MANUAL" (TOE-C945-404.1).

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2.1 SYSTEM SETUP

Four system setup functions are provided :

(1) System Configuration

In order to start up the YASNAC MRC, system parameters must be set up according to the robot system configuration. This procedure is called system configuration. System parameters are automatically set up by selecting menus and entering system specifications on the system configuration display.

(2) File Initialization

Various files can be initialized. (Before initializing files, system configuration must be completed.)

(3) ROM File Initialization

Various ROM files can be initialized. (Before initializing ROM files, system configuration must be completed.)

(4) SYSCON Internal Data Initialization

SYSCON internal data can be initialized. (Before initializing the data, system configuration must be completed.)

■ SYSTEM SETUP DISPLAY

1

Start up standard maintenance mode and select SETUP SYSTEM.

```
MAINTENANCE MODE

SETUP SYSTEM
SYSTEM VERSION
HARDWARE DIAGNOSTICS

SEL BY ↑ ↓/EXEC BY <ENTER>
```

2

On the system setup display, move the cursor to the process to be started, then depress ENTER.

```
SETUP SYSTEM

SYSTEM CONFIGURATION
INITIALIZE FILES
INITIALIZE ROM FILE
INITIALIZE SYSCON INTERNAL DATA

SEL BY ↑ ↓/EXEC BY <ENTER>
RETURN BY <CANCEL>
```

* If INITIALIZE FILES, INITIALIZE ROM FILE or INITIALIZE SYSCON INTERNAL DATA display does not appear after selecting from the menu, initialize the system configuration.

2.2 SYSTEM CONFIGURATION

OUTLINE

Three system configuration functions are provided :

(1) Initialization

This function automatically sets up system parameters and initializes all files. System configuration settings are stored in CMOS memory. When starting up the YASNAC MRC, initialization of system configuration is required.

(2) Modification

This function modifies system configuration settings.
System parameters are automatically set up in the same way as in initialization.

System configuration must be modified when :

- External axes are added.
- Applications are changed.
- I/O modules are added.
- Sensor boards are added.

(3) Display

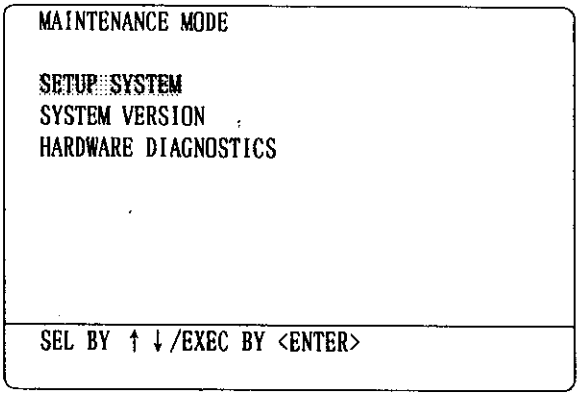
System configuration settings can be checked on the display.

System configuration items to be set up are :

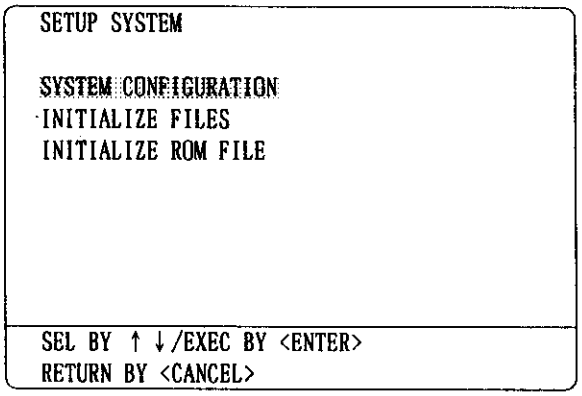
- First language
- Second language
- Number of robots, bases, and stations (configuration of controlled axes)
- Contactor connection
- Robots types
- Base axis specifications
- Station axis specifications
- Applications
- CIO ladders
- Application of robots
- I/O modules
- Sensor functions
- Use of sensor boards for robots
- Operation panel
- CMOS memory
- Calendar

SYSTEM CONFIGURATION DISPLAY

When YASNAC MRC starts-up in standard maintenance mode, the display shown below appears.

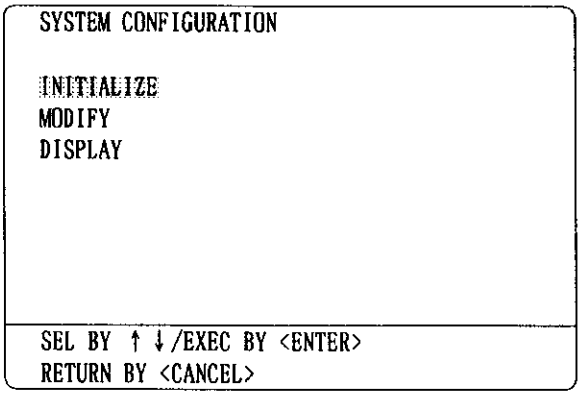


To set up system configuration, select SETUP SYSTEM and depress ENTER .



→ INITIALIZE FILES and INITIALIZE ROM FILE can be selected only after system configuration is initialized.

When SYSTEM CONFIGURATION is selected in the SETUP SYSTEM display, the following display appears.



→ Any other than INITIALIZE can be selected only after execution of initialization.

INITIALIZATION

When setting up system configuration for the first time, initialize it by the following procedure.

On any of the following displays, depress [ENTER] after setting. The display automatically change to the next display.

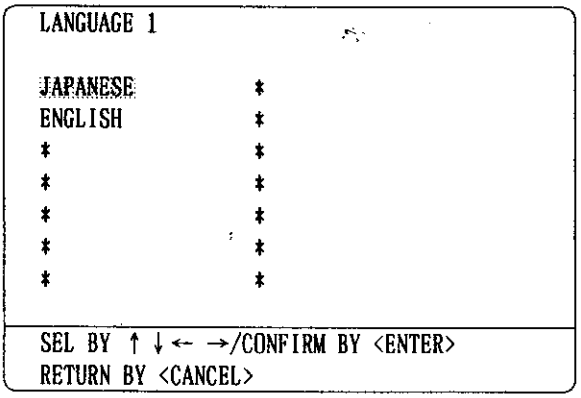
Depressing [CANCEL] invalidetes the settings you have made and the initialization display appears again.

Select "INITIALIZE" in the system configuration display.
↓
Language 1 Display
↓
Language 2 Display
↓
Axes Configuration Display
↓
Application Display
↓
CIO Ladder Display
↓
Robot Application Option Display
↓
I/O Module Display
↓
Sensor Function Display
↓
Robot Application Sensor Board Display*
↓
OP Display
↓
CMOS Memory Display
↓
Calendar Display
↓
Check Display
↓
Completion
(Return to the system configuration display.)

* Displayed only when the sensor board is provided.

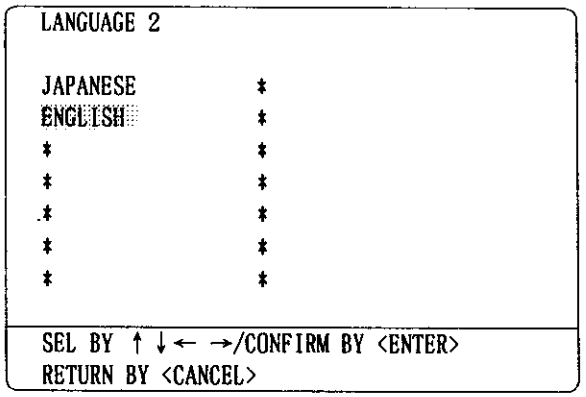
● LANGUAGE 1 AND 2 DISPLAYS

Select INITIALIZE on the system configuration display to call up the following display.



→ A list of selectable languages appears.

Depress ENTER after selecting LANGUAGE 1. The following display appears.



→ A list of selectable language appears.

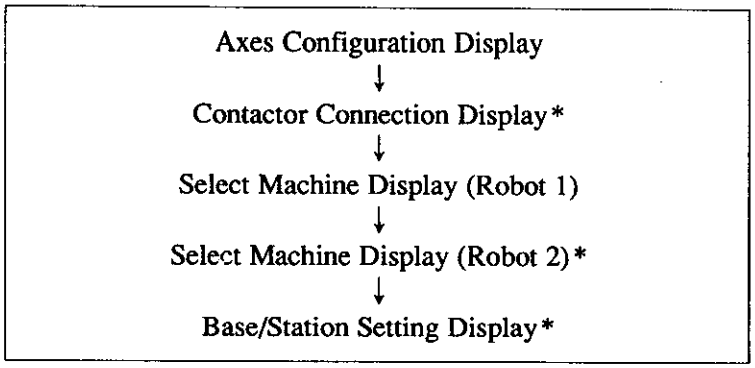
Depress ENTER after selecting LANGUAGE 2. The controlled axes configuration display appears.

● CONTROLLED AXIS DISPLAY

In the controlled axis display, robot model selection and base/station setting are enabled.

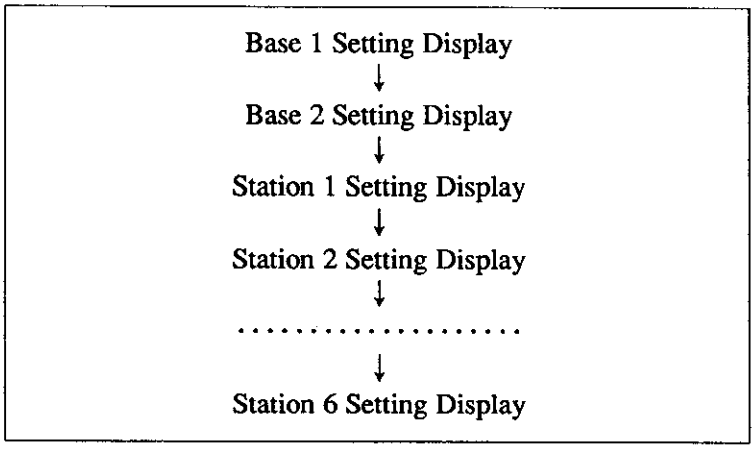
The following shows the configuration of the controlled axis display.

Controlled Axis Display Configuration

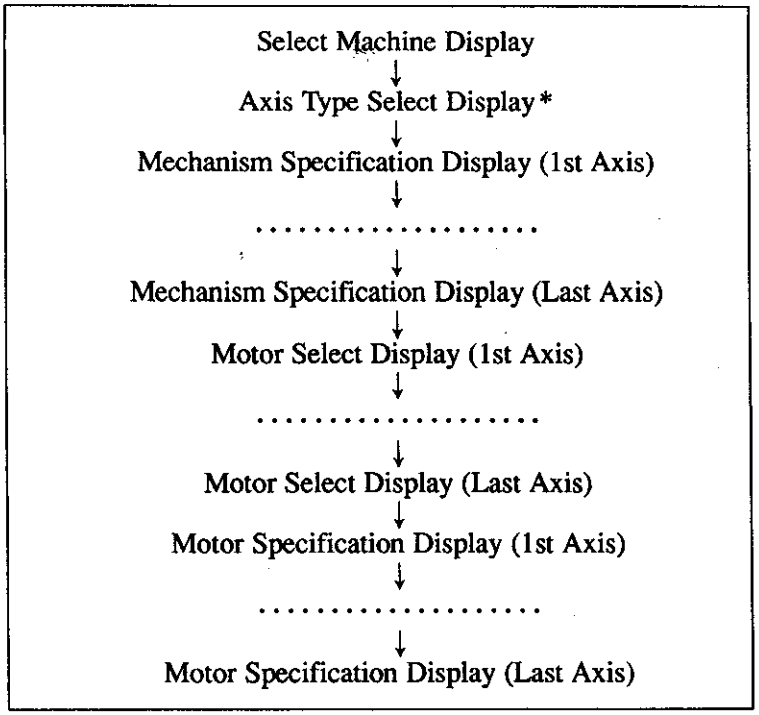


Note : According to the setting in the axes configuration display, only those marked with * in the above figure that require setting are displayed.
The following shows the configuration of the base/station setting display.

Base/Station Setting Display Configuration



The setting displays of bases 1, 2 and stations 1 to 6 have the following configuration for each controlled axis group. (Common for bases 1, 2 and stations 1 to 6.)



* Omitted when TURN type model is selected in the select machine display.

- Controlled axes configuration
  Base 1, base 2 provided/not provided, number of stations
- Contactor connection
  Select either contactor 1, 2 or 3 for each group axis.
- Model selection
  With base axis :
  Select either rectangle-X, -Y, -Z, -XY, -XZ, -YZ or -XYZ.
  With station axis :
  Select either turn-1 or -2.
  For the other models, select either universal-1, -2, -3, -4, -5 or -6.
- Axis type selection
  With turn-* :
  Selection is not needed (axis type is of turn.)
  With rectangle-* :
  Select either rectangle-B (ball screw) or rectangle-R & P (rack and pinion).
  With universal-* :
  Select either rectangle-B (ball screw), rectangle-R & P (rack and pinion) or turn.

- Specifications
  When the type of the relevant axis is of ball screw, set the following items :
  Deceleration ratio (numerator)
  Deceleration ratio (denominator)
  Ball screw pitch 〔mm/r〕
  Working range (+) 〔mm〕
  Working range (-) 〔mm〕

  When the type of the relevant axis is of rack & pinion, set the following items :
  Deceleration ratio (numerator)
  Deceleration ratio (denominator)
  PCD 〔mm〕
  Working range (+) 〔mm〕
  Working range (-) 〔mm〕

  When the type of the relevant axis is of turn, set the following items :
  Deceleration ratio (numerator)
  Deceleration ratio (denominator)
  Working range (+) 〔deg〕
  Working range (-) 〔deg〕
  Offset (between axes 1 and 2) 〔mm〕

- Motor selection
  Select one from the motor model list on the display.

- Motor specifications
  Set the following items :
  Rotating direction 〔forward/reverse〕
  Maximum rotation speed 〔r/min〕
  Accel/decel time 〔sec〕
  Load inertia ratio

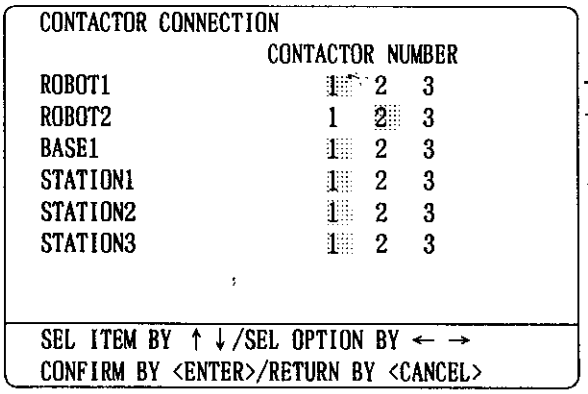
(1) Controlled Axes Configuration Display

```
AXES CONFIGURATION

ROBOT COUNT    1        2

BASE1          OFF      ON
BASE2          OFF      ON

STATION COUNT  0  1  2  3  4  5  6


SEL ITEM BY ↑ ↓/SEL OPTION BY ← →
CONFIRM BY <ENTER> /RETURN BY <CANCEL>
```

→ The cursor position blinks.

Set up the number of robots, use of bases, and the number of stations. Then depress ENTER to call up the machine select display. If the group combination which has been made is not possible, an error occurs.

(2) Contactor Connection Display

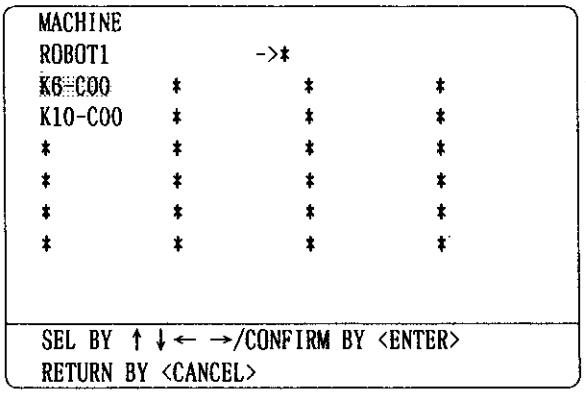


→ The cursor position blinks.
→ Contactor No. 2 is set to robot 2 as default value.
→ Only existing group axis is displayed.

Depress ENTER after setting the contactor number connecting each group axis to call up the select machine display (robot).

Note : This display is omitted when the controlled axis is composed of only one robot (without any base or station).

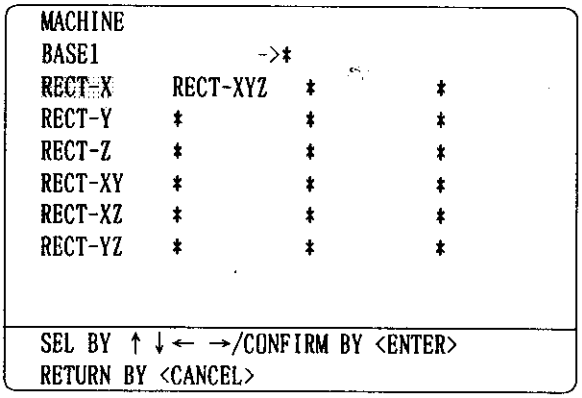
(3) Select Machine Display (Robot)



→ A robot list (1 or 2 models) stored in ROM is displayed.

Depress ENTER after selecting the robot (as well as robot 2).

(4) Select Machine Display (Base)

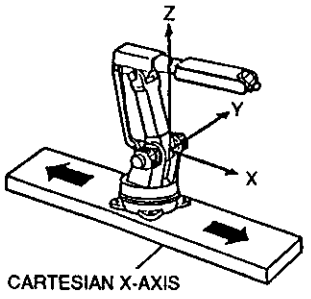


RECT-X : Rectangle X-axis type base
RECT-Y : Rectangle Y-axis type base
RECT-Z : Rectangle Z-axis type base
RECT-XY : Rectangle XY- axis type base
RECT-XZ : Rectangle XZ-axis type base
RECT-YZ : Rectangle YZ-axis type base
RECT-XYZ : Rectangle XYZ-axis type base

Depress ENTER after selecting the robot model to call up the axis type display. (Do the same for base 2.) If the sum of axes exceeds 21, an error occurs.

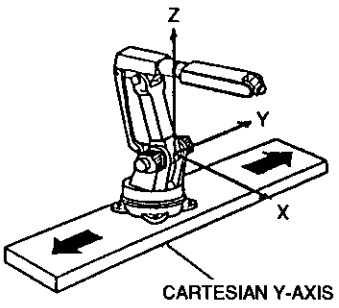
Base Type

Rectangle-X



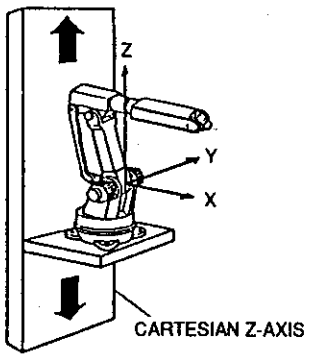
The base axis advance direction coincides with the robot coordinate X-axis.

Rectangle-Y



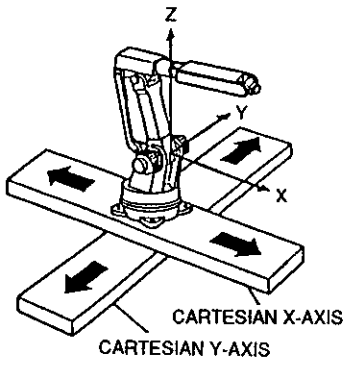
The base axis advance direction coincides with the robot coordinate Y-axis.

Rectangle-Z



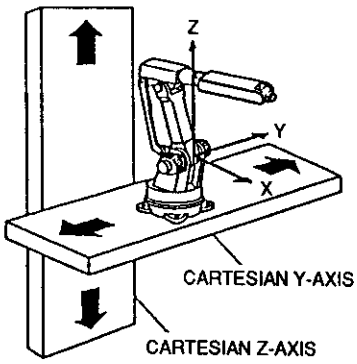
The base axis advance direction coincides with the robot coordinate Z-axis.

