Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

MOTOMAN INSTRUCTIONS

MOTOMAN—□□□ INSTRUCTIONS
DX200 INSTRUCTIONS
DX200 OPERATOR’S MANUAL
DX200 MAINTENANCE MANUAL

The DX200 Operator’s manual above corresponds to specific usage. Be sure to use the appropriate manual.

Part Number: 165556-1CD
Revision: 0
MANDATORY

• This manual explains the search function of the DX200. Read this manual carefully and be sure to understand its contents before handling the DX200.

• General items related to safety are listed in Chapter 1: Safety of the DX200 Instructions. To ensure correct and safe operation, carefully read the DX200 Instructions before reading this manual.

CAUTION

• Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.

• The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.

• YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications.

• If such modification is made, the manual number will also be revised.

• If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.

• YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.
Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the DX200.

In this manual, the Notes for Safe Operation are classified as “WARNING”, “CAUTION”, “MANDATORY”, or “PROHIBITED”.

WARNING

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

CAUTION

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

MANDATORY

Always be sure to follow explicitly the items listed under this heading.

PROHIBITED

Must never be performed.

Even items described as “CAUTION” may result in a serious accident in some situations.

At any rate, be sure to follow these important items:

To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “CAUTION” and “WARNING”.
WARNING

• Before operating the manipulator, check that servo power is turned OFF pressing the emergency stop buttons on the front door of the DX200 and the programming pendant. When the servo power is turned OFF, the SERVO ON LED on the programming pendant is turned OFF.

Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop buttons do not function.

Figure 1: Emergency Stop Button

• Once the emergency stop button is released, clear the cell of all items which could interfere with the operation of the manipulator. Then turn the servo power ON.

Injury may result from unintentional or unexpected manipulator motion.

Figure 2: Release of Emergency Stop

• Observe the following precautions when performing teaching operations within the P-point maximum envelope of the manipulator:
  – View the manipulator from the front whenever possible.
  – Always follow the predetermined operating procedure.
  – Keep in mind the emergency response measures against the manipulator’s unexpected motion toward you.
  – Ensure that you have a safe place to retreat in case of emergency.

Improper or unintended manipulator operation may result in injury.

• Confirm that no person is present in the P-point maximum envelope of the manipulator and that you are in a safe location before:
  – Turning ON the power for the DX200.
  – Moving the manipulator with the programming pendant.
  – Running the system in the check mode.
  – Performing automatic operations.

Injury may result if anyone enters the P-point maximum envelope of the manipulator during operation. Always press an emergency stop button immediately if there is a problem.

The emergency stop buttons are located on the right of front door of the DX200 and the programming pendant.
CAUTION

- Perform the following inspection procedures prior to conducting manipulator teaching. If problems are found, repair them immediately, and be sure that all other necessary processing has been performed.
  - Check for problems in manipulator movement.
  - Check for damage to insulation and sheathing of external wires.
- Always return the programming pendant to the hook on the cabinet of the DX200 after use.

The programming pendant can be damaged if it is left in the manipulator's work area, on the floor, or near fixtures.
- Read and understand the Explanation of Warning Labels in the DX200 Instructions before operating the manipulator:

Definition of Terms Used Often in This Manual

The MOTOMAN is the YASKAWA industrial robot product.

The MOTOMAN usually consists of the manipulator, the controller, the programming pendant, and supply cables.

In this manual, the equipment is designated as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX200 controller</td>
<td>DX200</td>
</tr>
<tr>
<td>DX200 programming pendant</td>
<td>Programming pendant</td>
</tr>
<tr>
<td>Cable between the manipulator and the controller</td>
<td>Manipulator cable</td>
</tr>
</tbody>
</table>
Search Function

Descriptions of the programming pendant, buttons, and displays are shown as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming Pendant</td>
<td>Character Keys: The keys which have characters printed on them are denoted with [ ]. ex. [ENTER]</td>
</tr>
<tr>
<td></td>
<td>Symbol Keys: The keys which have a symbol printed on them are not denoted with [ ] but depicted with a small picture. ex. page key</td>
</tr>
<tr>
<td></td>
<td>The cursor key is an exception, and a picture is not shown.</td>
</tr>
<tr>
<td></td>
<td>Axis Keys Number Keys: &quot;Axis Keys&quot; and &quot;Number Keys&quot; are generic names for the keys for axis operation and number input.</td>
</tr>
<tr>
<td></td>
<td>Keys pressed simultaneously: When two keys are to be pressed simultaneously, the keys are shown with a &quot;+&quot; sign between them, ex. [SHIFT]+[COORD]</td>
</tr>
<tr>
<td>Displays</td>
<td>The menu displayed in the programming pendant is denoted with { }. ex. {JOB}</td>
</tr>
</tbody>
</table>

Description of the Operation Procedure

In the explanation of the operation procedure, the expression "Select • • • " means that the cursor is moved to the object item and the SELECT key is pressed, or that the item is directly selected by touching the screen.

