YRC1000micro OPTIONS INSTRUCTIONS

FOR CONVEYOR SYNCHRONIZED FUNCTION

SUPPLEMENTARY FOR CONTINUOUS OPERATION CONVEYOR SYNCHRONIZED FUNCTION

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

MOTOMAN INSTRUCTIONS

MOTOMAN-□□□□ INSTRUCTIONS
YRC1000micro INSTRUCTIONS
YRC1000micro OPERATOR’S MANUAL
YRC1000micro MAINTENANCE MANUAL
YRC1000micro ALARM CODES (MAJOR ALARMS) (MINOR ALARMS)

Please have the following information available when contacting Yaskawa Customer Support:
- System
- Primary Application
- Software Version (Located on Programming Pendant by selecting: [Main Menu] - [System Info] - [Version])
- Robot Serial Number (Located on robot data plate)
- Robot Sales Order Number (Located on controller data plate)

Part Number: 188393-1CD
Revision: 0
DANGER

• This manual describes the continuous operation conveyor synchronized function of the YRC1000micro system. Read this manual carefully and be sure to understand its contents before handling the YRC1000micro. Any matter, including operation, usage, measures, and an item to use, not described in this manual must be regarded as “prohibited” or “improper”.

• General information related to safety are described in “Chapter 1. Safety” of “YRC1000micro INSTRUCTIONS”. To ensure correct and safe operation, carefully read “Chapter 1. Safety” of “YRC1000micro INSTRUCTIONS”.

CAUTION

• In some drawings in this manual, protective covers or shields are removed to show details. Make sure that all the covers or shields are installed in place before operating this product.

• YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids the product warranty.

NOTICE

• 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.
Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the YRC1000micro.

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

**DANGER**

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Safety Signs identified by the signal word DANGER should be used sparingly and only for those situations presenting the most serious hazards.

**WARNING**

Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury. Hazards identified by the signal word WARNING present a lesser degree of risk of injury or death than those identified by the signal word DANGER.

**CAUTION**

Indicates a hazardous situation, which if not avoided, could result in minor or moderate injury. It may also be used without the safety alert symbol as an alternative to “NOTICE”.

**NOTICE**

NOTICE is the preferred signal word to address practices not related to personal injury. The safety alert symbol should not be used with this signal word. As an alternative to “NOTICE”, the word “CAUTION” without the safety alert symbol may be used to indicate a message not related to personal injury.

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

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

**NOTE**

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

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

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

**NOTE**

To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “DANGER”, “WARNING” and “CAUTION”.
Before operating the manipulator, make sure the servo power is turned OFF by performing the following operations. When the servo power is turned OFF, the SERVO ON LED on the programming pendant is turned OFF.
- Press the emergency stop button on the programming pendant or on the external control device, etc.
- Disconnect the safety plug of the safety fence. (when in the play mode or in the remote mode)

If operation of the manipulator cannot be stopped in an emergency, personal injury and/or equipment damage may result.

**Fig. : Emergency Stop Button**

Before releasing the emergency stop, make sure to remove the obstacle or error caused the emergency stop, if any, and then turn the servo power ON.

Failure to observe this instruction may cause unintended movement of the manipulator, which may result in personal injury.

**Fig. : Release of Emergency Stop**

Observe the following precautions when performing a teaching operation within the manipulator's operating range:
- Be sure to perform lockout by putting a lockout device on the safety fence when going into the area enclosed by the safety fence. In addition, the operator of the teaching operation must display the sign that the operation is being performed so that no other person closes the safety fence.
- View the manipulator from the front whenever possible.
- Always follow the predetermined operating procedure.
- Always keep in mind emergency response measures against the manipulator’s unexpected movement toward a person.
- Ensure a safe place to retreat in case of emergency.

Failure to observe this instruction may cause improper or unintended movement of the manipulator, which may result in personal injury.

Confirm that no person is present in the manipulator's operating range and that the operator is in a safe location before:
- Turning ON the YRC1000 micro power
- Moving the manipulator by using the programming pendant
- Running the system in the check mode
- Performing automatic operations

Personal injury may result if a person enters the manipulator’s operating range during operation. Immediately press an emergency stop button whenever there is a problem. The emergency stop button is located on the upper right of the programming pendant.

Read and understand the Explanation of the Warning Labels before operating the manipulator.
**DANGER**

- In the case of not using the programming pendant, be sure to supply the emergency stop button on the equipment. Then before operating the manipulator, check to be sure that the servo power is turned OFF by pressing the emergency stop button. Connect the external emergency stop button to the 4-14 pin and 5-15 pin of the Safety connector (Safety).

- Upon shipment of the YRC1000micro, this signal is connected by a jumper cable in the dummy connector. To use the signal, make sure to supply a new connector, and then input it.

If the signal is input with the jumper cable connected, it does not function, which may result in personal injury or equipment damage.