Rectangle-XY



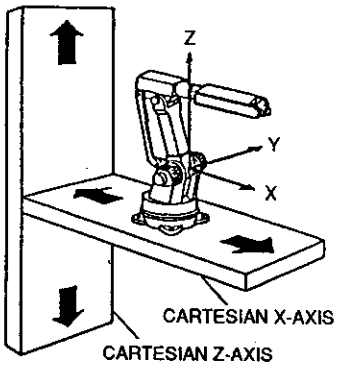
The base 1st axis advance direction coincides with the robot coordinate X-axis and the base 2nd axis with the robot coordinate Y-axis.

Rectangle-YZ



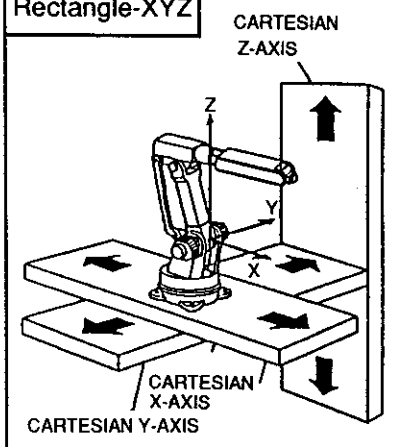
The base 1st axis advance direction coincides with the robot coordinate Y-axis and the base 2nd axis with the robot coordinate Z-axis.

Rectangle-XZ



The base 1st axis advance direction coincides with the robot coordinate X-axis and the base 2nd axis with the robot coordinate Z-axis.

Rectangle-XYZ



The base 1st axis advance direction coincides with the robot coordinate X-axis, the base 2nd axis with the robot coordinate Y-axis and the base 3rd axis with the robot coordinate Z-axis.

(5) Select Machine Display (Station)

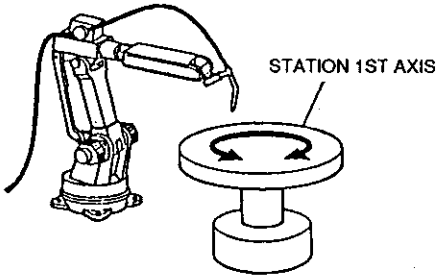
```
MACHINE
STATION1          ->*
TURN-1    *       UNIV-1    *
TURN-2    *       UNIV-2    *
          *       UNIV-3    *
          *       UNIV-4    *
          *       UNIV-5    *
          *       UNIV-6    *

SEL BY ↑ ↓ ← →/CONFIRM BY <ENTER>
RETURN BY <CANCEL>
```

TURN-1 : Rotation 1-axis type station
TURN-2 : Rotation 2-axis type station
UNIV-1 : Universal 1-axis type station
UNIV-2 : Universal 2-axis type station

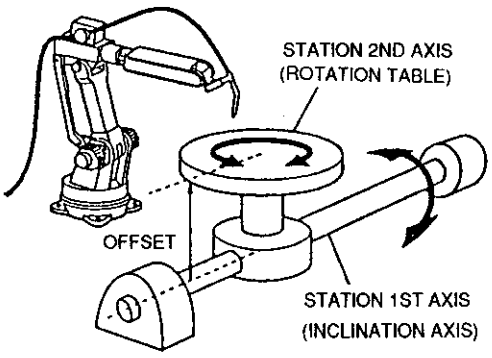
When any mechanism (rectangle axes, etc.) other than "TURN-1" and "TURN-2" is used as a station axis, select "UNIV". However, when "UNIV" is used, interpolation operation (linear, circular) is not supported.

Station Type

Turn-1



Turn-2



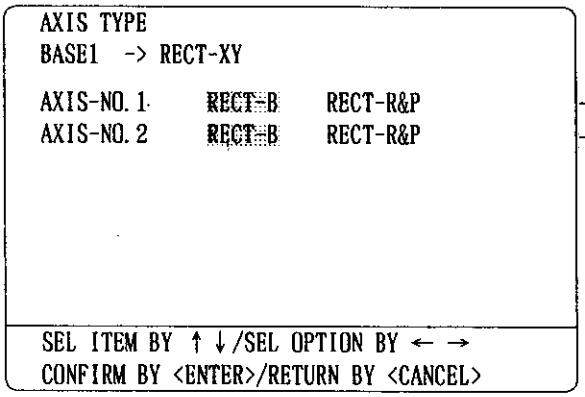
When the model is a station, which axis is to be the 1st axis or to be the 2nd axis is determined depending on which axis is located at the bottom most.
For example, in the figure on the left, the rotation table is inclined by the inclination axis ; therefore, the inclination axis is an axis that is mounted at the bottom of the rotation table so that it is to be the 1st axis. The rotation table becomes the 2nd axis.

Depress ENTER after selecting "TURN" type for the station, and the mechanism specification setting display appears.
Depress ENTER after selecting "UNIV" type for the station, and the axis type select display appears.
If the sum of the axes exceeds 21, an error occurs.

(6) Axis Type Display (Base, Station)

① Select RECT-* on the select machine (base) display. The following display appears.

Axis Type Select Display (Rectangle Type)



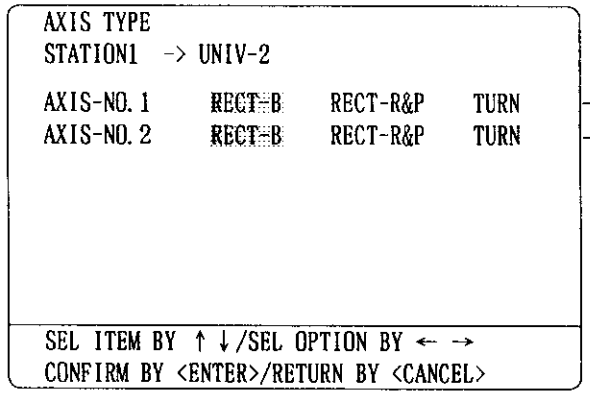
→ The cursor position blinks.
→ RECT-B : Rectangle axis (ball screw)
RECT-R&P : Rectangle axis (rack & pinion)

Select RECT-B for the rectangle axis by ball screw mechanism and RECT-R & B for that by rack & pinion mechanism.

② Select TURN-* on the select machine (station) display

③ Select UNIV-* on the select machine (station) display. The following display appears.

Axis Type Select Display (Universal Type)



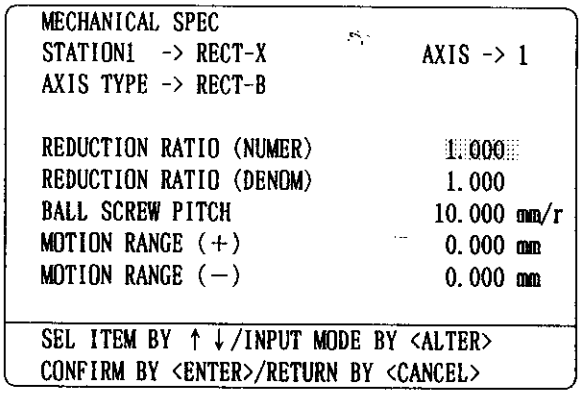
→ The cursor position blinks.
→ RECT-B : Rectangle axis (ball screw)
RECT-R&P : Rectangle (rack & pinion)
TURN : Rotation axis (When RECT is selected on the select machine display, TURN is not displayed.)

Select RECT-B for the rectangle axis by ball screw mechanism, RECT-R & B for that by rack & pinion mechanism and TURN for that rotation axis.

Depress ENTER after selecting the axis type. The mechanical specification display appears.

(7) Mechanical Specification Display (Base, Station)

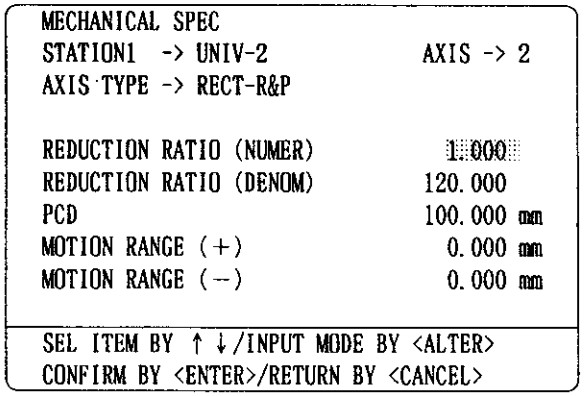
Mechanical Specification Display (RECT-B Type)



→ Model, axis No. and axis type that are currently selected are displayed.
→ The cursor position is displayed inversely.

Deceleration ratio : Set a value for numerator and denominator, respectively. (Example : Set 1.0 to numerator and 1.0 to denominator for 1/1.)
Ball screw pitch : Set the moving distance for motor one rotation. (unit : mm/r)
Working range : Set the operation limit position (plus and minus directions) when the home position is assumed to be 0. (unit : mm)

Mechanical Specification Display (RECT-R & P Type)



→ Model, axis No. and axis type that are currently selected are displayed.
→ The cursor position is displayed inversely.

Deceleration ratio : Set a value for numerator and denominator, respectively. (Example : Set 1.0 to numerator and 120.0 to denominator for 1/120.)
PCD : Set the pinion diameter. (unit : mm)
Working range : Set the operation limit position (plus and minus directions) when the home position is assumed to be 0. (unit : mm)

Mechanical Specification Display (Rotation Axis Type)

```
MECHANICAL SPEC
STATION1  -> TURN-2              AXIS -> 1
AXIS TYPE -> TURN

REDUCTION RATIO (NUMER)            1.000
REDUCTION RATIO (DENOM)          120.000
MOTION RANGE (+)                   0.000 deg
MOTION RANGE (-)                   0.000 deg
OFFSET (AXIS#1-#2)                 0.000mm

SEL ITEM BY ↑ ↓/INPUT MODE BY <ALTER>
CONFIRM BY <ENTER>/RETURN BY <CANCEL>
```

→ Model, axis No. and axis type that are currently selected are displayed.

→ The cursor position is displayed inversely.

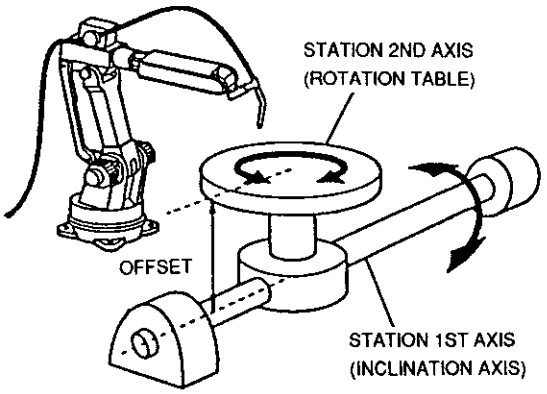
→ Displayed on the 1st axis display only when the model is of TURN-2 type.

Deceleration ratio : Set a value for numerator and denominator, respectively.
(Example : Set 1.0 to numerator and 120.0 to denominator for 1/120.)

Working range : Set the operation limit position (plus and minus directions) when the home position is assumed to be 0. (unit : deg.)

Offset : Setting is required only when the model is of TURN-2 type.
Set the distance between the inclination axis (1st axis) and the rotation table (2nd axis). (unit : mm)

Turn-2



Depress ENTER after selecting the mechanism specifications to call up the display for the next axis. With the last axis, the motor select display appears.

(8) Motor Display (Base, Station)

Terminate the mechanical specification display. The following display appears.

```
MOTOR
STATION1  → UNIV-2  AXIS → 1
AXIS TYPE → TURN
USADED-13-YR21          USAPEM-07-YR42
USASEM-02-YR32          USAREM-01-YR52
USADED-13-YR41          USADED-22-YR32
USAREM-02CYR22          USASEM-08-YR61
USAPEM-07-YR11          USADED-22-YR41
USAREM-01-YR41          USASEM-08-YR71

SEL BY ↑ ↓ ← →/SEL NEXT PAGE BY <MORE>
CONFIRM BY <ENTER>/RETURN BY <CANCEL>
```

→ The group, machine, axis number, and axis type that are currently selected are displayed.

→ A motor list stored in ROM is displayed.

→ Depress [MORE] to display the next model list.

Depress [ENTER] after selecting the motor type to call up the motor select display for the next axis. With the last axis, the motor specification setting display appears.

(9) Motor Specification Display (Base, Station)

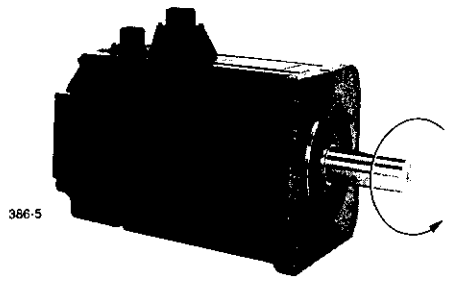
Select the motor type on the motor select display. The following display appears.

```
MOTOR SPEC
STATION1     -> UNIV-2          AXIS -> 1
AXIS TYPE    -> RECT-R&P
MACHINE TYPE -> USADED-13-YR21

ROTATION (FWD : 0 REV : 1)        0
MOTOR MAX RPM                  2000 rpm
ACCELERATION TIME              0.300 sec
INERTIA RATIO                    300

SEL ITEM BY ↑ ↓/INPUT MODE BY <ALTER>
CONFIRM BY <ENTER>/RETURN BY <CANCEL>
```

→ The set values related to the axis that is currently selected are displayed.

→ The cursor position is displayed inversely.

Rotating direction : Set the motor rotating direction at which the current value increases in the plus direction.
(The CCW direction viewed from the load side is to be the forward rotating direction.)



AC SERVOMOTOR

Maximum rotating speed : Set the maximum motor rotating speed. (unit : r/min)
Accel/decel time : Set the value of the time in which the maximum speed is to be reached from the stop status in the range from 0.01 to 1.00 upon operating at the full link speed (100%).
Load inertia ratio : 300 is set with rectangle axis and 0 is set with rotation axis as an initial value. If any of the following faults occurs after verification of movement, take the corrective actions as described below.

<Fault 1> The robot moves unsteadily in the proceeding direction during operation. → Increase the load inertia ratio by 100 to verify the movement.

<Fault 2> Abnormal noise is generated from the motor at stop. → Decrease the load inertia ratio by 100 to verify the movement.

Depress [ENTER] after setting the motor specifications to call up the display for the next axis.
With the last axis, the application display appears.

● APPLICATION DISPLAY

Terminate the controlled axis display. The following display appears.

```
APPL

ARC                 GENERAL PURPOSE
JIG-LESS            CO2-LASER
ARC +ARC            LASER CUTTING
HANDLING            PAINT
SPOT                *
SPOT / SPOT         *


SEL BY ↑ ↓ ← →/CONFIRM BY <ENTER>
RETURN BY <CANCEL>
```

→ The list of applications is displayed.

→ If the list of applications is not contained on a single page, depress [MORE] to call up the next page of the list.

Depress [ENTER] after selecting applications to call up the following display.

● CIO LADDER DISPLAY

```
CIO LADDER

ARC                 GENERAL PURPOSE
JIG-LESS            CO2-LASER
ARC + ARC           LASER CUTTING
HANDLING            PAINT
SPOT                *
SPOT / SPOT         *

SEL BY ↑ ↓ ← →/CONFIRM BY <ENTER>
RETURN BY <CANSEL>
```

→ The list of ladders is displayed.

Depress ENTER after selecting the CIO ladder, and the following display appears.

● ROBOT APPLICATION OPTION DISPLAY

After selecting the application, the following display appears.

```
ROBOT APPL OPTION

ROBOT1
      APPL 1        USED        NOT USED
      APPL 2        USED        NOT USED

ROBOT2
      APPL 1        USED        NOT USED
      APPL 2        USED        NOT USED

SEL ITEM BY ↑ ↓/SEL OPTION BY ← →
CONFIRM BY <ENTER>/RETURN BY <CANCEL>
```

→ If the number of applications has been set to 1, APPL 2 is not displayed.

→ If the system has only one robot, ROBOT 2 is not displayed.

Depress ENTER after setting. The next display appears.

● IO MODULE DISPLAY

```
IO MODULES

SLOT-1        DIO-16
SLOT-2        DIO-32
SLOT-3        NONE
SLOT-4        NONE
SLOT-5        MEW01-1

CONFIRM BY <ENTER>/RETURN BY <CANCEL>
```

Board	Display
MIO01	DIO-××
MIO02	DIO-××
MIO03	DIO-××
MIO04	DIO-××

↑ Number indicates point of contacts.

Verify that the display matches the I/O module implementation, then depress ENTER to call up the following display. Automatic setup may or may not be available depending on the I/O module settings. If not, "AUTOMATIC SETTING IMPOSSIBLE" is displayed.

● SENSOR FUNCTION DISPLAY

```
SENSOR FUNCTION

SENSOR BOARD 1 → COM-ARC
SENSOR BOARD 2 → NONE

CONFIRM BY <ENTER>/RETURN BY <CANCEL>
```

→ If sensor boards are mounted, their functions are displayed.

Verify that the display matches the sensor board implementation, then depress ENTER to call up the following display.

● ROBOT SENSOR OPTION DISPLAY

Depress ENTER on the sensor function display. The following display appears only when the sensor board is mounted.

```
ROBOT SENSOR OPTION

ROBOT1
  SENSOR BOARD 1      USED      NOT USED
  SENSOR BOARD 2      USED      NOT USED
ROBOT2
  SENSOR BOARD 1      USED      NOT USED
  SENSOR BOARD 2      USED      NOT USED

SEL ITEM BY ↑ ↓/SEL OPTION BY ← →
CONFIRM BY <ENTER>/RETURN BY <CANCEL>
```

→ Not displayed unless sensor board 2 exists.

→ Not displayed unless robot 2 exists.

Depress ENTER after setting. The following display appears.

● OP DISPLAY

```
OP

IF02            -> ON                    ---> *1
OP              -> ON                    ---> *2
  LANGUAGE 1    -> JAPANESE              ---> *3
  LANGUAGE 2    -> ENGLISH

OP                 USED       NOT USED   ---> *4

SEL ITEM BY ← → /CONFIRM BY <ENTER>
RETURN BY <CANCEL>
```

*1 OFF when MIF02 board does not exist.
*2 OFF when OP is not connected.
*3 The language incorporated into ROM of the operation panel is displayed only when the OP is connected.
*4 Displayed only when OP is connected.

Verify that the display matches the MIF02 board and OP implementation, then depress [ENTER] to call up the following display.
To disconnect the OP from the system, select NOT USED.

Note : If the languages that have been selected on the first and second language select displays (Par. 3.1) are not stored in OP ROM, an OP language collation error is output.

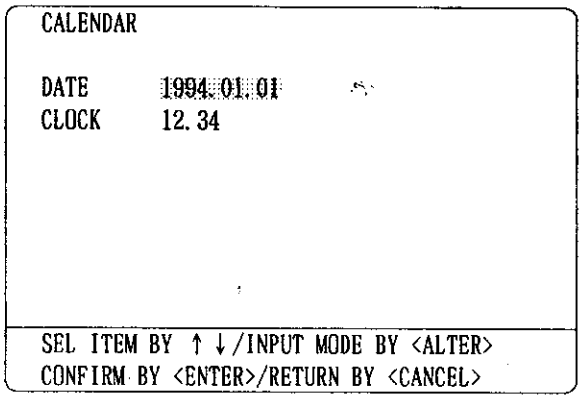
● CMOS MEMORY DISPLAY

```
CMOS MEMORY

AVAILABLE       -> 256KB
HW CAPACITY     -> 256KB

CONFIRM BY <ENTER>/RETURN BY <CANCEL>
```

CMOS Memory Mounted Status	Capacity
Standard	256 kB
MMM01-2 Board Added	1 MB
MMM01-3 Board Added	2 MB
MMM01-4 Board Added	3 MB

Depress [ENTER] after verifying that the display is the same as CMOS memory mounted status. The following display appears.