Registered Trademark

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or brand names for each company or corporation. The indications of (R) and ™ are omitted.
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1 Search Function

The search function moves the manipulator to a specified position and stops it when a specified direct input signal comes ON.

Position data at the point the manipulator stops can be taken in. This information can be used with other instructions, for instance, to obtain the distance from a goal position and modify operation accordingly.

<Example> A manipulator performs a handling operation of panels

1. The manipulator moves to the search starting position.

2. The manipulator moves to the goal position in the search operation at low-speed. When the manipulator comes to the position to take the panel, a input signal (Direct-IN signal) from the sensor comes ON, then the manipulator stops. At this moment, the difference between the search starting position and the detected position is calculated.
3. On the base of the calculated difference, the program is modified to proceed the operation.

Table 1-1: JOB:WORK

<table>
<thead>
<tr>
<th>Line NO.</th>
<th>Instruction</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>NOP</td>
<td></td>
</tr>
<tr>
<td>001</td>
<td>MOVJ VJ=20.00</td>
<td></td>
</tr>
<tr>
<td>002</td>
<td>MOVL V=300.0 PL=0</td>
<td></td>
</tr>
<tr>
<td>003</td>
<td>REFP 1</td>
<td>Set the target point of the search operation</td>
</tr>
<tr>
<td>004</td>
<td>CALL JOB:SRCH</td>
<td>Search operation</td>
</tr>
<tr>
<td>005</td>
<td>SFTON P002</td>
<td>parallel shift start</td>
</tr>
<tr>
<td>006</td>
<td>DOUT OT#(1)=ON</td>
<td>Execution of operation</td>
</tr>
<tr>
<td>007</td>
<td>MOVL V=100.0</td>
<td></td>
</tr>
<tr>
<td>008</td>
<td>SFTOF</td>
<td>parallel shift end</td>
</tr>
<tr>
<td>009</td>
<td>MOVJ VJ=20.00</td>
<td></td>
</tr>
<tr>
<td>010</td>
<td>END</td>
<td></td>
</tr>
</tbody>
</table>
### Table 1.2: JOB: SRCH

<table>
<thead>
<tr>
<th>Line NO.</th>
<th>Instruction</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>NOP</td>
<td></td>
</tr>
<tr>
<td>001</td>
<td>GETS LPX000 $PX021</td>
<td>Load the target point of the search operation</td>
</tr>
<tr>
<td>002</td>
<td>MOVL LP000 V=100.0 SRCH</td>
<td>Search operation</td>
</tr>
<tr>
<td></td>
<td>RIN(#1)=ON DIS=0.1</td>
<td></td>
</tr>
<tr>
<td>003</td>
<td>GETS LB000 $B002</td>
<td>Load the detection result</td>
</tr>
<tr>
<td>004</td>
<td>JUMP *NG IF LB000=0</td>
<td>Determination of the detection result</td>
</tr>
<tr>
<td>005</td>
<td>GETS LPX001 $PX002</td>
<td>Load the detected position</td>
</tr>
<tr>
<td>006</td>
<td>MSHIFT PX002 RF LPX000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LPX001</td>
<td></td>
</tr>
<tr>
<td>007</td>
<td>SETE P002 (4) 0</td>
<td>Shift amount calculation</td>
</tr>
<tr>
<td>008</td>
<td>SETE P002 (5) 0</td>
<td></td>
</tr>
<tr>
<td>009</td>
<td>SETE P002 (6) 0</td>
<td></td>
</tr>
<tr>
<td>010</td>
<td>GETE LD000 P002 (1)</td>
<td>Shift length calculation</td>
</tr>
<tr>
<td>011</td>
<td>GETE LD001 P002 (2)</td>
<td></td>
</tr>
<tr>
<td>012</td>
<td>GETE LD002 P002 (3)</td>
<td></td>
</tr>
<tr>
<td>013</td>
<td>SET LR000 EXPRESS LD000 *</td>
<td>Shift length check</td>
</tr>
<tr>
<td></td>
<td>LD000 + LD001 + LD002 + LD002</td>
<td></td>
</tr>
<tr>
<td>014</td>
<td>SQRT LR000 LR000</td>
<td></td>
</tr>
<tr>
<td>015</td>
<td>JUMP *NG IF LR000&gt;400000</td>
<td>Normal termination</td>
</tr>
<tr>
<td>016</td>
<td>JUMP *NG IF LR000&lt;300000</td>
<td>Abnormal termination</td>
</tr>
<tr>
<td>017</td>
<td>RET</td>
<td></td>
</tr>
<tr>
<td>018</td>
<td>*NG</td>
<td></td>
</tr>
<tr>
<td>019</td>
<td>PAUSE</td>
<td></td>
</tr>
<tr>
<td>020</td>
<td>JUMP *NG</td>
<td></td>
</tr>
<tr>
<td>021</td>
<td>END</td>
<td></td>
</tr>
</tbody>
</table>
2 Wiring