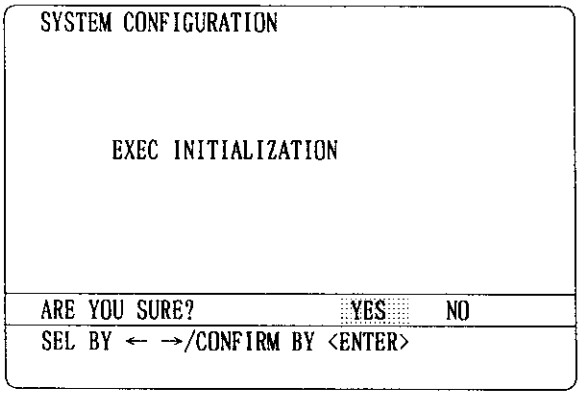
● CALENDAR DISPLAY



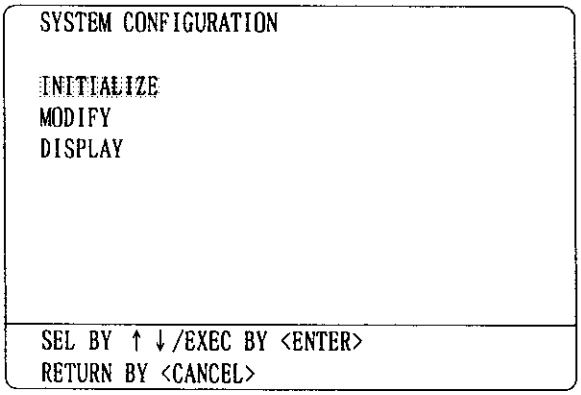
→ Year, Month, Day
→ Hour, Minute

If the display differs from the actual date or time, depress [MODIFY] to be in the input mode and correct it. Since the calendar is already set when the display is proper, correction is not needed. Depress [ENTER] to call up the following display.

● VERIFICATION DISPLAY



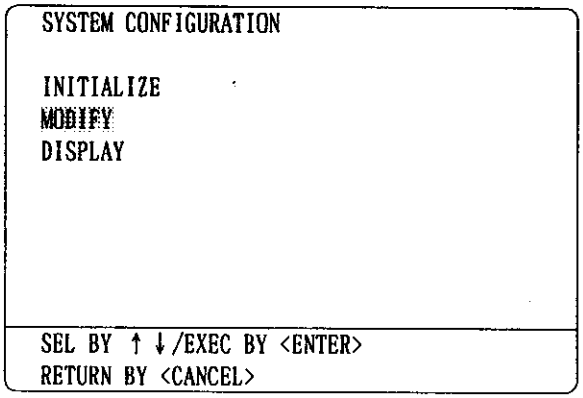
Move the cursor to YES and depress [ENTER] to initialize the contents of CMOS memory and return to the system configuration display. If NO is selected, the contents of CMOS memory are left unmodified.



The procedure above completes initialization. Reset the rotary switch to 0 and turn power OFF to ON again.

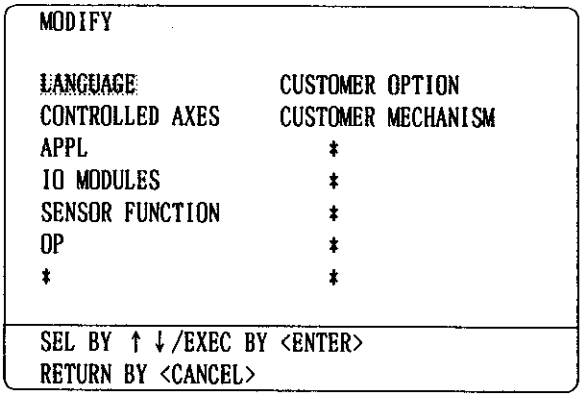
MODIFICATION

To change part of system configuration after execution of initialization, select [MODIFY] . Succeeding displays are the same as those that appeared in initialization procedure, except that current settings are displayed are on the former.



→ MODIFY and DISPLAY can be selected only after initialization.

For modifying the system configuration, select [MODIFY] on the system configuration display.



Depress [ENTER] after selecting the item. Each item modification display appears.

(1) Changing Languages

Language 1 and 2 can be changed on the language displays. The displays are the same as those appeared in initialization procedure.

(2) Changing Controlled Axes

To change controlled axes, perform the same procedure as that of initialization.

* Note that all the robot, base, and station parameters (of all controlled axes groups) are initialized by the procedure.
* When the controlled axes configuration is changed because of addition of base or station axes, the job data internal form is also changed. Therefore, job data initialization is required.
  Initialize the job data following the above-mentioned changing operation.
* When a set value such as working range is changed after addition of base or station axes, job data does not have to be initialized again since the controlled axes configuration does not change.

(3) Changing Application

Application setting is changed in the following procedures.

* The displays are the same as those appeared in initialization procedure.

Select APPL on the Modification Display.
↓
Application Select Display
↓
Robot Application Option Display
↓
Completion
(Return to the System Configuration Display.)

Changing application settings will not initialize CIO ladders. Initialize CIO ladders on the file initialization display if necessary.

(4) Changing I/O Modules

The displays are the same as that which appeared in initialization procedure, except that after [ENTER] is depressed a message appears asking change. Return YES to the message and depress [ENTER] to start automatic setting of the CIO parameters according to the current hardware implementation.

If the parameters could not be set up, "AUTOMATIC SETUP IMPOSSIBLE" is displayed.

(5) Modifying Sensor Function

The displays are the same as those appeared in initialization procedure.

Select SENSOR FUNCTION on the Modification Display.
↓
Sensor Function Display
↓
Robot Application Sensor Display
↓
Verification of execution
↓
Completion
(Return to the Modification Display.)

(6) Modifying OP Setting

The display is the same as those appeared in initialization procedure, except that after ENTER is depressed a message appears asking modification.
Return YES to the message and depress ENTER to start automatic setting of the system parameters according to the current hardware implementation.

(7) Modifying Customer Option

Select CUSTOMER OPTION on the modification display. The following display appears.

```
CUSTOMER OPTION

REMOTE FUNCTION
  IO              USED    NOT USED
  COMMAND         USED    NOT USED
  PP/PBOX         USED    NOT USED

ARC WELDING       STANDARD  ENHANCED

SEL ITEM BY ↑ ↓/SEL OPTION BY ← →
EXEC BY <ENTER>/RETURN BY <CANCEL>
```

→ Displayed only when ARC WELDING is selected. (Including arc+arc and jig-less)

Depress ENTER after setting is modified. The verification message is displayed as shown below.

```
CUSTOMER OPTION

REMOTE FUNCTION
  IO              USED    NOT USED
  COMMAND         USED    NOT USED
  PP/PBOX         USED    NOT USED

ARC WELDING       STANDARD  ENHANCED
INITIALIZE RELATED FILES
ARE YOU SURE?               YES    NO
SEL BY ← →/CONFIRM BY <ENTER>
```

Depress ENTER after selecting YES in the verification message. The system parameter is changed according to the setting status of the display.

Note : Only when the arc welding function setting is modified, the welding starting condition file and ending condition file are initialized.
When the COM-ARC function is validated, the arc welding function cannot be set to ENHANCED.

(8) Modifying Customer Mechanism

Select CUSTOMER MECHANISM on the modification display. The following display appears.

```
CUSTOMER MECHANISM

ROBOT1
ROBOT2

SEL BY ↑ ↓/EXEC BY <ENTER>
RETURN BY <CANCEL>
```

→ Selectable only for models containing customer mechanism such as K506-C30.

Select the ROBOT 1 or ROBOT 2. The following display appears.

```
T-AXIS OFFSET

ROBOT1  -> K506-C30

OFFSET (X-DIRECTION)          0.000 mm
OFFSET (Y-DIRECTION)        260.000 mm
OFFSET (ANGLE)                0.000 deg

SEL ITEM BY ↑ ↓/INPUT MODE BY <ALTER>
RETURN BY <CANCEL>
```

Select the item to be modified by using [↑] or [↓] and input the value to be in the numerical input mode.

Depress [ENTER] after inputting the data. The data is set and the mode changes to previous mode.

DISPLAY

To display the system configuration status, select DISPLAY on the system configuration display.

```
SYSTEM CONFIGURATION

INITIALIZE
MODIFY
DISPLAY




SEL BY ↑ ↓/EXEC BY <ENTER>
RETURN BY <CANCEL>
```

→ MODIFY and DISPLAY can be selected only after execution of initialization.

```
DISPLAY

LANGUAGE              CUSTOMER OPTION
CONTROLLED AXES       CUSTOMER MECHANISM
APPL
IO MODULES
SENSOR FUNCTION
OP
CMOS MEMORY

SEL BY ↑ ↓/EXEC BY <ENTER>
RETURN BY <CANCEL>
```

Depress [ENTER] after selecting an item. The display of each item appears.

● Language Display

```
LANGUAGE

LANGUAGE 1      -> ENGLISH
LANGUAGE 2      -> JAPANESE




RETURN BY <CANCEL>
```

● Controlled Axes Display

The controlled axes setting status can be displayed on the following display.

```
CONTROLLED AXES

CONTACTOR
ROBOT
BASE
STATION

SEL BY ↑ ↓/EXEC BY <ENTER>
RETURN BY <CANCEL>
```

Depress ENTER after selecting a group. The display of each group appears.

(1) Contactor Connection Display

The displays are the same as those appeared in initialization procedure.

(2) Robot Setting Status Display

```
ROBOT

ROBOT1      -> K10-A00
ROBOT2      -> NONE

RETURN BY <CANCEL>
```

→ The model that is currently set is displayed

(3) Base Setting Status Display

```
BASE

BASE1       ->  RECT-X
BASE2       ->  NONE

SEL BY ↑ ↓/DISP DETAIL BY <ENTER>
RETURN BY <CANCEL>
```

→ The model that is currently set is displayed.
(The cursor position is displayed inversely.)

(4) Display of Station Setting Status

```
STATION

STATION1      ->  TURN-1
STATION2      ->  NONE
STATION3      ->  NONE
STATION4      ->  NONE
STATION5      ->  NONE
STATION6      ->  NONE

SEL BY ↑ ↓/DISP DETAIL BY <ENTER>
RETURN BY <CANCEL>
```

→ The model being set is displayed. (The cursor position is displayed inversely.)

Select a station number to call up the following display.

```
STATION
STATION1  -> UNIV-2
AXIS-NO.1 -> RECT-R&P
AXIS-NO.2 -> TURN
AXIS-NO.3 -> NONE
AXIS-NO.4 -> NONE
AXIS-NO.5 -> NONE
AXIS-NO.6 -> NONE
AXIS-NO.7 -> NONE
AXIS-NO.8 -> NONE
SEL BY ↑ ↓/DISP DETAIL BY <ENTER>
RETURN BY <CANCEL>
```

→ The axis type being set is displayed.
(The cursor position is displayed inversely.)

Select an axis to call up the following display.

```
AXIS SPEC
STATION1  -> UNIV-2              AXIS -> 1
AXIS TYPE -> RECT-R&P

MECHANICAL SPEC
MOTOR SPEC

SEL BY ↑ ↓/DISP DETAIL BY <ENTER>
RETURN BY <CANCEL>
```

Depress ENTER after selecting the mechanical specification on the axis specification display. The following display appears.

Mechanical Specification Display

```
MECHANICAL SPEC
STATION1  -> UNIV-2              AXIS -> 1
AXIS TYPE -> RECT-R&P

REDUCTION RATIO (NUMBER)          1.000
REDUCTION RATIO (DENOM)         120.000
PCD                               0.000 mm
MOTION RANGE (+)                  0.000 mm
MOTION RANGE (-)                  0.000 mm


RETURN BY <CANCEL>
```

→ The currently set value is displayed.

Depress [ENTER] after selecting the motor specification on the axis specification display. The following display appears.

Motor Specification Display

```
MOTOR SPEC
STATION1      -> UNIV-2          AXIS -> 1
AXIS TYPE     -> RECT-R&P
MACHINE TYPE -> USADED-13-YR21

ROTATION (FWD : 0 REV : 1)        0
MOTOR MAX RPM                  3000 rpm
ACCELERATION TIME              0.300 sec
INERTIA RATIO                    300


RETURN BY <CANCEL>
```

→ The currently set value is displayed.

● Application Display

The application setting status can be observed on the application display.

```
SENSOR FUNCTION

SENSOR BOARD 1-> COM-ARC
SENSOR BOARD 2-> NONE
ROBOT1
  SENSOR BOARD 1-> USED
  SENSOR BOARD 2-> NOT USED
ROBOT2
  SENSOR BOARD 1-> NOT USED
  SENSOR BOARD 2-> USED


RETURN BY <CANCEL>
```

→ Not displayed unless application 2 exists.

→ Not displayed unless robot 2 exists.

Depress [CANCEL] to return to the display.

● I/O Module

The I/O module setting status can be observed on the I/O module display.

```
IO MODULES

SLOT 1        DIO-16
SLOT 2        DIO-32
SLOT 3        NONE
SLOT 4        NONE
SLOT 5        MEW01-1


RETURN BY <CANCEL>
```

→ The current parameter setting status is displayed.

Depress CANCEL to return to the display.

● Sensor Function Display

The sensor function setting status can be displayed on the sensor function display.

```
SENSOR FUNCTION

SENSOR BOARD 1-> COM-ARC
SENSOR BOARD 2-> NONE
ROBOT 1
  SENSOR BOARD 1-> USED
  SENSOR BOARD 2-> NOT USED
ROBOT 2
  SENSOR BOARD 1-> NOT USED
  SENSOR BOARD 2-> USED

RETURN BY <CANCEL>
```

→ Not displayed unless robot 2 exists.

→ Not displayed unless application 2 exists.

● OP

The OP setting status can be displayed on the OP display.

```
OP

IF02          -> ON                    → *1
OP            -> ON                    → *2
  LANGUAGE 1  -> JAPANESE              → *3
  LANGUAGE 2  -> ENGLISH

OP            USED    NOT USED         → *4

RETURN BY <CANCEL>
```

*1 OFF when M1F02 board does not exist.
*2 OFF when OP is not connected.
*3 The language incorporated into ROM of the operation panel is displayed only when OP is connected.
*4 Displayed only when OP is connected.

Depress [CANCEL] to return to the display.

● CMOS Memory

The CMOS memory setting status can be observed on the CMOS memory display.

```
CMOS MEMORY

AVAILABLE     -> 256KB
HW CAPACITY   -> 256KB

RETURN BY <CANCEL>
```

Depress [CANCEL] to return to the display.

● Customer Option

The customer option setting status can be observed on the customer option display.

```
CUSTOMER OPTION

REMOTE FUNCTION
  IO                USED    NOT USED
  COMMAND           USED    NOT USED
  PP/PBOX           USED    NOT USED

ARC WELDING         STANDARD  ENHANCED


RETURN BY <CANCEL>
```

Depress CANCEL to return to the display.

● Customer Mechanism

The customer mechanism setting status can be observed on the customer mechanism display.

OPERATION EXAMPLE

Initializing a Cooperative System

In the example below, robot 1 is assigned to K30-A411 (K50SX) for holding workpieces and robot 2 to K6-A301 (K6S) for are welding.

1

Set the rotary switch to 7 and turn ON power. The following display appears.

```
YASNAC-MRC

MAINTENANCE MODE

LANGUAGE    JAPANESE      ENGLISH




SEL BY ← →/CONFIRM BY <ENTER>
```

Select either JAPANESE or ENGLISH and depress [ENTER].
The following display appears.

2

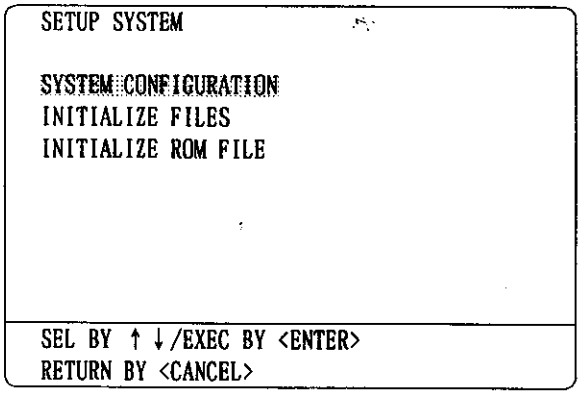
Maintenance Mode Display

```
MAINTENANCE MODE

SETUP SYSTEM
SYSTEM VERSION
HARDWARE DIAGNOSTICS




SEL BY ↑ ↓/EXEC BY <ENTER>
```

Select SETUP SYSTEM to call up the following display.

3

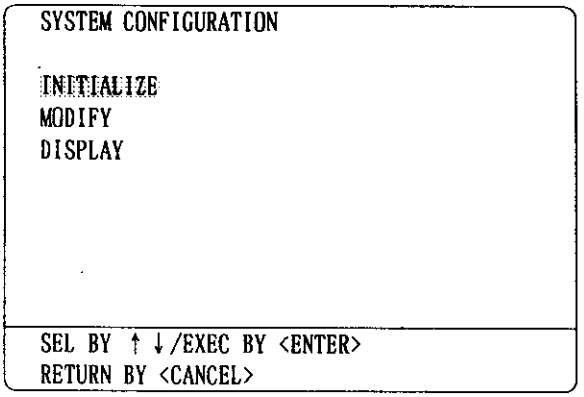
System Setup Display



Select SYSTEM CONFIGURATION to call up the following display.

4

System Configuration Display

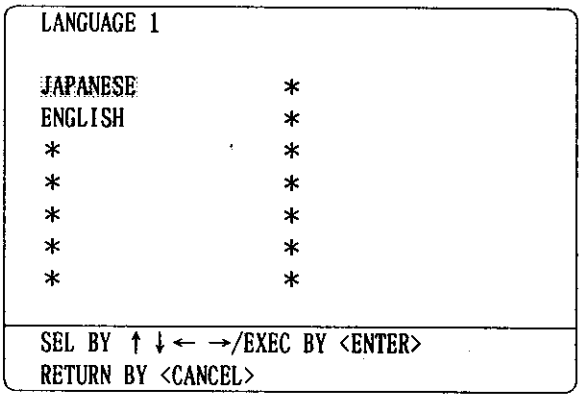


When INITIALIZE is selected, the language 1 display appears.

5

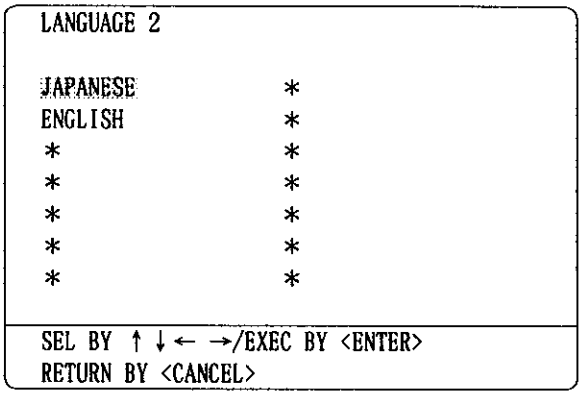
1st Language/2nd Language Display

When "INITIALIZE" is selected in the system configuration display, the following display appears.



→ The list of selectable languages is displayed.

Depress ENTER after selecting LANGUAGE 1 to call up the following display.



→ The list of selectable languages is displayed.

Depress ENTER after selecting LANGUAGE 2 to call up the following display.

6

Controlled Axes Configuration Display

```
AXES CONFIGURATION

ROBOT COUNT       1        2

BASE1             OFF      ON
BASE2             OFF      ON

STATION COUNT     0 1 2 3 4 5 6


SEL ITEM BY ↑ ↓/SEL OPTION BY ← →
CONFIRM BY <ENTER>/ABORT BY <CANCEL>
```

Set ROBOT COUNT to "2" (BASE-1 and -2 : "OFF", STATION COUNT : "0") and depress ENTER to call up the following display.

7

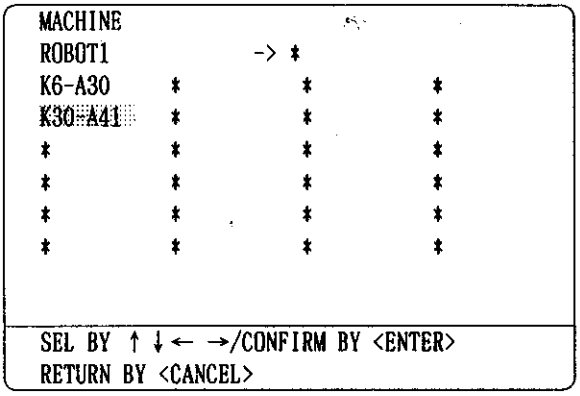
Contactor Connection Display

```
CONTACTOR CONNECTION
                    CONTACTOR NUMBER
ROBOT1                1  2  3
ROBOT2                1  2  3




SEL BY ↑ ↓/CONFIRM BY <ENTER>
RETURN BY <CANCEL>
```

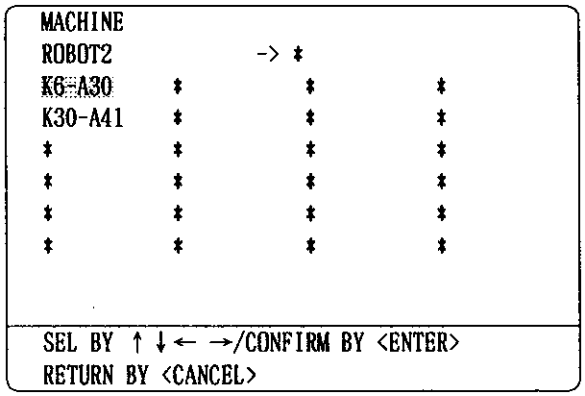
Set ROBOT 1 to CONTACTOR 1 and ROBOT 2 to CONTACTOR 2 on the default display, and depress ENTER . The machine display of ROBOT 1 appears.

8

Machine Display (ROBOT 1, ROBOT 2)



Select the model "K30-A41" for ROBOT 1, and depress ENTER . The ROBOT 2 machine display appears.



Select the model "K6-A30" for ROBOT 2 and depress ENTER . The following display appears.

9

Application Display

```
APPL

ARC                 GENERAL PURPOSE
JIG-LESS            CO2-LASER
ARC+ARC             LASER CUTTING
HANDLING            PAINT
SPOT                *
SPOT/SPOT           *


SEL BY ↑ ↓ ← →/CONFIRM BY <ENTER>
RETURN BY <CANCEL>
```

Depress ENTER after selecting JIG-LESS. The following display appears.

10

CIO Ladder Display

```
CIO LADDER

ARC                 GENERAL PURPOSE
JIG-LESS            CO2-LASER
ARC+ARC             LASER CUTTING
HANDLING            PAINT
SPOT                *
SPOT/SPOT           *


SEL BY ↑ ↓ ← →/CONFIRM BY <ENTER>
RETURN BY <CANCEL>
```

Depress ENTER after selecting JIG-LESS for CIO ladder application. The following display appears.

11

Robot Application Option Display

```
ROBOT APPL OPTION

ROBOT1
       APPL 1      USED       NOT USED
ROBOT2
       APPL 1      USED       NOT USED




SEL ITEM BY ↑ ↓/SEL OPTION BY ← →
CONFIRM BY <ENTER>/RETURN BY <CANCEL>
```

Set application 1 of robot 1 to NOT USED, application 1 of robot 2 to USED, and depress ENTER. The following display appears.

12

IO Module Display

```
IO MODULES

SLOT-1              DI016
SLOT-2              DI032
SLOT-3              NONE
SLOT-4              NONE
SLOT-5              MEW01-1




CONFIRM BY <ENTER>/RETURN BY <CANCEL>
```

Verify that the display matches the I/O module implementation, then depress ENTER. The following display appears.

13

Sensor Function Display

```
SENSOR FUNCTION

SENSOR BOARD 1 -> NONE
SENSOR BOARD 2 -> NONE

CONFIRM BY <ENTER>/RETURN BY <CANCEL>
```

Verify that the display matches sensor board implementation, then depress ENTER. The following display appears.

14

OP Display

```
OP

IF02      -> OFF
OP        -> OFF

CONFIRM BY <ENTER>/RETURN BY <CANCEL>
```

Verify that the display matches the IF02 board and OP connection, then depress ENTER. The following display appears.

15

CMOS Memory Display

```
CMOS MEMORY

AVAILABLE     -> 256KB
HW CAPACITY   -> 256KB




CONFIRM BY <ENTER>/RETURN BY <CANCEL>
```

Verify that the display matches the CMOS memory implementation, then depress ENTER. The following display appears.

16

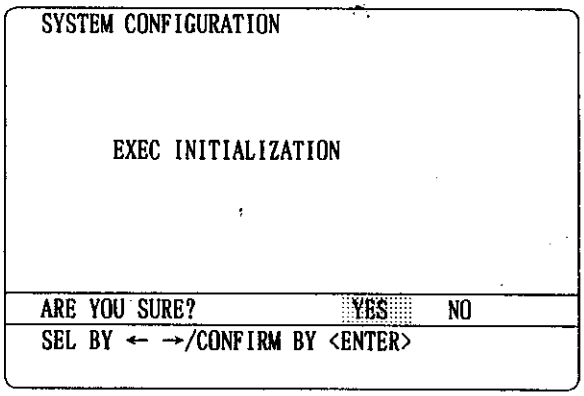
Calendar Display

```
CALENDAR

DATE      1994 01 01
CLOCK     12.34




SEL ITEM BY ↑ ↓/INPUT MODE BY <ALTER>
CONFIRM BY <ENTER>/RETURN BY <CANCEL>
```

Depress ENTER after setting date and time. The following display appears.

17

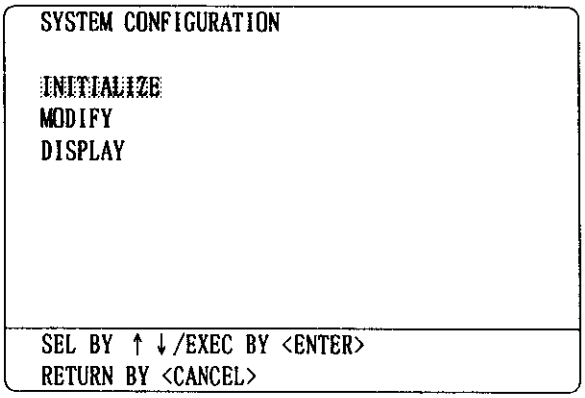
System Configuration Execution Check Display



Depress ENTER after selecting "YES". The CMOS memory contents are initialized and the following display appears.

18

System Configuration Display



The above procedures complete initialization.

19

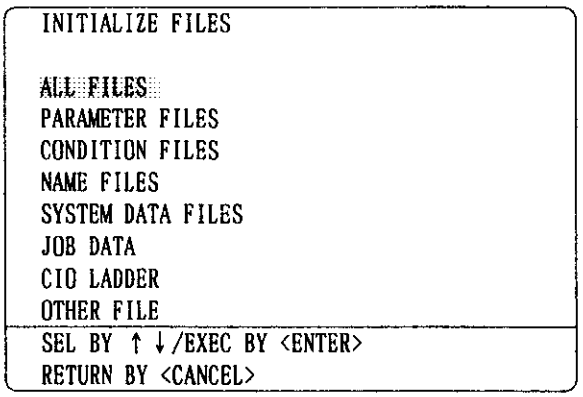
Turn the power OFF to ON.

2.3 FILE INITIALIZATION

■ SELECTING FILES TO INITIALIZE

Select files to initialize on the file initialization display before starting initialization.

(1) To initialize parameter files, refer to "Initializing Parameter Files".
(2) To initialize condition files, refer to "Initializing Condition Files".
(3) To initialize name files, refer to "Initializing Name Files ".
(4) To initialize system data files, refer to "Initializing System Data Files".
(5) To Initialize CIO ladders, refer to "Initializing CIO Ladders".
(6) To Initialize other resources, refer to "Initializing Other Files".
(7) If either ALL FILES or JOB DATA are selected, a message appears asking to initialize them. After selecting YES, they will be initialized.



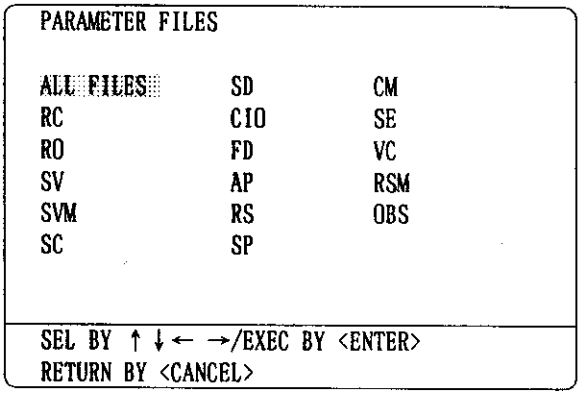
→ Move the cursor to the files to initialize then depress ENTER. A message appears asking to initialize them. After selecting YES, depress ENTER. Then the selected files will be initialized.

When the job data are initialized, the following files are also initialized.

- Position variable data
- User coordinate files
- Robot calibration files
- Tool calibration files

■ INITIALIZING PARAMETER FILES

By selecting PARAMETER FILES on the file initialization display, the parameter file selection display appears.



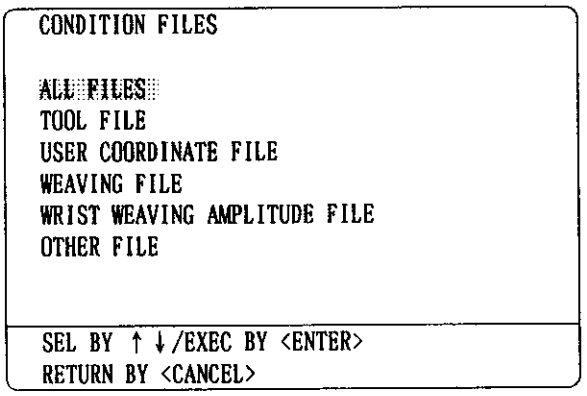
Move the cursor to the files to initialize then depress ENTER . A message appears asking to initialize them. After selecting YES, depress ENTER . Then the selected files will be initialized.

■ INITIALIZING CONDITION FILES

Select CONDITION FILES on the file initialization display to call up the condition file select display.

(1) If any of ALL FILES, TOOL FILE, USER COORDINATE FILE, WEAVING FILE or WRIST WEAVING AMPLITUDE FILE is selected, a message appears asking to initialize it. After selecting YES, the selected files will be initialized.

(2) If OTHER FILE is selected, the condition file select display (other files) appears.

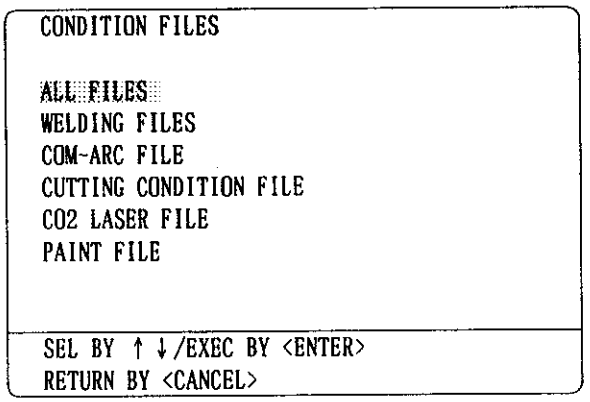


→ Move the cursor to the files to initialize then depress ENTER . A message appears asking to initialize them. After selecting YES, depress ENTER . Then the selected files will be initialized.

If OTHER FILE are selected on the condition file select display, the condition file select display (other files) shown below appears.

(1) If either ALL FILES or CUTTING CONDITION FILE is selected, a message appears asking to initialize it. After selecting YES, the selected files will be initialized.

(2) If other options are selected, the corresponding file select display appears.

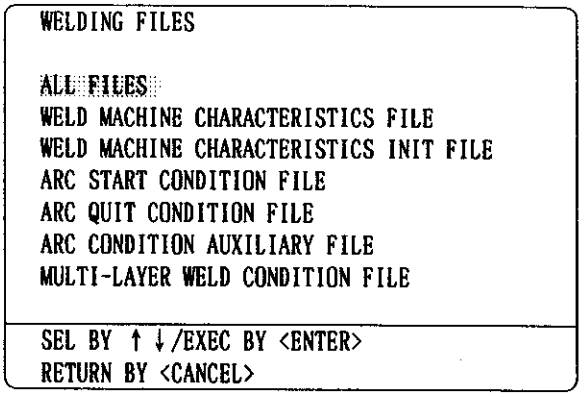


→ Selectable only at arc application
→ Selectable only at COM-ARC setting
→ Selectable only at laser cutting application
→ Selectable only at CO2 laser application
→ Selectable only at painting application

1

Initializing Welding Files

Select WELDING FILES on the condition file select display to call up the welding file select display.



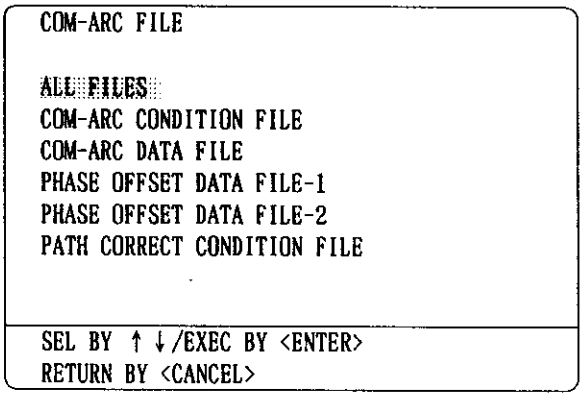
→ Move the cursor to the files to initialize then depress [ENTER]. A message appears asking to initialize them. After selecting YES, depress [ENTER]. Then the selected files will be initialized.

Note : Multi-layer welding condition file is initialized only when CMOS extension memory is mounted.

2

Initializing COM-ARC Files

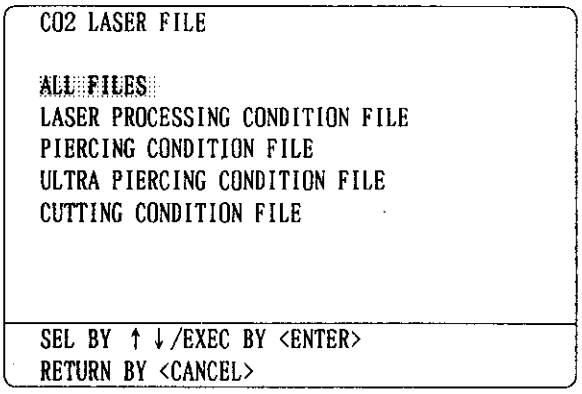
Select COM-ARC FILE on the condition file select display to call up the COM-ARC file select display.



→ Move the cursor to the files to initialize then depress [ENTER]. A message appears asking to initialize them. After selecting YES, depress [ENTER]. Then the selected files will be initialized.

3

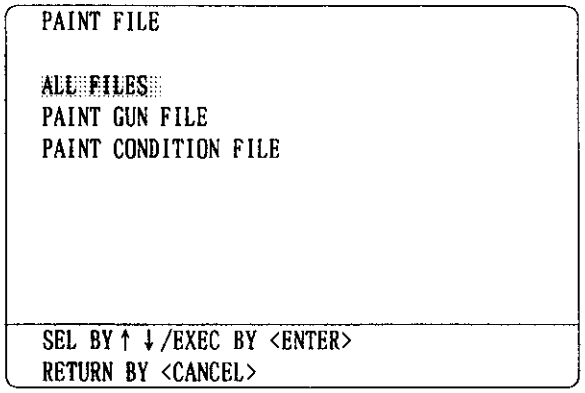
Initializing CO2 Laser File
Select CO2 LASER FILE on the condition file select display to call up the CO2 laser file select display.



→ Move the cursor to the files to initialize then depress ENTER . A message appears asking to initialize them. After selecting YES, depress ENTER . Then the selected files will be initialized.

4

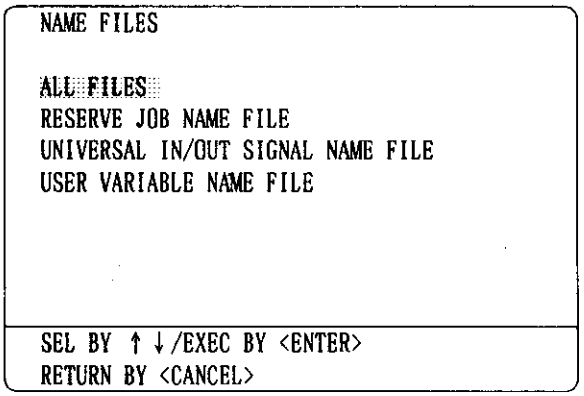
Initializing Paint File
Select PAINT FILE on the condition file select display to call up the paint file select display.



→ Move the cursor to the files to initialize then depress ENTER . A message appears asking to initialize them. After selecting YES, depress ENTER . Then the selected files will be initialized.

■ INITIALIZING NAME FILES

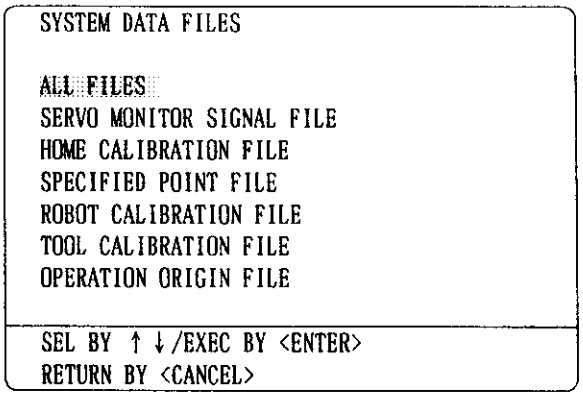
Select NAME FILES on the file initializing display to call up the name file select display.



→ Move the cursor to the files to initialize then depress ENTER. A message appears asking to initialize them. After selecting YES, depress ENTER. Then the selected files will be initialized.

■ INITIALIZING SYSTEM DATA FILES

Select SYSTEM DATA FILES on the file initialization display to call up the system data file select display.



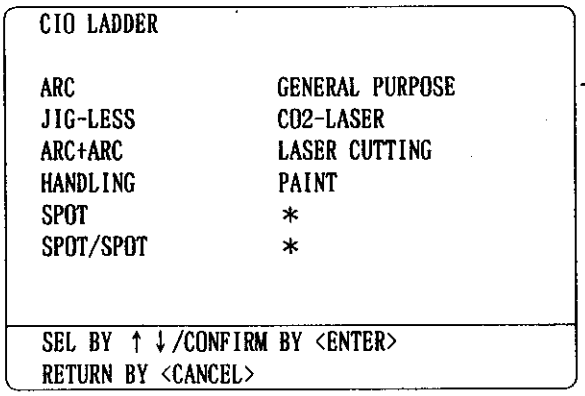
→ Move the cursor to the files to initialize then depress ENTER. A message appears asking to initialize them. After selecting YES, depress ENTER. Then the selected files will be initialized.

■ INITIALIZING CIO LADDERS

Select CIO LADDER on the file initialization display to call up the CIO ladder select display.

(1) A list of applications is displayed on which the current selected application is displayed inversely.

(2) If the list is not contained on a single page, "DEPRESS MORE FOR NEXT PAGE" is displayed.



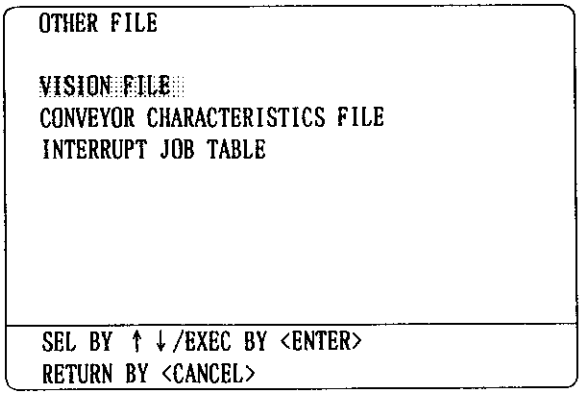
→ Move the cursor to the files to initialize then depress ENTER. A message appears asking to initialize them. After selecting YES, depress ENTER. Then the selected files will be initialized.

■ INITIALIZING OTHER FILES

Select OTHER FILE on the file initialization display to call up the other file select display.

1

Select the files to initialize.

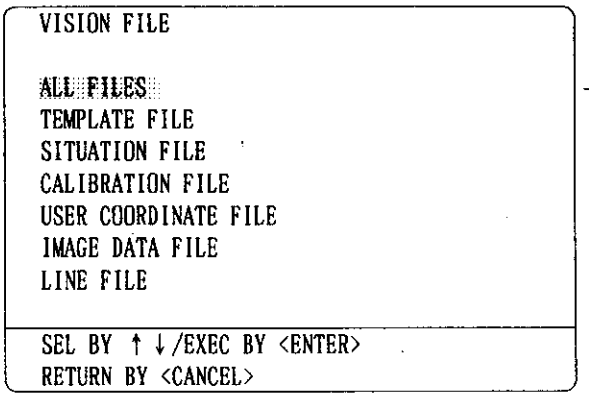


→ Move the cursor to the files to initialize then depress ENTER. A message appears asking to initialize them. After selecting YES, depress ENTER. Then the selected files will be initialized.

2

Initializing Vision Files

Select VISION FILE on the other file select displays to call up the vision file select display.