Output signals of the sensor used in the system are connected to the DX200 input port for direct-input signals. The signals that are input from this port are called direct-in signals.

The output signals of the sensor used in the system can be connected via a sequencer to the direct-in signal input port, however, processing variations may result due to scanning timing of the sequencer.

It is therefore recommended to connect the output signal of the sensor directly to the DX200 input port.

2.1 Direct IN Connection

The part of wiring is that if there is a slave for the coordinated control side major axes control circuit board (SRDA-EAXA21A).
Search Function

2. Wiring
2.2 Confirmation of Direct IN Signal Status

2.2 Confirmation of Direct IN Signal Status

Check the status of direct-input signal on the RIN INPUT window.

2.2.1 RIN INPUT Window

1. Select {IN/OUT} under the main menu
2. Select {RIN}
   - The RIN INPUT window appears.
   - “●” indicates the ON status of direct IN signal.
   - “○” indicates the OFF status of direct IN signal
3 Instructions

3.1 SRCH (Search Instruction)

3.1.1 Function

The SRCH is an instruction to execute the search function. It is set as an additional item to the move instruction.

- MOVL
- IMOV
- SMOVL

3.1.2 Construction

* Two or more tags can be set in portions  and , though the description is omitted here.
3.1.3 Explanation

<table>
<thead>
<tr>
<th>№</th>
<th>Tag</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SRCH</td>
<td>Specifies the SRCH instruction. SRCH instruction is an instruction to execute search operation.</td>
</tr>
<tr>
<td>2</td>
<td>RIN# (Input number)</td>
<td>Specify direct in signal number.</td>
</tr>
<tr>
<td>3</td>
<td>=</td>
<td>It is equal.</td>
</tr>
<tr>
<td>4</td>
<td>B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]/</td>
<td>Specify byte type variables which are used as detection conditions.</td>
</tr>
<tr>
<td>5</td>
<td>ON/OFF</td>
<td>Specify detection conditions by ON/OFF.</td>
</tr>
<tr>
<td>6</td>
<td>Distance</td>
<td>Specify the distance to extend the target point.</td>
</tr>
<tr>
<td>7</td>
<td>Time</td>
<td>When using direct in signal search start delay time (in 0.01 s) and start point search unit, set 0.1 s or more. This is because there may be cases where the relay (200 V) is switched when starting search operation and direct in signal is constantly received.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.: 1 - 6 B/I/D/B/]/D]/LB/LI/LD/LB]/LI]/LD[ can be used.</td>
</tr>
<tr>
<td>Last significant bit: 0: OFF 1: ON</td>
</tr>
<tr>
<td>Distance: 0.1 - 6553.5mm Variable B/I/D/B]/D]/LB/LI/LD/LB] Distance can be specified with variables B/I/D/B]/D]/LB/LI/LD/LB]/LI]/LD[ (unit: 0.1 mm).</td>
</tr>
<tr>
<td>unit: 0.01 - 655.35 s Time can be specified with variables I/ LI]/LI] (unit: 0.01 s).</td>
</tr>
</tbody>
</table>

3.1.4 Register SRCH Instruction

1. Move the cursor to the instruction area.
2. Move the cursor to the move instruction where SRCH instruction is to be registered.
   (1) Press [SELECT] once to display the contents registered in the job in the input buffer line.
   (2) Press [SELECT] once more, and the DETAIL EDIT window of the move instruction appears.
3 Instructions
3.1 SRCH (Search Instruction)