→ Move the cursor to the files to initialize then depress ENTER. A message appears asking to initialize them. After selecting YES, depress ENTER. Then the selected files will be initialized.

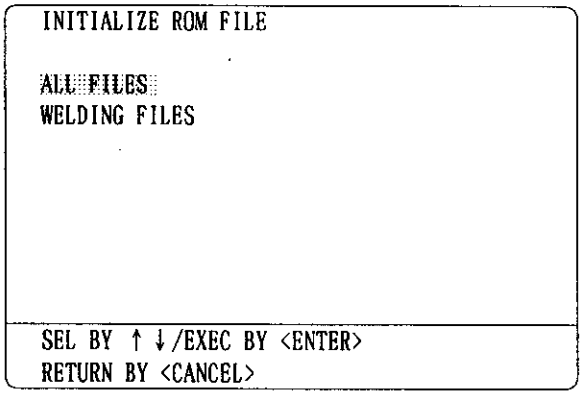
2.4 INITIALIZATION OF ROM FILES

■ SELECTING ROM FILES TO BE INITIALIZED

Select files to be initialized on the ROM file initialization display and depress ENTER.

(1) To initialize WELDING FILES, refer to "Initializing Welding Files".

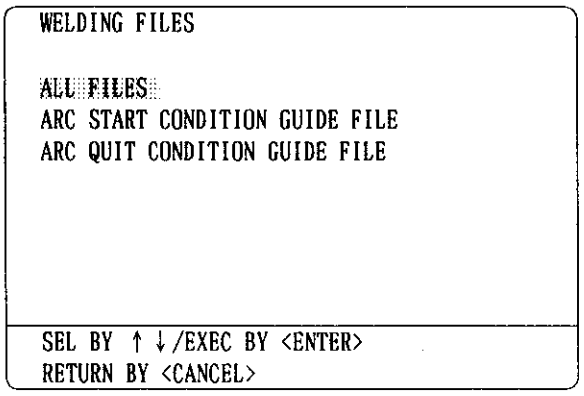
(2) If ALL FILES are selected, a message appears asking to initialize them. After selecting YES, the selected files will be initialized.



→ Move the cursor to the files to initialize then depress ENTER. A message appears asking to initialize them. After selecting YES, depress ENTER. Then the selected files will be initialized.

■ INITIALIZING WELDING FILES

Select WELDING FILES on the ROM file initialization display to call up the welding file select display.



→ Move the cursor to the files to initialize then depress ENTER. A message appears asking to initialize them. After selecting YES, depress ENTER. Then the selected files will be initialized.

SECTION 3

SYSTEM VERSION CHECK

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3.1 SYSTEM VERSION CHECK

ROM versions of boards of the system and the SERVOPACKs can be displayed on the system version check displays.

(1) Board ROM Version Check

Versions of board ROM chips mounted on the system are displayed.

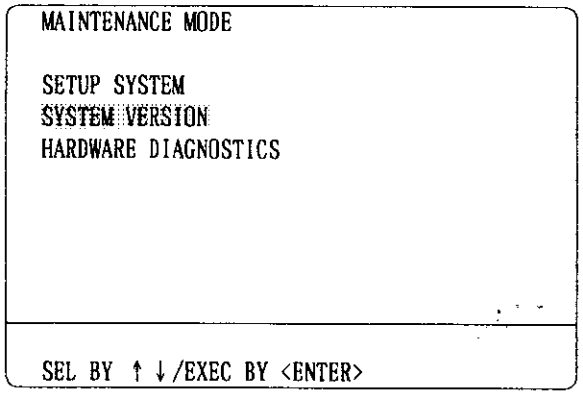
(2) SERVOPACK ROM Version Check

Versions of SERVOPACK ROM chips mounted on the system are displayed.

SYSTEM VERSION CHECK DISPLAY

1

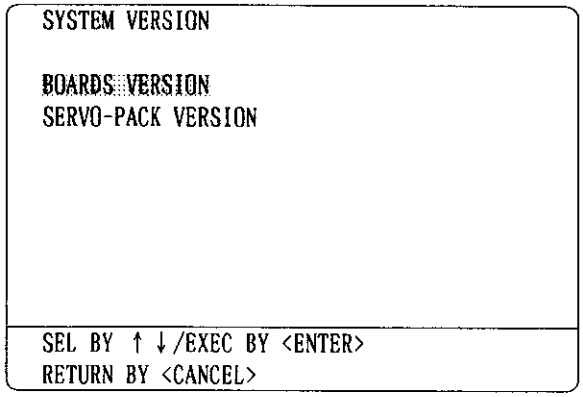
Start up in maintenance mode and select SYSTEM VERSION.



→ Select processing by using ↑ or ↓ and depress ENTER .

2

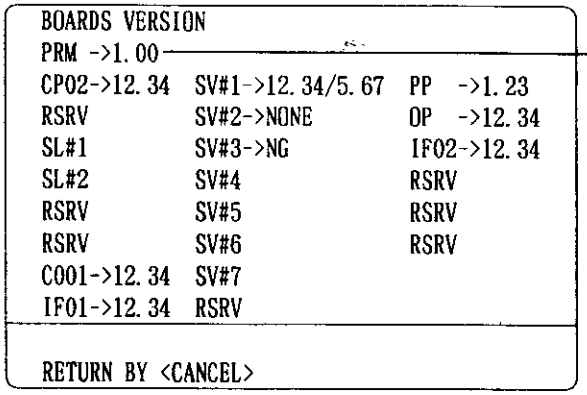
On the system version check display, move the cursor to the processing to be displayed and depress ENTER .



→ Select processing by using ↑ or ↓ and depress ENTER .

3.2 BOARD ROM VERSION

Select BOARD ROM VERSION on the system version check display to call up the board ROM version display.



Version of parameter ROM is displayed.

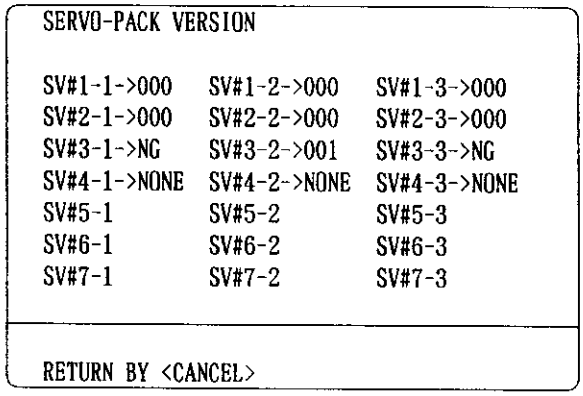
Version of board ROMs are displayed.

->XX.XX	ROM version
->NG	Communication error
->NONE	No board
-> ?	Error on CP02 board
Blank	Parameter not set

* For SV, a ROM version is displayed in a format of DSP/monitor CPU.

3.3 SERVOPACK ROM VERSION

Select SERVO-PACK VERSION on the system version check display to call up the SERVOPACK ROM version display.



Versions of SERVOPACK ROMs are displayed.

->xxx*	ROM version
->NG	Communication error
->NONE	No board
-> ?	Error on CP02 board
Blank	Parameter not set

* xxx = 000 to 999

SECTION 4

ALARM OF ONLINE MODE AT POWER ON

4

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	ALARMS CAUSED BY HARDWARE ERROR	71
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	OTHER ALARMS	86

4.1 OUTLINE

If the MRC system starts up in standard or simulated online mode, the following procedure is executed immediately after power is turned ON. Provided that the entire procedure is completed normally, the system gets ready in either online mode.

If an error occurs during the startup procedure, an alarm display appears and the system stops. (In simulated online mode, the procedure can be restarted by depressing [CANCEL].)

Standard/Forced Online Mode Startup Procedure

Power ON
↓
CPU response-ready status read (A-bus/S-bus CPU exchange)
↓
CIO board presence check
If failed → "0" display on 7-segment LED of MCP01 board
↓
PP data link setup
If failed → "F" display on 7-segment LED of MCP01 board
↓
PP initial display
↓
CMOS communication area clear
↓
General-purpose output area initialization
↓
Parameter file sum check
If failed → Alarm 200 (parameters lost)
↓
CPU board insertion status check (on all CPUs)
If failed → Alarm 10 (CPU board insertion error)
↓
A-bus shared RAM test (on MCP01)
If failed → Alarm 60 (A-bus shared RAM error)
↓
S-bus 2-port RAM test (on MCP01)
If failed → Alarm 80 (S-bus 2-port RAM error)
↓
CPU communication test (on MCP02, MIF01, and MIF02)
If failed → Alarm 20 (CPU communication error)
↓
OP data link setup
If failed → Alarm 20 (CPU communication error)
↓
OP initial display
↓
D-bus 2-port RAM test (on MCP02)
If failed → Alarm 70 (D-bus 2-port RAM error)
↓

CMOS memory capacity collation
If failed → Alarm 310 (CMOS memory capacity collation error)
↓
Job file recovery
↓
Job file sum check
If failed → Alarm 220 (job management data lost)
↓
CIO ladder intermediate code sum check
If failed → Alarm 230 (CIO ladders lost)
↓
System configuration data sum check
If failed → Alarm 210 (system configuration data lost)
↓
Axis board setting collation
If failed → Alarm 300 (system configuration data collation error)
↓
Language collation
If failed → Alarm 300 (system configuration data collation error)
↓
Application setting parameter collation check
If failed → Alarm 360 (application setting collation error)
↓
CPU communication test (on all CPUs)
If failed → Alarm 20 (CPU communication error)
↓
ROM test (on all CPUs)
If failed → Alarm 30 (ROM error)
↓
Local RAM test (on all CPUs)
If failed → Alarm 40 (local RAM error)
↓
RTC test (on all CPUs)
If failed → Alarm 50 (RTC error)
↓
A-bus shared RAM test (on MCP01, MCP02 and MIF02)
If failed → Alarm 60 (A-bus shared RAM error)
↓
D-bus 2-port RAM test (on MSV)
If failed → Alarm 70 (D-bus 2-port RAM error)
↓
Parameter transmission (on MIF01 and MSV)
If failed → Alarm 400 (parameter transmission error)
↓
CIO parameter consistency check
If failed → Alarm 330 (parameter error)
↓

I/O module connection status transmission
If failed → Alarm 90 (I/O module communication error)
↓
I/O module connection status result collation
If failed → Alarm 320 (I/O module collation error)
↓
Sensor function collation
If failed → Alarm 370 (sensor function collation error)
↓
Current amplifier parameter read (version number)
If failed → Alarm 100 (current amplifier communication error)
↓
Current amplifier parameter write
(motor code/current amplifier gain)
If failed → Alarm 110
(current amplifier parameter write error)
↓
Absolute data preparation
If failed → Alarm 120 (encoder communication error)
Alarm 130 (encoder overspeed)
Alarm 131 (encoder absolute error)
Alarm 132 (encoder backup error)
Alarm 133 (encoder check sum error)
Alarm 134 (encoder battery error)
Alarm 135 (encoder overheat)
Alarm 350 (encoder type collation error)
↓
Online mode transition processing (on all CPUs except MCP01)
If failed → Alarm 410 (mode transition error)
↓
CIO ladder transmission and compilation
If failed → Alarm 410 (mode transition error)
↓
Online display

4.2 LIST OF PRE-ONLINE MODE ALARMS

1 : Alarms Caused by Hardware Error

No.	Name	Process	Corrective Action
10	CPU BOARD INSERTION ERROR	×	Visual check
20	CPU COMMUNICATION ERROR	×	Visual check
30	ROM ERROR	×	Visual check
40	LOCAL RAM ERROR	×	Visual check
50	RTC ERROR	×	Visual check
60	ABUS COMMON RAM ERROR	×	Visual check
70	DBUS 2PORT RAM ERROR	×	Visual check
80	SBUS 2PORT RAM ERROR	×	Visual check
90	I/O MODULE COMMUNICATION ERROR	×	Visual check and parameter correction
100	IAMP COMMUNICATION ERROR	×	Visual check
110	IAMP PARAM MODIFICATION ERROR	×	Visual check
120	ENCODER COMMUNICATION ERROR	×	Visual check
130	ENCODER OVER SPEED	×	Visual check
131	ENCODER ABS DATA ERROR	×	Visual check
132	ENCODER BACKUP ERROR*	△*	Battery replacement and home position registration
133	ENCODER CHECKSUM ERROR	△*	Battery replacement and home position registration
134	ENCODER BATTERY ERROR †	○†	Battery replacement
135	ENCODER OVER HEAT ‡	○‡	Encoder cooling

× : Operation halts.
△ : Changed to online mode after alarm is reset.
○ : Message displayed at any time after changed to online mode.

2 : Alarms Caused by CMOS Data Error

No.	Name	Process	Corrective Action
200	PARAM ERROR	×	Re-initialization in maintenance mode
210	SYSTEM CONFIG DATA ERROR	×	Re-initialization in maintenance mode
220	JOB MANAGEMENT DATA ERROR	×	Re-initialization in maintenance mode
230	CIO LADDER ERROR	×	Re-initialization in maintenance mode

3 : Alarms Caused by System Configuration Error

No.	Name	Process	Corrective Action
300	SYSTEM CONFIG DATA VERIFY ERROR	×	Re-initialization in maintenance mode
310	CMOS MEMORY SIZE VERIFY ERROR	×	Re-initialization in maintenance mode
320	I/O MODULE VERIFY ERROR	×	Re-initialization in maintenance mode
330	INVALID PARAM	×	Parameter value correction
340	SERVOPACK TYPE VERIFY ERROR	×	Parameter value correction
350	ENCODER TYPE VERIFY ERROR	×	Parameter value correction
360	APPLICATION VERIFY ERROR	×	Re-initialization in maintenance mode
370	SENSOR FUNCTION VERIFY ERROR	×	Re-initialization in maintenance mode

4 : Other Alarms

No.	Name	Process	Corrective Action
400	PARAM TRANSMISSION ERROR	×	Visual check
410	MODE CHANGE ERROR	×	Visual check

If an alarm occurs, it is displayed on the PP display.
Alarms occurring during startup procedure are recorded in offline alarm history in the same way as alarms occurring during operations in online mode.

* If CANCEL is depressed after any of the following alarms occur, the encoder of the axis where the alarm occurred is reset, home positioning completion status is reset to 0, and online mode is started.

132 ENCODER BACKUP ERROR 133 ENCODER CHECKSUM ERROR

† If the following alarm occurs, the encoder of the axis where the alarm occurred is unconditionally alarm-masked. After transition to online mode, "ENCODER BATTERY ERROR [axis-number]" is displayed continuously.

134 ENCODER BATTERY ERROR

‡ If the following alarm occurs, the encoder of the axis where the alarm occurred is unconditionally alarm-masked. After transition to online mode, "ENCODER OVER HEAT [axis-number]" is displayed continuously.
In order to prevent further overheating, playback operation is prohibited by interlocking.

135 ENCODE OVER HEAT

Count-down Display

```
YASNAC-MRC

PERFORMING SYSTEM DIAGNOSTICS

COUNT -> 999
```

ALARMS CAUSED BY HARDWARE ERROR

Alarm 10 Display

```
ALARM 10
  CPU BOARD INSERTION ERROR
  CP02 -> OK        SV#1 -> OK        PP
  RSRV              SV#2 -> NONE      OP
  SL#1              SV#3              IF02
  SL#2              SV#4              RSRV
  RSRV              SV#5              RSRV
  RSRV              SV#6              RSRV
  CP01 -> OK        SV#7
  IF01 -> OK        RSRV
```

OK : Normal
NONE : No board inserted

Explanation : CPU board presence check error
Action to be taken : Check status of insertion of the board marked NONE.
Replace ROM of the board marked NONE.
Replace the board marked NONE.

ALARMS CAUSED BY HARDWARE ERROR (Cont'd)

Alarm 20 Display

```
ALARM 20
  CPU COMMUNICATION ERROR
  CP02 -> OK        SV#1 -> OK        PP
  RSRV              SV#2 -> NG        OP
  SL#1              SV#3              IF02
  SL#2              SV#4              RSRV
  RSRV              SV#5              RSRV
  RSRV              SV#6              RSRV
  CP01 -> OK        SV#7
  IF01 -> OK        RSRV
```

OK : Normal
NG : Error

Explanation : CPU communication test error
Action to be taken : Check status of insertion of the board marked NONE.
Replace ROM of the board marked NONE.
Replace the board marked NONE.

Alarm 30 Display

```
ALARM 30
  ROM ERROR
  CP02 -> OK        SV#1 -> OK        PP
  RSRV              SV#2 -> NG        OP
  SL#1              SV#3              IF02
  SL#2              SV#4              RSRV
  RSRV              SV#5              RSRV
  RSRV              SV#6              RSRV
  CP01 -> OK        SV#7
  IF01 -> OK        RSRV
```

OK : Normal
NG : Error

Explanation : ROM total value check error
Action to be taken : Replace the ROM of the board marked NG.

Alarm 40 Display

```
ALARM 40
  RAM ERROR (LOCAL)
  CP02 -> OK        SV#1 -> OK        PP
  RSRV              SV#2 -> NG        OP
  SL#1              SV#3              IF02
  SL#2              SV#4              RSRV
  RSRV              SV#5              RSRV
  RSRV              SV#6              RSRV
  CP01 -> OK        SV#7
  IF01 -> OK        RSRV
```

OK : Normal
NG : Error

Explanation : Local RAM test error
Action to be taken : Replace the board marked NG.

Alarm 50 Display

```
ALARM 50
  RTC ERROR
  CP02 -> OK        SV#1 -> OK        PP
  RSRV              SV#2 -> NG        OP
  SL#1              SV#3              IF02
  SL#2              SV#4              RSRV
  RSRV              SV#5              RSRV
  RSRV              SV#6              RSRV
  CP01 -> OK        SV#7
  IF01 -> OK        RSRV
```

OK : Normal
NG : Error

Explanation : RTC test error
Action to be taken : Replace the board marked NG.

ALARMS CAUSED BY HARDWARE ERROR (Cont'd)

Alarm 60 Display

```
ALARM 60
  RAM ERROR (A-BUS COMMON)
  CP02 -> OK
  RSRV
  SL#1
  SL#2
  RSRV
  RSRV
  CP01 -> OK
  IF01 -> OK
```

OK : Normal
NG : Error

Explanation : A-bus common RAM error
Action to be taken : Check inserted status of CP01/CP02/IF01/SL boards.
Replace the CP01/CP02/IF01/SL boards.

Alarm 70 Display

```
ALARM 70
  RAM ERROR (D-BUS 2-PORT)
  CP02 -> OK        SV#1 -> OK
  CP02 -> OK        SV#2 -> OK
  CP02              SV#3
  CP02              SV#4
  CP02              SV#5
  CP02              SV#6
  CP02              SV#7
  CP02              RSRV
```

OK : Normal
NG : Error

Explanation : D-bus 2-port RAM test error
Action to be taken : Check inserted status of CP02/SV boards.
Replace the CP02/SV boards.

Alarm 80 Display

```
ALARM 80
  RAM ERROR (S-BUS 2-PORT)
  CP01 -> OK        IF02 -> OK
  CP01              RSRV
  CP01              RSRV
  CP01              RSRV
```

OK : Normal
NG : Error

Explanation : S-bus 2-port RAM error
Action to be taken : Check inserted status of CP01 board/board marked NG.
Replace the CP01 board/board marked NG.

Alarm 90 Display

```
ALARM 90
  IO MODULE COMMUNICATION ERROR

  SLOT-1  -> OK
  SLOT-2  -> OK
  SLOT-3
  SLOT-4
  SLOT-5  -> NG
  RY      -> NG
  PBOX    -> OK
```

OK : Normal
NG : Error

Explanation : I/O module communication test error
Action to be taken : Check inserted status of the module marked NG.
Replace the module marked NG.

ALARMS CAUSED BY HARDWARE ERROR (Cont'd)

Alarm 100 Display

```
ALARM 100
  IAMP COMMUNICATION ERROR

  SV#1-1 -> OK  SV#1-2 -> OK  SV#1-3 -> NG
  SV#2-1 -> OK  SV#2-2 -> OK  SV#2-3 -> NG
  SV#3-1        SV#3-2        SV#3-3
  SV#4-1        SV#4-2        SV#4-3
  SV#5-1        SV#5-2        SV#5-3
  SV#6-1        SV#6-2        SV#6-3
  SV#7-1        SV#7-2        SV#7-3
```

OK : Normal
NG : Error
SV#X-X : Y-axis of SV#X-board

Explanation : Current amplifier communication test error
Action to be taken : Check cable connection between the SV board and SERVOPACK (of the axis marked NG).
Replace the SV board or SERVOPACK (of the axis marked NG).

Alarm 110 Display

```
ALARM 110
  IAMP PARAM MODIFICATION ERROR

  SV#1-1 -> OK  SV#1-2 -> OK  SV#1-3 -> NG
  SV#2-1 -> OK  SV#2-2 -> OK  SV#2-3 -> NG
  SV#3-1        SV#3-2        SV#3-3
  SV#4-1        SV#4-2        SV#4-3
  SV#5-1        SV#5-2        SV#5-3
  SV#6-1        SV#6-2        SV#6-3
  SV#7-1        SV#7-2        SV#7-3
```

OK : Normal
NG : Error

Explanation : Current amplifier parameter modification error
Action to be taken : Check cable connection between the SV board and SERVOPACK (of the axis marked NG).
Replace the SV board or SERVOPACK (of the axis marked NG).

Alarm 120 Display

```
ALARM 120
  ENCODER COMMUNICATION ERROR
  ROBOT1    -> S  L  U  R  B  T
  ROBOT2    -> S  L  U  R  B  T  A  B
  BASE1     -> 1
  BASE2     -> 1
  STATION1  -> 1  2  3
  STATION2  -> 1
  STATION3  -> 1
  STATION4  -> 1
```

Inverted display : Error

Explanation : Encoder communication error
Action to be taken : Check cable connection between the SV board and SERVOPACK (of the axis marked NG).
Replace the SV board or SERVOPACK (of the axis marked NG).

4

Alarm 130 Display

```
ALARM 130
  ENCODER OVERSPEED
  ROBOT1    -> S  L  U  R  B  T
  ROBOT2    -> S  L  U  R  B  T  A  B
  BASE1     -> 1
  BASE2     -> 1
  STATION1  -> 1  2  3
  STATION2  -> 1
  STATION3  -> 1
  STATION4  -> 1
```

Inverted display : Error

Explanation : Encoder error
Action to be taken : Replace the encoder (of inverted axis).

Alarm 131 Display

```
ALARM 131
  ENCODER ABSO DATA ERROR
  ROBOT1    -> S  L  U  R  B  T
  ROBOT2    -> S  L  U  R  B  T  A  B
  BASE1     -> 1
  BASE2     -> 1
  STATION1  -> 1  2  3
  STATION2  -> 1
  STATION3  -> 1
  STATION4  -> 1

  RESET ALARM BY <CANCEL>
```

Inverted display : Error

Explanation : Encoder error
Action to be taken : Replace the encoder (of inverted axis).

Alarm 132 Display

```
ALARM 132
  ENCODER BACK-UP ERROR
  ROBOT1    -> S  L  U  R  B  T
  ROBOT2    -> S  L  U  R  B  T  A  B
  BASE1     -> 1
  BASE2     -> 1
  STATION1  -> 1  2  3
  STATION2  -> 1
  STATION3  -> 1
  STATION4  -> 1

  RESET ALARM BY <CANCEL>
```

Inverted display : Error

Explanation : Encoder error
Action to be taken : Replace the battery and register home position.

Alarm 133 Display

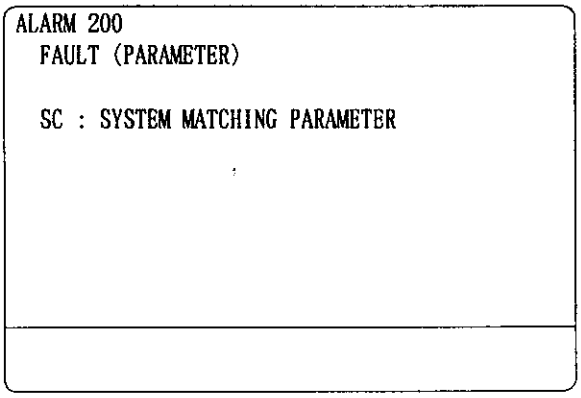
```
ALARM 133
  ENCODER CHECKSUM ERROR
  ROBOT1    ->  S  L  U  R  B  T
  ROBOT2    ->  S  L  U  R  B  T  A  B
  BASE1     ->  1
  BASE2     ->  1
  STATION1  ->  1  2  3
  STATION2  ->  1
  STATION3  ->  1
  STATION4  ->  1

  RESET ALARM BY <CANCEL>
```

Inverted display : Error

Explanation : Encoder error
Action to be taken : Replace the battery and register home position.

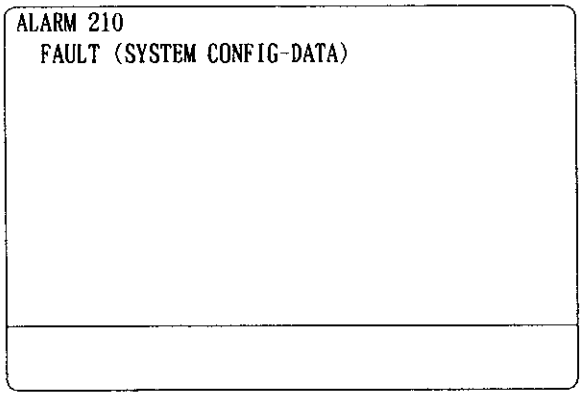
ALARMS CAUSED BY CMOS ERROR

Alarm 200 Display



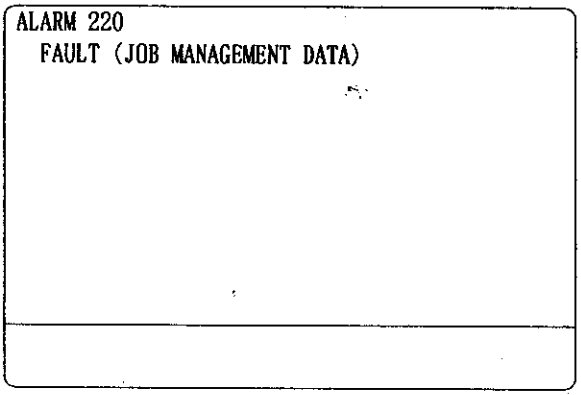
Explanation : Parameter sum check error
Action to be taken : Initialize the parameter again.

Alarm 210 Display



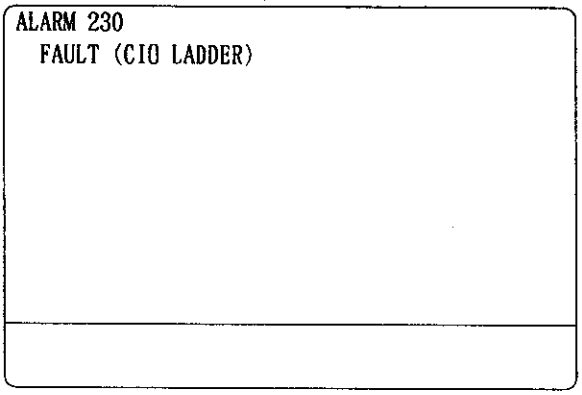
Explanation : System configuration data sum check error
Action to be taken : Initialize the system configuration again.

Alarm 220 Display



Explanation : Job management data sum check error
Action to be taken : Initialize the job again.

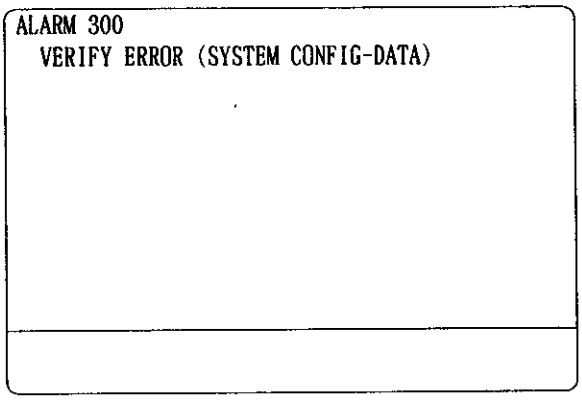
Alarm 230 Display



Explanation : CIO ladder sum check error
Action to be taken : Initialize the CIO ladder again.

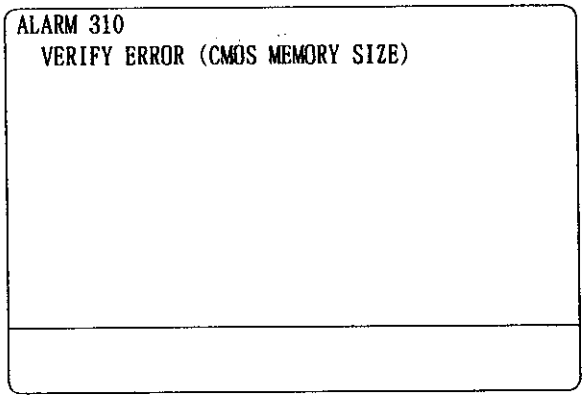
ALARMS CAUSED BY SYSTEM CONFIGURATION ERROR

Alarm 300 Display



Explanation : System configuration data verification test error
Action to be taken : Initialize the system configuration again.

Alarm 310 Display



Explanation : CMOS memory capacity verification error
(System configuration setting differs from hardware mounted status.)
Action to be taken : Verify the extension CMOS board mounted status.

Alarm 320 Display

```
ALARM 320
  VERIFY ERROR (I/O MODULE)

  SLOT-1   -> OK
  SLOT-2   -> OK
  SLOT-3
  SLOT-4
  SLOT-5   -> NG
```

OK : Matched
NONE : Not matched

Explanation : I/O module verification error
(System configuration setting differs from hardware mounted status.)
Action to be taken : Verify the type of the module marked NG.

Alarm 330 Display

```
ALARM 330
  ILLEGAL PARAMETER
```

Explanation : Parameter value error
(CIO, RC×G, SV×G, SV1D, SV2D, SVM parameters)
Action to be taken : Correct parameter value.

Alarm 340 Display

```
ALARM 340
  VERIFY ERROR (SERVOPACK TYPE)

  SV#1-1 -> OK  SV#1-2 -> OK  SV#1-3 -> NG
  SV#2-1 -> OK  SV#2-2 -> OK  SV#2-3 -> NG
  SV#3-1        SV#3-2        SV#3-3
  SV#4-1        SV#4-2        SV#4-3
  SV#5-1        SV#5-2        SV#5-3
  SV#6-1        SV#6-2        SV#6-3
  SV#7-1        SV#7-2        SV#7-3
```

OK : Matched
NONE : Not matched

Explanation : SERVOPACK type verification error
(Parameter setting differs from hardware mounted status.)
Action to be taken : Correct parameter value.

Alarm 350 Display

```
ALARM 350
  VERIFY ERROR (ENCODER TYPE)
  ROBOT1    -> S  L  U  R  B  T
  ROBOT2    -> S  L  U  R  B  T  A  B
  BASE1     -> 1
  BASE2     -> 1
  STATION1  -> 1  2  3
  STATION2  -> 1
  STATION3  -> 1
  STATION4  -> 1
```

Inverted axis : Error

Explanation : Encoder type verification error
(Parameter setting differs from hardware mounted status.)
Action to be taken : Correct parameter value.

Alarm 360 Display

```
ALARM 360
  VERIFY ERROR (APPLICATION)
```

Explanation : Application setting verification error
Action to be taken : Correct parameter value.

Alarm 370 Display

```
ALARM 370
  VERIFY ERROR (SENSOR FUNCTION)

  SENSOR BOARD 1 -> OK
  SENSOR BOARD 2 -> NG
```

OK : Matched
NG : Not matched

Explanation : Sensor function verification error
(System configuration setting differs from hardware mounted status.)
Action to be taken : Verify the type of the board marked NG.

OTHER ALARMS

Alarm 400 Display

```
ALARM 400
  PARAMETER TRANSMISSION ERROR
  CP02 -> OK        SV#1 -> OK        PP
  RSRV              SV#2 -> NG        OP
  SL#1              SV#3              IF02
  SL#2              SV#4              RSRV
  RSRV              SV#5              RSRV
  RSRV              SV#6              RSRV
  CP01 -> OK        SV#7
  IF01 -> OK        RSRV
```

OK : Completed normally
NG : Transmission error

Explanation : Parameter transmission error

Alarm 410 Display

```
ALARM 410
  MODE CHANGE ERROR
  CP02 -> OK        SV#1 -> OK        PP
  RSRV              SV#2 -> NG        OP
  SL#1              SV#3              IF02
  SL#2              SV#4              RSRV
  RSRV              SV#5              RSRV
  RSRV              SV#6              RSRV
  CP01 -> OK        SV#7
  IF01 -> OK        RSRV
```

OK : Completed normally
NONE : Mode change error

Explanation : Mode change error

SECTION 5

MCP01 BOARD 7-SEGMENT LED DISPLAY

5

■ 1-DIGIT ERROR CODE DISPLAY 88
■ 4-DIGIT CODE REPEATED DISPLAY 88

While the MRC system is functioning properly, the 7-segment LEDs of the MCP01 (SYSCON) board display nothing. If an error occurs, the LEDs indicate the code of the error.

■ 1-DIGIT ERROR CODE DISPLAY

Display	Meaning
.8.	MCP01 or SROMS error (MCP01 or SROMS board is defective.)
(Period)	NMI occurred during NINDY monitor operation. (MCP01, MCP02, MIF01, or MSV01 board is defective or not inserted properly.)
0	MIF01 (CIO) board error (MIF01 board is defective or not inserted properly.)
1 to F	Communication error between MCP01 and programming pendant

Details of Communication Error between MCP01 and Programming Pendant

Display	Meaning
1	System alarm
2	Data transmission buffer overflow
3	Data receiving buffer overflow
4	Data receiving time-over
5	SIO receiving alarm (overrun, flaming, parity error)
6	SIO receiving alarm (data transmission disabled)
7	Receiving data BCC alarm
9	Programming Pendant software watchdog alarm
a	Receiving data command length error
d	Denial response from programming pendant (BCC alarm detection at programming pendant)
E	Failed data transmission establishment other than at power ON
F	Failed data transmission establishment at program pendant alarm occurrence / power setup

■ 4-DIGIT CODE REPEATED DISPLAY

If a non-maskable interrupt (NMI) occurs, a 4-digit interrupt code (listed on the next page) is displayed repeatedly.

Example : If a watchdog timer error (whose alarm code is 0906) occurs on the MCP01 board, it is indicated as :

0 → 9 → 0 → 6 → . → 0 → 9 → 0 → 6 → . repeat

Return Code	Meaning
F000	Power lost *
F001	Watchdog error
F002	Access error
F003	A-bus error
F004	Other CPU error

* In thermostat diagnosis mode (rotary switch position 5), return codes from all CPUs at the time of occurrence are displayed on the result display.

Display	Meaning
0900's	Watchdog timer error (A-bus)
0900	MCP02
0901	Reserved
0902	SL#1
0903	SL#2
0904	Reserved
0905	Reserved
0906	MCP01
0907	MIP01
0910's	Watchdog timer error (D-bus)
0910	MSV#1
0911	MSV#2
0912	MSV#3
0913	MSV#4
0914	MSV#5
0915	MSV#6
0916	MSV#7
0917	Reserved
0920's	Watchdog timer error (S-bus)
0920	MIF02
0930's	Access error (A-bus)
0930	MCP02
0931	Reserved
0932	SL#1
0933	SL#2
0934	Reserved
0935	Reserved
0936	MCP01
0937	MIF01
0940's	A-bus error
0940	MCP02
0941	Reserved
0942	SL#1
0943	SL#2
0944	Reserved
0945	Reserved
0946	MCP01
0947	MIF01

(Cont'd)

■4-DIGIT CODE REPEATED DISPLAY (Cont'd)

(Cont'd)

Display	Meaning
0950's	CPU hang-up error (A-bus)
0950	MCP02
0951	Reserved
0952	MSL#1
0953	MSV#2
0954	Reserved
0955	Reserved
0956	MCP01
0957	MIF01
0960's	CPU hang-up error (D-bus)
0960	MSV#1
0961	MSV#2
0962	MSV#3
0963	MSV#4
0964	MSV#5
0965	MSV#6
0966	MSV#7
0967	Reserved
0970's	CPU hang-up error (S-bus)
0970	MIF02
0999's	
0999	NMI (non-maskable interrup) factor judgement disabled

Action to be Taken when 7-segment LEDs of MCP01 Board Light

● Refer to the maintenance procedure and verify that :
  ·All boards in the CPU rack are inserted in proper slots,
  ·All boards in the I/O rack are inserted in proper slots,
  ·Cables between boards are connected properly, and
  ·ROMs are properly inserted into all boards in the CPU rack. (Make sure of this particularly after replacing ROMs.)

↓

If all these connections are perfect, proceed to the steps below.

↓

● Remove from the rack the boards that correspond to the code displayed on the 7-segment LED and insert it again.
  → (The board contact is probably faulty.)

↓

Proceed to the next step if the same error occurs after restarting the system. (Do it in other steps.)

↓

● Remove other boards from the rack and insert them again.
  → Because of the hardware configuration, faulty contact with a board may be indicated by another board's error code.

↓

● Start up in maintenance mode.
  → If the system is not started, observe the procedure of "Action to be Taken when Startup in Maintenance Mode Failed" explained below.

↓

● Select the system version check display in maintenance mode. Confirm that there is a ROM version display for all the mounted boards. If any board is omitted, replace that board.
  → The board is probably defective.

↓

● Replace the board that corresponds to the code displayed on the 7-segment LED.
  → (The board is probably defective.)

↓

● Replace other boards.
  → Because of the hardware configuration, failure of a board may be indicated by another board's error code.

↓

● Contact your YASKAWA representative.

Action to be Taken when Startup in Maintenance Mode Failed

● Leaving the MCP01 and MIF01 boards only, remove all boards (MCP02, MSL01, MSL02 and MSV) from the rack and turn ON power.
  → If startup in maintenance mode fails again, the MCP01 or MIF01 board probably has a connection failure or is defective.

↓

● If the system has been started up, insert the removed boards one by one each time checking if the system can be started.
  → The board that has been inserted before failure in startup in maintenance mode probably has a connection failure or is defective.

* The system can be started up in maintenance mode with no other boards except boards MCP01 and MIF01.

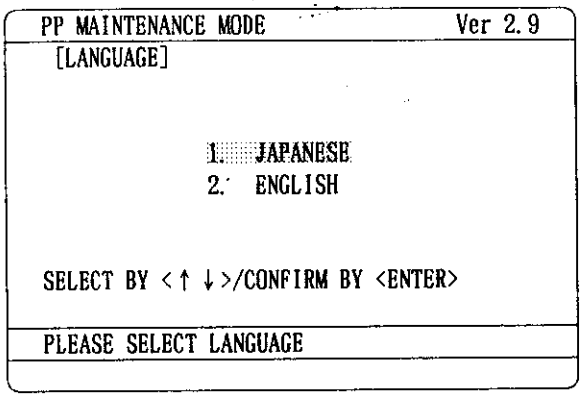
APPENDIX 1

PP (PROGRAMMING PENDANT) MAINTENANCE

1.1 FUNCTION OUTLINE	94
1.2 SECTION DIAGNOSIS	96
1.3 SYSTEM DIAGNOSIS	104
1.4 DIAGNOSIS MENU TREE	105

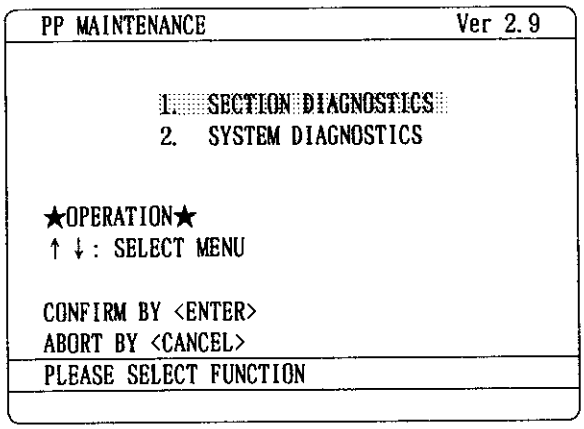
1.1 FUNCTION OUTLINE

Software diagnosis can be conducted by key operations on the programming pendant. Turn OFF power to the robot. Holding down both [↑] and [MORE] turn ON power to the MRC. The system starts up in maintenance mode and the display appears as shown below.