4. Select {UNTIL}.

5. Select {SRCH}.

6. Set each item on the DETAIL EDIT window of SRCH instruction.
   – The DETAIL EDIT window of SRCH instruction appears.

7. Press [ENTER].
   – Returns to the DETAIL EDIT window of the move instruction.

   (1) Press [ENTER] once to display the set contents in the input buffer line.
   (2) Press [ENTER] once more, and the set contents are registered in the job.
3.2 GETS Instruction

3.2.1 Function
Saves the system variable ($ variable) as a user variable.

3.2.2 Construction

3.2.3 Explanation

<table>
<thead>
<tr>
<th>№</th>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]</td>
<td>Specify byte type variable number to save system variable.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]</td>
<td>Specify expanded position type variable number to save system variable.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>$B Variable number/ $B [Array number]</td>
<td>Specify byte type system variable number to set.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>$PX Variable number/ $PX [Array number]</td>
<td>Specify expanded position type variable number to set.</td>
<td></td>
</tr>
</tbody>
</table>

* Two or more tags can be set in portion A, though the description is omitted here.
System variable

The GETS is the only instruction that refers to system variables written by the controller system.

The following system variables are available.

<table>
<thead>
<tr>
<th>System Variable</th>
<th>Type</th>
<th>No.</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B type variable</td>
<td>Byte type</td>
<td>$B002</td>
<td>Specifies detected/not detected of the SRCH instruction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0: Not detected, 1: Detected</td>
</tr>
<tr>
<td>$PX type variable</td>
<td>Expanded position type</td>
<td>$PX002</td>
<td>Position detected by the optional SRCH instruction (pulse type)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$PX003</td>
<td>Position detected by the optional SRCH instruction (XYZ type)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$PX011 - 018</td>
<td>Teaching position by REFP 1 - 8 instruction (pulse type)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$PX021 - 028</td>
<td>Teaching position by SREFP 1 - 8 instruction (pulse type)</td>
</tr>
</tbody>
</table>

3.2.4 Register GETS Instruction

1. Move the cursor to the address area.
2. Move the cursor to the line where GETS instruction is to be registered.
3. Press [INFORM LIST].
   (1) The instruction list dialog box appears.
   (2) The cursor moves to the instruction list dialog box while the cursor in the address area changes to an under bar.
4. Select (GETS).
   – At this stage, the instruction on the cursor position is displayed with the previously registered additional items in the input buffer line.

6. The DETAIL EDIT window of GETS instruction appears.

   (1) Press [ENTER] once to display the set contents in the input buffer line.
   (2) Press [ENTER] once more, and the set contents are registered in the job.
3.3 CNVRT (Position Type Variable Conversion Instruction)

3.3.1 Function
The CNVRT is an instruction to convert a pulse data position type variable into XYZ type position type variable of the specified coordinate system.

3.3.2 Construction

3.3.3 Explanation

<table>
<thead>
<tr>
<th>№</th>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]</td>
<td>Specifies the number of the expanded position type variable where the converted data is stored.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]</td>
<td>Specifies the number of the expanded position type variable to be converted.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>BF</td>
<td>Specifies the conversion in the base coordinate system.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>RF</td>
<td>Specifies the conversion in the robot coordinate system.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>TF</td>
<td>Specifies the conversion in the tool coordinate system.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>UF# (User coordinate number)</td>
<td>Specifies the conversion in the user coordinate system.</td>
<td>No.: 1 - 63 Variable B/I/D/LB/LI/LD can be used.</td>
</tr>
<tr>
<td>7</td>
<td>MTF</td>
<td>Specifies the conversion on the master tool coordinate system. On the master tool coordinate system, the data is converted to a position relative to the master manipulator.</td>
<td>Available only with the optional independent coordinate function.</td>
</tr>
</tbody>
</table>
3.3 CNVRT (Position Type Variable Conversion Instruction)

3.3.4 CNVRT Instruction

1. Move the cursor to the address area.

2. Move the cursor to the line where CNVRT instruction is to be registered.

3. Press [INFORM LIST].

   (1) The instruction list dialog box appears.

   (2) The cursor moves to the instruction list dialog box while the cursor in the address area changes to an under bar.

Expanded position type variables

The expanded position type variable is a position type variable that depends on the control group in the job.

<Example>

- When the control group is R1:
  PX000 indicates P000.

- When the control group is R1 + B1:
  PX000 indicates P000 and BP000.