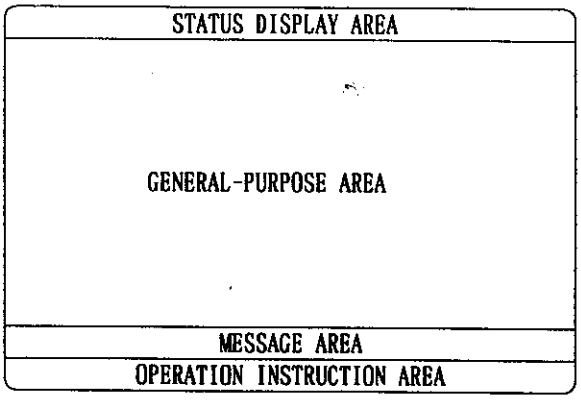


Select a display language. For the display screens in the following explanation, English has been selected.

There are two diagnosis procedures.
・Section diagnosis : Selected test is conducted. (Manual diagnosis)
・System diagnosis : The entire system is diagnosed automatically.



Display on the programming pendant screen consists of the following four areas.



(1) Status Display Area

Diagnosis type and the programmable ROM version are displayed.

(2) General-purpose Area

Necessary information of the ongoing diagnosis test is displayed. The name of the test is displayed in the upper left of the area.

(3) Message Area

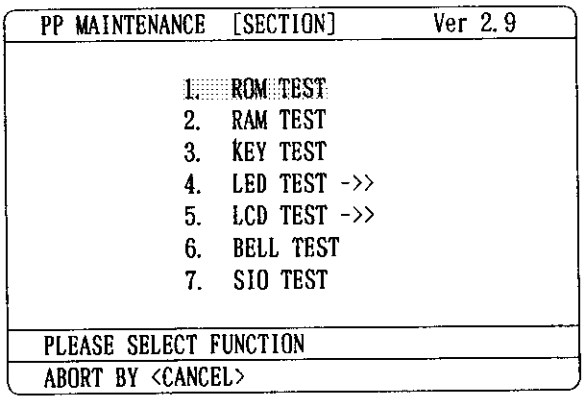
Error messages and other interactive system messages are displayed. These messages are automatically scrolled in the horizontal direction. This motion is indicative of normal function of the programming pendant.

(4) Operation Instruction Area

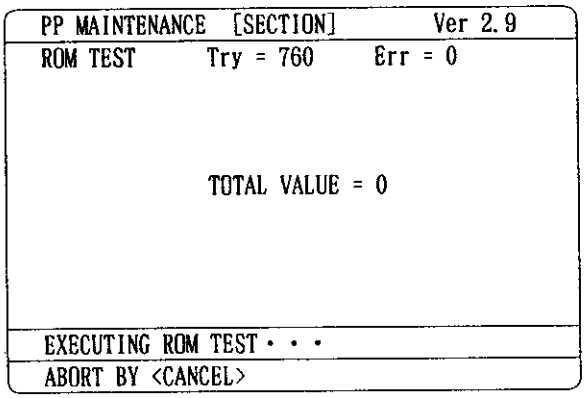
Possible operations are suggested here.

SECTION DIAGNOSIS

Select section diagnosis to call up the menu shown below. The ->> mark after a test name means that there are submenus for that test.



Select 1. ROM TEST to call up the display shown below and start ROM test. If an error occurs, an error message appears on the message area and diagnosis process stops. Replace the PROM. This test is repeated until the CANCEL key is depressed.



Select 2. RAM TEST to call up the display shown below and start RAM test. If an error occurs, an error message appears on the message line. Replace the CPU board. This test is repeated until the CANCEL key is depressed.

```
PP MAINTENANCE  [SECTION]          Ver 2.9
RAM TEST       Try = 18.5     Err = 0


     RAM ADDRESS =   0      : 5800



EXECUTING RAM TEST • • •
ABORT BY <CANCEL>
```

Select 3. KEY TEST to call up the display shown below.
When one key on the programming pendant is depressed, the corresponding bit of the corresponding group is set to "1" and displayed inversely. Correspondence between the bits and the keys is shown in the keyboard matrix below. If the bit remains "0" after the corresponding key is depressed, the key is defective. Replace the keyboard chip. Depressing the CANCEL key returns to the preceding display.

```
PP MAINTENANCE  [SECTION]          Ver 2.9
KEY TEST       Try = 0       Err = 0

KEY-GRP0 : 1000-0000  KEY-GRP4 : 0000-0000
KEY-GRP1 : 0000-0000  KEY-GRP5 : 0000-0000
KEY-GRP2 : 0000-0000  KEY-GRP6 : 0000-0000
KEY-GRP3 : 0000-0000  KEY-GRP7 : 0000-0000



DEPRESS KEY • • •
RETURN BY <CANCEL>
```

Keyboard Matrix Configuration

Bit / Group	b7	b6	b5	b4	b3	b2	b1	b0
GRP0	*	HOLD RELEASE	ENABLE	MAN SPD SLW	▲	F · 3	F · 2	F · 1
GRP1		HIGH SPD	COORD	MAN SPD FST	MORE	CUS-TOMER	F · 5	F · 4
GRP2		DELETE	INSERT	MODIFY	FUNC	SELECT	EDIT	DISP
GRP3	FWD	BWD	T+ (z+)	B+ (y+)	R+ (x+)	U+ (z+)	L+ (y+)	S+ (x+)
GRP4	TEST START	ENTER	T- (z-)	B- (y-)	R- (x-)	U- (z-)	L- (y-)	S- (x-)
GRP5	7	6	5	4	3	2	1	0
GPR6	↑	←	OPEN	DSP CHG	−	.	9	8
GRP7	↓	→	POS LV1	PLAY SPD	MOTION TYPE	CANCEL		

Select 4. LED TEST to call up the display shown below.

```
PP MAINTENANCE  [SECTION]          Ver 2.9


        1.  LED TEST (INDIVIDUAL MODE)
        2.  LED TEST (SIMULTANEOUS MODE)


PLEASE SELECT FUNCTION
ABORT BY <CANCEL>
```

LED test has two modes :

1. Individual mode
2. Simultaneous mode

Select 1. LED TEST (INDIVIDUAL MODE) to call up the display shown below. The LEDs light one by one. As one LED lights, the corresponding bit of the corresponding group is set to "1" and is displayed inversely. Correspondence between the bits and the LEDs is shown in the keyboard matrix below. If the bit remains "0" after the corresponding LED lights, the LED is defective. Replace the keyboard chip. This test is repeated until the CANCEL key is depressed.

```
PP MAINTENANCE  [SECTION]          Ver 2.9
LED TEST       Try = 4        Err = 0

 LED-GRP0 : 0000        LED-GRP3 : 0000
 LED-GRP1 : 0000        LED-GRP4 : 0010
 LED-GRP2 : 0000




EXECUTING LED TEST • • •
ABORT BY <CANCEL>
```

Select 2. LED TEST (SIMULTANEOUS MODE) to call up the display shown below. All the LEDs start blinking at once. If there is any LED that does not blink, replace the keyboard chip. The LEDs continue blinking until the CANCEL key is depressed.

```
PP MAINTENANCE  [SECTION]          Ver 2.9
LED TEST        Try = 4        Err = 0

 LED-GRP0 : 1111        LED-GRP3 : 1111
 LED-GRP1 : 1111        LED-GRP4 : 1111
 LED-GRP2 : 1111

EXECUTING LED TEST • • •
ABORT BY <CANCEL>
```

LED Matrix Configuration

Bit / Group	b3	b2	b1	b0
GRP0	COORD			
	USER	TOOL	WLD/CYL	JOINT
GRP1	MAN SPD			
	INCH	SLW	MED	FST
GRP2	HOLD RELEASE		ENABLE	NOT USED
GRP3	MODIFY	INSERT	DELETE	
GRP4	DSP CHG	OPEN	PLAY SPD	POS LV1

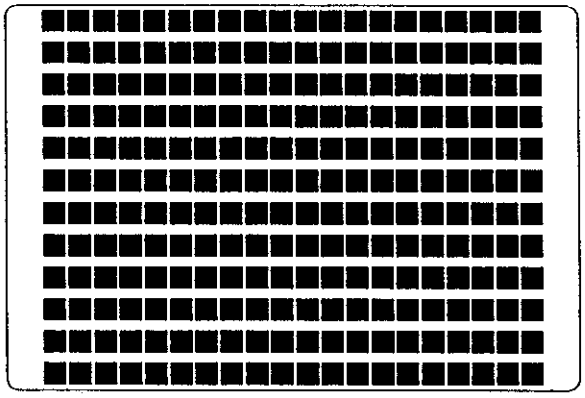
Select 5. LCD TEST to call up the display shown below.

```
PP MAINTENANCE  [SECTION]        Ver 2.9

                1.  LCD TEST
                2.  LIGHT TEST
                3.  FONT TEST

PLEASE SELECT FUNCTION
ABORT BY <CANCEL>
```

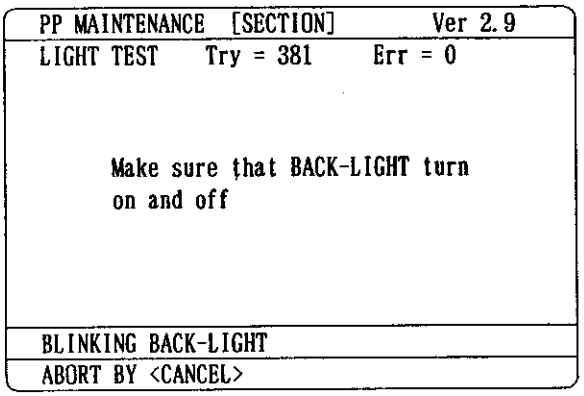
LCD test has three options.

1. Pinhole test
2. Back light test
3. Font test

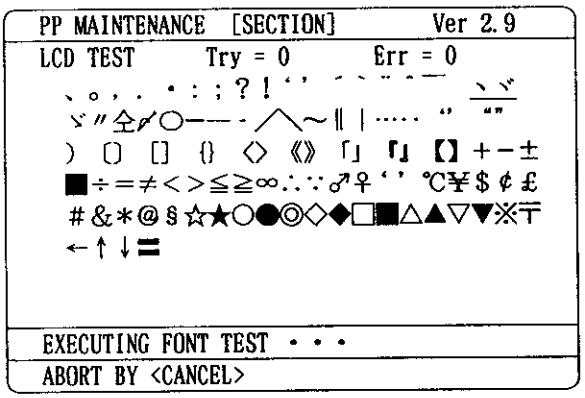
Select 1. PINHOLE TEST to call up the display shown below, the entire display starts blinking. If there is any unevenness or small holes in the display, the liquid crystal display is defective. Replace the LCD. To return to the preceding display, depress the CANCEL key.



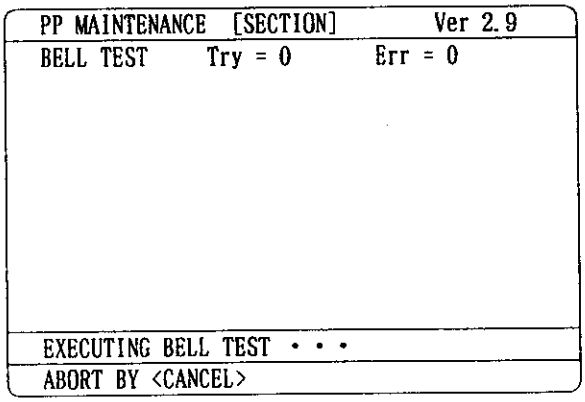
Select 2. BACK LIGHT TEST to call up the display shown below, and at the same time the back light starts blinking. If the back light does not blink, replace it. Darken the room to check the blinking. To return to the preceding display, depress the CANCEL key.



Select 3. FONT TEST to call up the display shown below, where characters of various fonts are displayed repeatedly. If nothing is displayed after selecting font test, replace the font ROM. To return to the preceding display, depress the CANCEL key.



Select 6. BELL TEST to call up the display shown below, and at the same time the bell starts ringing. The bell sound continues until the CANCEL key is depressed. If the bell does not sound, replace the CPU board. To return to the preceding display, depress the CANCEL key.



Select 7. SIO (SYSTEM I/O) TEST to call up the display shown below and starts the SIO test. If an error occurs, an error message appears on the message area.
Replace the CPU board, this test is repeated until the CANCEL key is depressed.

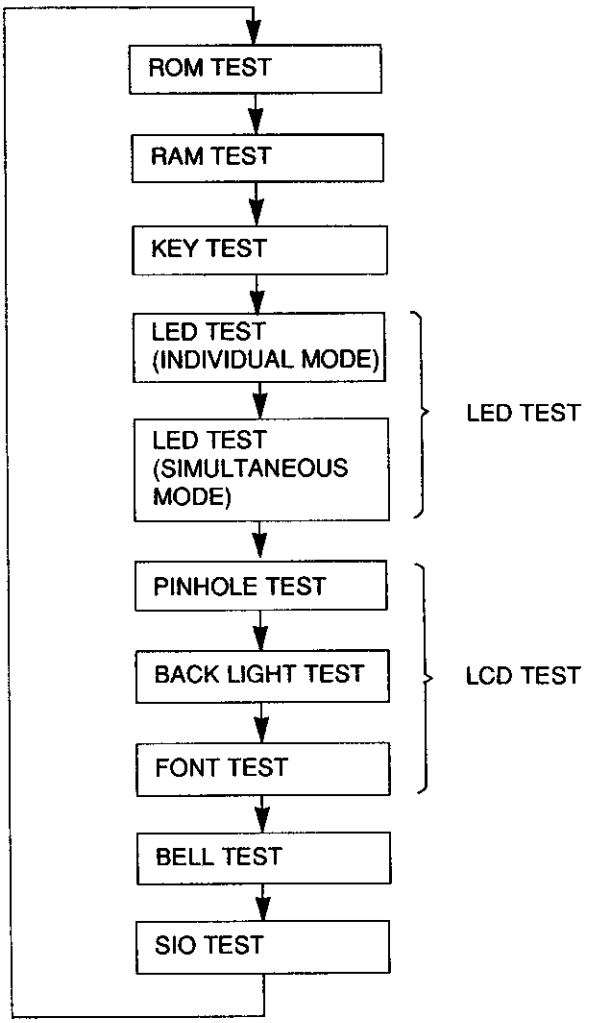
```
PP MAINTENANCE  [SECTION]          Ver 2.9
SIO TEST      Try = 1       Err = 0


          SEND DATA :          ||
          RECEIVE DATA :       ||


EXECUTING SIO TEST • • •
ABORT BY <CANCEL>
```

Exclusive-use cables are needed for this test. If this diagnosis is executed without connecting the exclusive-use cable, an error occurs.

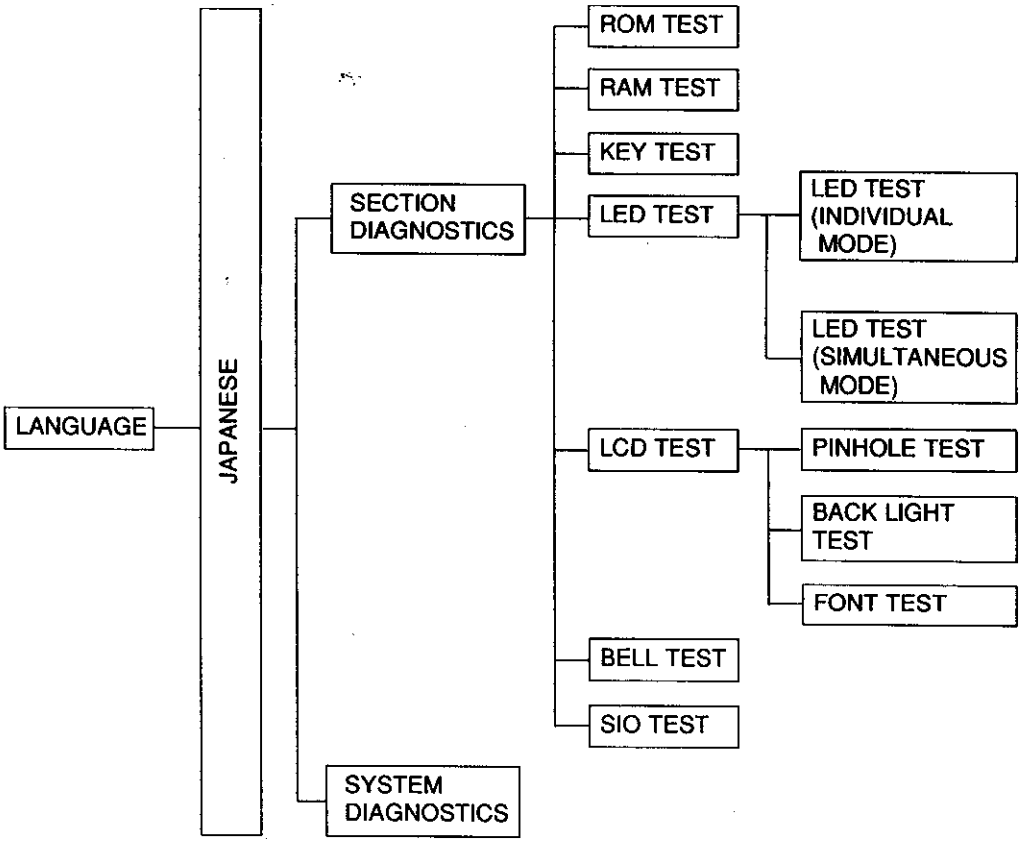
SYSTEM DIAGNOSIS

Select 2. SYSTEM DIAGNOSTICS to start overall diagnosis on the system. It takes about two minutes to complete the whole procedure of system diagnosis. System diagnosis is repeated until the CANCEL key is depressed. If an error occurs, an error message appears on the message area and diagnosis process stops.

Flow of diagnosis is shown below.



1.4 DIAGNOSIS MENU TREE



APPENDIX 2

PP ALARMS

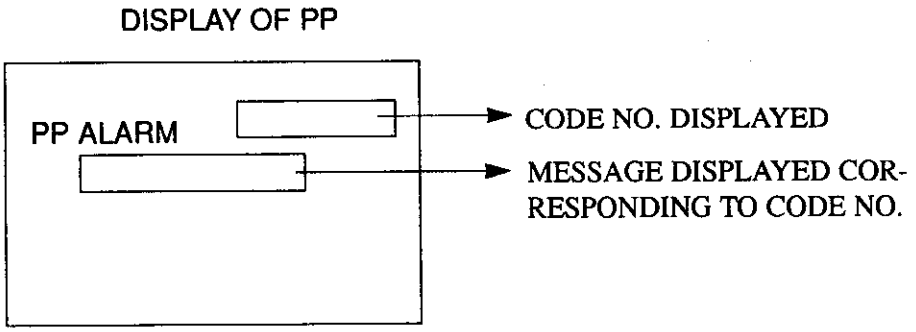
2.1	PROGRAMMING PENDANT ALARMS	108
	WHAT IS PP ALARM ?	108
2.2	CONTENTS OF PP ALARM	108
2.3	ACTION TO BE TAKEN FOR PP ALARM 20	110
2.4	ERROR CODE DISPLAY ON 7-SEGMENT LEDS OF MCP01 BOARD	111
2.5	ACTION TO BE TAKEN FOR PP ALARM 21	114

2.1 PROGRAMMING PENDANT ALARMS

WHAT IS PP ALARM ?

Alarms displayed on the program pendant (hereinafter called PP) when some failure occurs in the YASNAC MRC system.

2.2 CONTENTS OF PP ALARM



List of Code Nos.

Code No.	Message	Contents	Factor Source	Corrective Action or Possible Factor
0010	None	PP ROM error	Hardware	<Corrective action> Replace PP.
0011	None	PP RAM error		
0020	None	1. Breakdown at MRC side 2. Transmission shut off between PP and MRC	Hardware	<Corrective action> Refer to the APPENDIX Par. 2.3 "Action to be Taken for PP ALARM 20".
0021	None	Breakdown at PP side	Hardware	<Corrective action> Refer to the APPENDIX Par. 2.5 "Action to be Taken for PP ALARM 21".
2000	None	Receiving data error	Hardware	Noise between PP and MRC
2001	None	Parity error		
2002	None	Overrun error		
2004	None	Framing error		
2010	None	SIO data transmission error	Software	Software program error Note : For error codes 5000 to 5005, 99 in the message WIN-NO : 99 is numeric data.
2100	None	Receiving buffer full		
2101	None	Transmitting buffer full		
3000	None	Display command buffer full		
3001	None	Display buffer full		
5000	WIN-NO : 99	Display data length error		
5001	WIN-NO : 99	Limit over		
5002	WIN-NO : 99	Data overlapped definition		
5003	WIN-NO : 99	Display No. alarm		
5004	WIN-NO : 99	Window No. alarm		
5005	WIN-NO : 99	Data quantity alarm		

2.3 ACTION TO BE TAKEN FOR PP ALARM 20

"PP ALARM 20" displayed on the program pendant means that communication with the PP has broken because of an error on the MRC side. The error may be hardware error (defective boards, etc.) or software crush caused either by hardware or software error.

Observe the procedure to investigate the cause of PP ALARM 20.

→ Refer to the precaution in Par. 2.5 "ACTION TO BE TAKEN FOR PP ALARM 21".

"PP ALARM 20" is displayed.

↓

Keep the power turned ON and open the controller door.

↓

Read the 7-segment LEDs of the MCP01 board in the CPU rack according to the explanation below.

↓

Find the possible defective board suggested by the 7-segment LEDs, remove the board and re-insert it to see if the error is corrected. (Check for faulty contact.)

↓

If the error is not corrected, replace the board.

↓

If the error is not corrected, inform your YASKAWA representative of the code on the 7-segment LEDs.

2.4 ERROR CODE DISPLAY ON 7-SEGMENT LEDS OF MCP01 BOARD

While the MRC system is functioning properly, the 7-segment LEDs of the MCP01 (SYSCON) board display nothing. If an error occurs, the LEDs indicate the code of the error.

- 1-digit error code display
- 4-digit code repeated display

If a non-maskable interrupt (NMI) occurs, a 4-digit interrupt code (listed on the next page) is displayed repeatedly.

Display	Meaning
.8.	MCP01 or SROMS error (MCP01 or SROMS board is defective.)
(Period)	NMI occurred during NINDY monitor operation. (MCP01, MCP02, MIF01, or MSV01 board is defective or not inserted properly.)
0	MIF01 (CIO) board error (MIF01 board is defective or not inserted properly.)
1 to F	Communication error between MCP01 and Programming Pendant

Example : If a watchdog timer error (whose alarm code is 0906) occurs on the MCP01 board, it is indicated as : 0 → 9 → 0 → 6 → . → 0 →9 → 0 → 6 → repeat

Details of Communication Error between MCP01 and Programming Pendant

Display	Meaning
1	System alarm
2	Data transmission buffer over flow
3	Data receiving buffer overflow
4	Data receiving time-over
5	SIO receiving alarm (overrun, flaming, parity error)
6	SIO receiving alarm (data transmission disabled)
7	Receiving data BCC alarm
9	Programming Pendant software watchdog alarm
a	Receiving data command length error
d	Denial response from programming pendant (BCC alarm detection at programming pendant)
E	Failed data transmission establishment other than at power ON
F	Failed data transmission establishment at program pendant alarm occurrence / power setup

2.4 ERROR CODE DISPLAY ON 7-SEGMENT LEDS OF MCP01 BOARD (Cont'd)

Display	Meaning
0900's	Watchdog timer error (A-bus)
0900	MCP02
0901	Reserved
0902	MSL#1
0903	MSL#2
0904	Reserved
0905	Reserved
0906	MCP01
0907	MIF01
0910's	Watchdog timer error (D-bus)
0910	MSV#1
0911	MSV#2
0912	MSV#3
0913	MSV#4
0914	MSV#5
0915	MSV#6
0916	MSV#7
0917	Reserved
0920's	Watchdog timer error (S-bus)
0920	MIV02
0930's	Access error (A-bus)
0930	MCP02
0931	Reserved
0932	MSL#1
0933	MSL#2
0934	Reserved
0935	Reserved
0936	MCP01
0937	MIF01
0940's	A-bus error
0940	MCP02
0941	Reserved
0942	MSL#1
0943	MSL#2
0944	Reserved
0945	Reserved
0946	MCP01
0947	MIF01

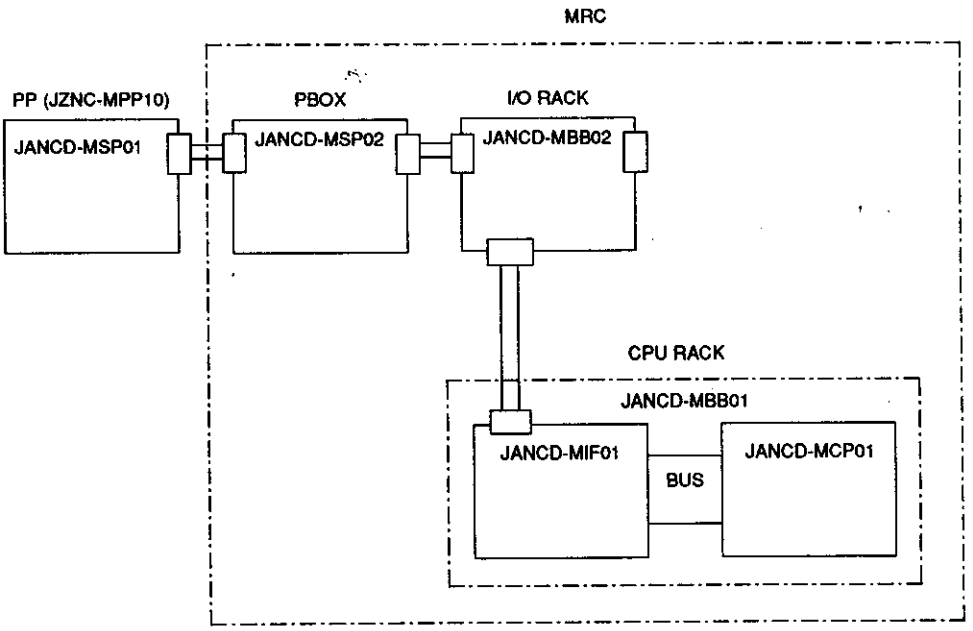
(Cont'd)

(Cont'd)

Display	Meaning
0950's	CPU hang-up error (A-bus)
0950	MCP02
0951	Reserved
0952	MSL#1
0953	MSL#2
0954	Reserved
0955	Reserved
0956	MCP01
0957	MIF01
0960's	CPU hang-up error (D-bus)
0960	MSV#1
0961	MSV#2
0962	MSV#3
0963	MSV#4
0964	MSV#5
0965	MSV#6
0966	MSV#7
0967	Reserved
0970's	CPU hang-up error (S-bus)
0970	MIF02
0999	NMI (non-maskable interrupt) factor judgement disabled

2.5 ACTION TO BE TAKEN FOR PP ALARM 21

The block diagram of the hardware around the PP is shown below.



<Cause>
The most common cause is failure of the PP (JZNC-MPP10).
Also possible are wiring and board errors related to the PP.

<Corrective Action>
Replace PP.
↓
Check wiring.
↓
Replace each board.

Note : If the 24 V power supply line is shorted because of improper connection of I/O signal lines (MIO board, etc.), PP ALARM 20 or 21 may occur. Check the I/O signal line connection.

APPENDIX 3

OP (OPERATION PANEL) MAINTENANCE (OPTION)

3.1 OUTLINE	116
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3.3 SYSTEM DIAGNOSTICS	118
3.4 SECTION DIAGNOSTICS	119
3.5 NOTES	121

3.1 OUTLINE

The following functions are available in the OP maintenance mode.

List of OP Maintenance Mode Functions

■ SYSTEM DIAGNOSTICS
(Full-automatic diagnosis for whole OP)

■ SECTION DIAGNOSTICS

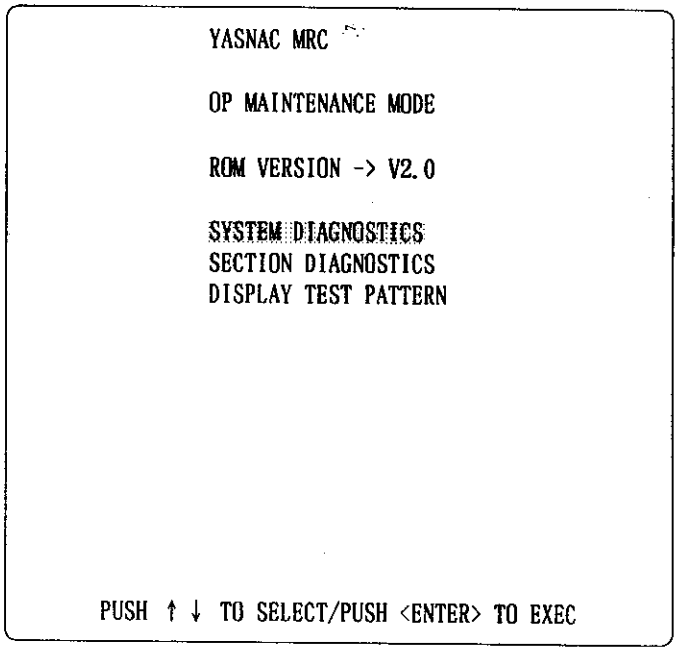
- ROM TEST
- LOCAL RAM TEST
- VIDEO RAM (CHARACTER) TEST
- VIDEO RAM (GRAPHIC) TEST
- RTC TEST
- WATCHDOG TIMER TEST
- CHARACTER GENERATOR ROM (YE) TEST
- CHARACTER GENERATOR ROM (JIS) TEST
- CRT CONTRAST TEST
- SERIAL PORT TEST
- FLAT KEY & LED TEST
- FULL KEYBOARD TEST
- PRINTER I/F TEST

■ DISPLAY TEST PATTERN

Checkered pattern displayed at an interval of 16 dots on the whole display.
(CRT assembly adjustment function)

3.2 OP MAINTENANCE MODE START-UP PROCEDURE

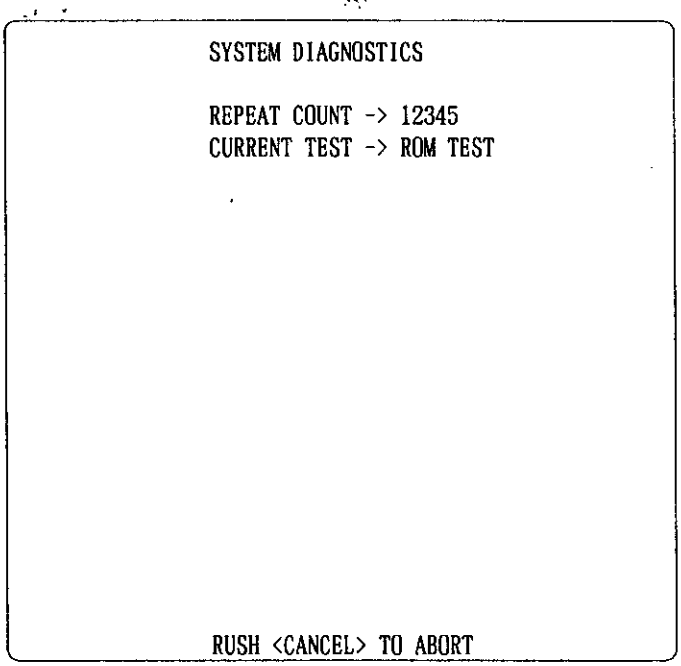
Holding down both [↑] and [MORE] keys, turn ON the control power.
The system starts up in OP maintenance mode and the display appears as shown below.



Maintenance Mode Display

3.3 SYSTEM DIAGNOSTICS

To start system diagnosis in OP maintenance mode, move the cursor to SYSTEM DIAGNOSTICS and depress [ENTER] . The display shown below appears and total diagnosis on OP hardware starts. It takes about three minutes to complete the whole procedure of system diagnosis.



System Diagnostics Execution Display

The system diagnosis procedure sequentially executes all tests except flat key and LED tests, full keyboard test, and printer interface test. Individual tests are listed in the next section. They can be carried out separately in section diagnosis.

3.4 SECTION DIAGNOSTICS

To start section diagnosis is OP maintenance mode, move the cursor to SECTION DIAGNOSTICS and depress [ENTER]. The display shown below appears.

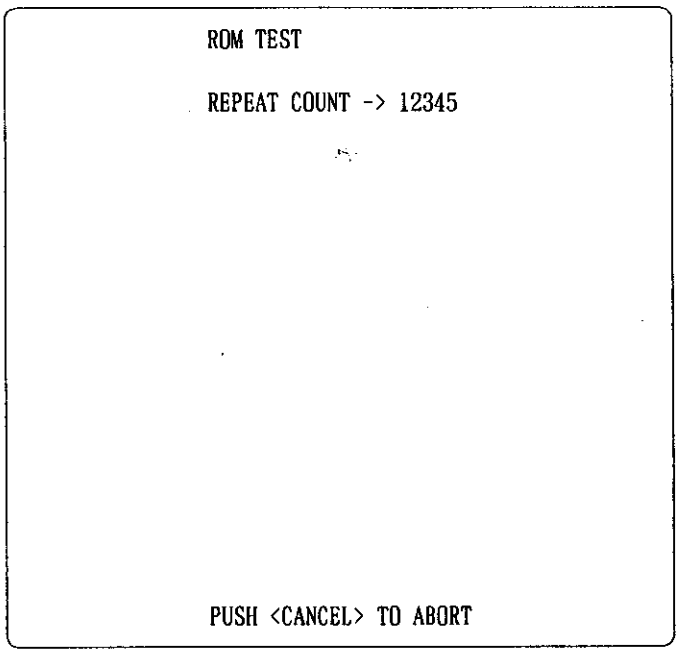
```
SECTION DIAGNOSTICS

ROM TEST
LOCAL RAM TEST
VIDEO RAM (CHARACTOR) TEST
VIDEO RAM (GRAPHIC) TEST
RTC TEST
WATCH DOG TIMER TEST
CHARACTER GENERATOR ROM (YE) TEST
CHARACTER GENERATOR ROM (JIS) TEST
CRT CONTRAST TEST
SERIAL PORT TEST
FLAT KEY & LED TEST
LED TEST
FULL KEYBOARD TEST
PRINTER I/F TEST

PUSH ↑ ↓ TO SELECT/PUSH <ENTER> TO EXEC
PUSH <CANCEL> TO RETURN
```

Section Diagnosis Display

Select an item by using [↑] or [↓] and depress [ENTER]. The display shown on the next page appears and the diagnosis of the selected item starts.
Section diagnosis is repeated until [CANCEL] is depressed. If an error occurs, an error display appears.



Section Diagnosis Execution Display

The following test requires manual input from the keyboard and visual check.

- Character generation ROM (YE) display test.
  → Starting with the first YE code (Japanese 00), 16 lines that consist of 16 characters each are displayed on the grid. Check visually.
- Character generation ROM (JIS) display test
  → Starting with the first JIS code (Japanese 2120), 16 lines that consist of 16 characters each are displayed on the grid. Check visually.
- CRT contrast adjustment test
  → Contrast is intensified and weakened alternately at an interval of one second. Check visually.
- Flat key and LED test
  → Status of input from flat keys is displayed on the CRT display. If there is a LED corresponding to a depressed key, the LED lights. Depressing the key again turns OFF the LED.
- Full keyboard test
  → At present, no test is conducted. (To be used in the future.)
- Printer interface test
  → At present, no test is conducted. (To be used in the future.)

3.5 NOTES

Notes :

1. While VRAM (character/graphic) test is ongoing, flickering image of unintelligible data appears on the display.
   This is a normal event caused by access to VRAM.
2. During watchdog timer test, a watchdog timer error is deliberately generated to sound the buzzer. This is the normal course of the test.
3. Connect the serial port test tool before starting system diagnosis, or a serial port test error occurs. This error also occurs if serial port test is conducted in section diagnosis without the tool. Be sure to connect the test tool before starting serial port test.

APPENDIX 4

ADDITIONAL MOUNTING OF CMOS EXTENSION MEMORY

Additional Mounting of CMOS Extension Memory

To mount the CMOS extension memory (MMM01 board) additionally to the controller in use, follow the procedure described below.

· Procedure

1. Save the standard system CMOS data into a floppy disk by FC1 or FC2 emulator.

·Precautions

CMOS batch file (CMOS. HEX) and user memory batch memory (JOB. HEX) cannot be loaded to use in the system where the MMM01 board is mounted to extend the memory.

For CMOS data excluding parameters must be saved in an individual file. At that time, use [BATCH] key.
Save the parameters in the all-parameter batch file.
→ Refer to the following page.

2. Start up in maintenance mode.
3. Verify the configuration status (language, controlled axes, application) on the system configuration display.
   (→ Because the same setting is needed again in step 6.)
4. Mount the MMM01 board on the MIF01 board with the control power supply OFF.
5. Start up in maintenance mode.
6. Select the system configuration to execute "initialization".
   (Verify the capacity displayed on the CMOS memory display.)

Board	Displayed Capacity
Standard	256 kB
MMM01-2 Mounted	1 MB
MMM01-3 Mounted	2 MB
MMM01-4 Mounted	4 MB

7. Start up in online mode.
8. Load the CMOS data saved in step 1 from the floppy disk by FC1 or FC2 emulator.
9. Turn ON the power supply to complete the procedure.

Files to be Saved and File Names after Saving

Data to be Saved			File Names after Saving	Function Mode		Customer Mode	
				Save	Load	Save	Load
⑦ CMOS (memory) batch save			Loading prohibited	○		○	○
③ User memory batch save,			Loading prohibited	○		○	○
②	① Job	Single job	Job name .JBI	○	○	○	○
		Related job (job + conditions)	Job name .JBR	○	○	○	○
	Condition Data	Weaving condition data	WEAV .CND	○	○	○	○
		Tool data	TOOL .CND	○	○	○	○
		User coordinate data	UFRAME .CND	○	○	○	○
		Welding starting condition data	ARCSRT .CND	○	○	○	○
		Welding quit condition data	ARCEND .CND	○	○	○	○
		COM-ARC2 condition data	COMSRT .CND	○	○	○	○
		COM-ARC2 data	COMARC2 .CND	○	○	○	○
		Locus correction condition data	SENSCOR .CND	○	○	○	○
	General-purpose Data	☆Variable data	VAR .DAT	○	○	○	○
		☆Welding condition auxiliary data	ARCSUP .DAT	○	○	○	○
		☆Phase compensated-value data	PC1PC2 .DAT	○	○	○	○
④ All-parameter Batch Save			ALL .PRM	○		○	○
④	Parameter	Robot conformity parameter	RC .PRM	○		○	○
		System definition parameter	SD .PRM	○		○	○
		Coordinate home position (A) parameter	RO .PRM	○		○	○
		System conformity parameter	SC .PRM	○		○	○
		Parameter for CIO	CIO .PRM	○		○	○
		Function definition parameter	FD .PRM	○		○	○
		☆Parameter for each application	AP .PRM	○		○	○
		☆Transmission (general-purpose) parameter	RS .PRM	○		○	○
		☆Transmission (data link) parameter	CM .PRM	○		○	○
		☆Parameter for printer	SP .PRM	○		○	○
		☆Parameter for sensor	SE .PRM	○		○	○
		☆Parameter for vision	VC .PRM	○		○	○
		☆Servo parameter	SV .PRM	○		○	○
		☆Servomotor parameter	SVM .PRM	○		○	○
⑤ I/O Data		Concurrent I/O program	CIOPRG .LST	○		○	○
		I/O name data	IONAME .DAT	○		○	○
⑥ Customer Data		Reserved job name	RJNAME .DAT	○		○	○
		SV monitor signal	SVMON .DAT	○	○	○	○
		Variable name	VARNAME .DAT	○		○	○
		Data of calibration between robots	RBCALIB .DAT	○		○	○
		Welder characteristic data	WELDER .DAT	○		○	○
		Welder characteristic user definition data	WELDUDEF .DAT	○		○	○
		Second home position	HOME2 .DAT	○	○	○	○
		☆Alarm history data	ALMHIST .DAT	○		○	
		☆Home positioning data	ABSO .DAT	○		○	○
		☆Welding condition guide data	ARCGUIDE .DAT	○		○	○
		☆System information	SYSTEM .SYS	○		○	

○ : Enabled

Note : Data marked with ☆ are not displayed unless scroll operation is performed.

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