- When the control group is R1 + B1 + ST1:
  PX000 indicates P000 + BP000 + EX000.

- When the control group is R1 + R2 + B1 + B2 + ST1 in the coordinated job (master R1 + B1):
  PX000 indicates the following:
  P000: R2 (slave)
  P001: R1 (master)
  BP000: B2 (slave)
  BP001: B1 (master)
  EX000: ST1
3 Instructions
3.3 CNVRT (Position Type Variable Conversion Instruction)

4. Select (CNVRT).
   – At this stage, the instruction on the cursor position is displayed with the previously registered additional items in the input buffer line.

5. Press [ENTER] twice.
   – The DETAIL EDIT window of CNVRT instruction appears.

6. Set variables on the DETAIL EDIT window of CNVRT instruction

   (1) Press [ENTER] once to display the set contents in the input buffer line.
   (2) Press [ENTER] once more, and the set contents are registered in the job.
3.4 MSHIFT Instruction

3.4.1 Function
Calculate shift amount in the specified coordinate system from the reference position and the target position.

3.4.2 Construction

3.4.3 Explanation
1. PX Variable number/LPX Variable number/PX [array number]/LPX [array number]
   - Add the following tag.

<table>
<thead>
<tr>
<th>Nº</th>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]</td>
<td>Specifies the number of the expanded position variable to store the calculated shift.</td>
<td>&lt;Data 1&gt;</td>
</tr>
</tbody>
</table>

2. BF/RF/TF/UF# (User coordinate number)/MTF

<table>
<thead>
<tr>
<th>Nº</th>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>BF</td>
<td>Specifies the conversion in the base coordinate system.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>RF</td>
<td>Specifies the conversion in the robot coordinate system.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>TF</td>
<td>Specifies the conversion in the tool coordinate system.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>UF# (User coordinate number)</td>
<td>Specifies the conversion in the user coordinate system.</td>
<td>No.: 1 - 63 Variable B/I/D/LB/LI/LD can be used.</td>
</tr>
<tr>
<td>6</td>
<td>MTF</td>
<td>Specifies the conversion on the master tool coordinate system. On the master tool coordinate system, the data is converted to a position relative to the master manipulator.</td>
<td>Available only with the optional independent/coordinated function.</td>
</tr>
</tbody>
</table>
3.4 **MSHIFT Instruction**

3. PX Variable/ LPX Variable/ PX [array number]/ LPX [array number]

<table>
<thead>
<tr>
<th>№</th>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]</td>
<td>Specifies the number of the expanded position variable to store the calculated shift.</td>
<td>&lt;Data 2&gt;</td>
</tr>
</tbody>
</table>

4. PX Variable number/ LPX Variable number/ PX [array number]/ LPX [array number]

<table>
<thead>
<tr>
<th>№</th>
<th>Tag</th>
<th>Explanation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]</td>
<td>Specifies the expanded position type variable number of the target position to calculate the amount of the shift.</td>
<td>&lt;Data 3&gt;</td>
</tr>
</tbody>
</table>

### 3.4.4 Register MSHIFT Instruction

1. Move the cursor to the address area.

2. Move the cursor to the line where MSHIFT instruction is to be registered.

3. Press [INFORM LIST].
   - (1) The instruction list dialog box appears.
   - (2) The cursor moves to the instruction list dialog box while the cursor in the address area changes to an under bar.

4. Select {MSHIFT}.
   - At this stage, the instruction on the cursor position is displayed with the previously registered additional items in the input buffer line.
Search Function

3 Instructions

3.4 MSHIFT Instruction

5. Press [ENTER] twice.

   – The DETAIL EDIT window of MSHIFT instruction windows appears.

6. Set variables on the DETAIL EDIT window of MSHIFT instruction.


   (1) Press [ENTER] once to display the set contents in the input buffer line.

   (2) Press [ENTER] once more, and the set contents are registered in the job.
## 4 Alarm List

<table>
<thead>
<tr>
<th>Alarm No.</th>
<th>Message</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>4474</td>
<td>WRONG CONTROL GROUP AXIS</td>
<td>The CALL/JUMP/PSTART destination job could not be executed. An attempt was made to call or jump to a job whose control group cannot be controlled. (Subcode: The related control-group)</td>
<td>(1) Confirm the settings below. • Make the setting in advance so that the control group of the CALL/JUMP destination job is included in that of the CALL/JUMP source job. • Don’t start a job containing a running control group with a &quot;PSTART&quot; instruction.</td>
</tr>
<tr>
<td>4499</td>
<td>UNDEFINED POSITION VARIABLE</td>
<td>The position type variable is not registered. An attempt was made to use the position type variable that was not set. (Subcode: The variable number)</td>
<td>(1) Confirm the settings below. Set the position type variable.</td>
</tr>
<tr>
<td>4507</td>
<td>REFP POS ERROR (SEARCH MOTION)</td>
<td>Incorrect teaching point for search detection The search start point and the motion target point are the same, or the distance between the two points is too short.</td>
<td>(1) Confirm the settings below. • Perform the teaching again so that the search start point and the motion target point are not the same. • Increase the distance between the search start point and the motion target point.</td>
</tr>
</tbody>
</table>
### 5 Instruction List

- `< >` indicates numerical or alphabetical data.
- If multiple items are shown in one section, select one of the items.

#### SRCH

<table>
<thead>
<tr>
<th>Function</th>
<th>Executes a search function.</th>
</tr>
</thead>
</table>
| Additional Item | RIN#(<direct IN No.>) = <status> | Direct IN No. : 1 - 6  
|               |                              | Status : ON, OFF,  
|               | T = <time>s                  | B <variable No.>  
|               | DIS =<distance>mm           | A length of  
|               |                              | passing over the  
|               |                              | target point  
|               |                              | specified by the  
|               |                              | position type  
| Example       | MOVL P000 V=138 SRCH RIN#(1)=ON T=1.00 DIS=10.0 |

#### GETS

<table>
<thead>
<tr>
<th>Function</th>
<th>Saves the system variable as a user variable.</th>
</tr>
</thead>
</table>
| Additional Item | B <variable No.>, I <variable No.>,  
|               | D <variable No.>, R <variable No.>,  
|               | PX <variable No.> | User variable  
|               | $B <variable No.>, $I <variable No.>,  
|               | $D <variable No.>, $R <variable No.>,  
|               | $PX <variable No.> | System variable  
| Example       | GETS B000 $B000  
|               | GETS I001 $I[1]  
|               | GETS PX003 $PX001 |

#### CNVRT

| Function      | Converts a pulse data position type data of Data 2 into a Cartesian data  
|---------------|----------------------------------------------|
|                | position type variable using a specified coordinate system, then saves in  
|                | Data 1.  
|                | Format : CNVRT <Data 1><Data 2> coordinate system  
| Additional Item | Data 1 PX <variable No.>  
|               | Data 2 PX <variable No.>  
|               | BF, RF, TF, UFF# (<user coordinate system No.>),  
|               | MTF | BF:Base  
|               |     | coordinate system  
|               |     | RF: Robot  
|               |     | coordinate system  
|               |     | TF: Tool  
|               |     | coordinate system  
|               |     | UF: User  
|               |     | coordinate system  
|               |     | MTF: Master tool  
|               |     | coordinate system  
| Example       | CNVRT PX000 PX001 BF  
|               | CNVRT LPX000 LPX001 TF |

#### SFTOF

<table>
<thead>
<tr>
<th>Function</th>
<th>Stop shift operation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional Item</td>
<td>No</td>
</tr>
<tr>
<td>Example</td>
<td>SFTOF</td>
</tr>
</tbody>
</table>

5-1
## MSHIFT Function

**Function**: Calculate shift amount in the specified coordinate system from data 2 and data 3 and store the calculated value in data 1.

**Format**: `MSHIFT <Data 1><Coordinates><Data 2><Data 3>`

<table>
<thead>
<tr>
<th>Additional Item</th>
<th align="right">Data 1</th>
<th align="right">Data 2</th>
<th align="right">Data 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinate</td>
<td align="right">BF, RF, TF, UF# (&lt;user coordinate system No.&gt;), MTF</td>
<td align="right">PX</td>
<td align="right">PX</td>
</tr>
<tr>
<td>Example</td>
<td align="right">MSHIFT PX100 RF PX001 PX002</td>
<td align="right"></td>
<td align="right"></td>
</tr>
</tbody>
</table>

**Additional Item Details**

- **BF**: Base coordinate system
- **RF**: Robot coordinate system
- **TF**: Tool coordinate system
- **UF**: User coordinate system
- **MTF**: Master tool coordinate system

Example in the table:

- Data 1 coordinates are specified as `PX` variable No.
- Data 2 and Data 3 also use `PX` variable No.
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FOR SEARCH FUNCTION

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for ongoing product modifications and improvements.