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**WARNING**

- Perform the following inspection procedures prior to conducting manipulator teaching. If there is any problem, immediately take necessary steps to solve it, such as maintenance and repair.
  - Check for a problem in manipulator movement.
  - Check for damage to insulation and sheathing of external wires.

- Return the programming pendant to a safe place after use.

If the programming pendant is left unattended on the manipulator, on a fixture, or on the floor, etc., the Enable Switch may be activated due to surface irregularities of where it is left, and the servo power may be turned ON. In addition, in case the operation of the manipulator starts, the manipulator or the tool may hit the programming pendant left unattended, which may result in personal injury and/or equipment damage.
Definition of Terms Used Often in This Manual

The MOTOMAN is the YASKAWA industrial robot product.

The MOTOMAN usually consists of the manipulator, the YRC1000micro controller, manipulator cables, the YRC1000micro programming pendant (optional), and the YRC1000micro programming pendant dummy connector (optional).

In this manual, the equipment is designated as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>YRC1000micro controller</td>
<td>YRC1000micro</td>
</tr>
<tr>
<td>YRC1000micro programming pendant</td>
<td>Programming pendant (optional)</td>
</tr>
<tr>
<td>Cable between the manipulator and the controller</td>
<td>Manipulator cable</td>
</tr>
<tr>
<td>YRC1000micro programming pendant dummy connector</td>
<td>Programming pendant dummy connector (optional)</td>
</tr>
</tbody>
</table>
Descriptions of the programming pendant keys, 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></td>
</tr>
<tr>
<td>Character Keys/Symbol Keys</td>
<td>The keys which have characters or symbols printed on them are denoted with [ ]. e.g. [ENTER]</td>
</tr>
<tr>
<td>Axis Keys/Numeric Keys</td>
<td>[Axis Key] and [Numeric Key] are generic names for the keys for axis operation and number input.</td>
</tr>
<tr>
<td>Keys pressed simultaneously</td>
<td>When two keys are to be pressed simultaneously, the keys are shown with a “+” sign between them, e.g. [SHIFT]+[COORD].</td>
</tr>
<tr>
<td>Mode Switch</td>
<td>Mode Switch can select three kinds of modes that are denoted as follows: REMOTE, PLAY or TEACH. (The switch names are denoted as symbols)</td>
</tr>
<tr>
<td>Button</td>
<td>The three buttons on the upper side of the programming pendant are denoted as follows: START, HOLD, or EMERGENCY STOP. (The button names are denoted as symbols)</td>
</tr>
<tr>
<td>Displays</td>
<td>The menu displayed in the programming pendant is denoted with { }. e.g. {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 [SELECT] 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.
Explanation of Warning Labels

The following warning labels are attached to the manipulator and YRC1000micro.

Fully comply with the precautions on the warning labels.

DANGER

- The label described below is attached to the manipulator.
  Observe the precautions on the warning labels.
  Failure to observe this caution may result in injury or damage to equipment.
  Refer to the manipulator manual for the warning label location.

Collision hazard label
Crush hazard label

- The following warning labels are attached to YRC1000micro.
  Observe the precautions on the warning labels.
  Failure to observe this warning may result in injury or damage to equipment.

Injury Warning NP

Electric Shock Warning NP

(Top View)

(Front View)
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The conveyor synchronized function has been used in such applications as painting and sealing of large work pieces that are brought in mainly on a single conveyor.

On the other hand, for applications in which work pieces that are brought in intermittently on a conveyor are handled, and subsequently paid out on a different conveyor (while synchronized with the motion of the conveyor), it is necessary to frequently switch over between synchronization control of the carry-in side conveyor, and synchronization control of the discharge side conveyor.

In order to switch over conveyor synchronization control using the conventional conveyor synchronized function, it is necessary to end the conveyor synchronized status after the conveyor synchronization operation has been fully completed. This will enable the next conveyor synchronization operation to be executed. For this reason, each time synchronization control is switched over, the robot always stops momentarily.

The continuous operation conveyor synchronized function is an expanded version of the conveyor synchronized function. It enables the interpolation motion to continue during conveyor synchronization switchover between two different conveyors.

By using this method of control, conveyor synchronization can be realized without stopping the synchronization switchover operation, hence the cycle time can be reduced.
2 Instructions Related to Continuous Operation Conveyor Synchronization

2.1 SYSTART Instruction

The SYSTART instruction is a instruction which indicates the start of the conveyor synchronous operation section.

2.1.1 Syntax tree

```
SYSTART CV#()  STP= CONT OL=   TRAP
             
```

2.1.2 Addition of [CONT] Tag

In order to execute continuous operation conveyor synchronization, the CONT tag must be added to the SYSTART instruction. By adding the CONT tag, switchover from the specified conveyor synchronization section to the next conveyor synchronization section can be performed without interruption.

2.1.3 Addition of [TRAP] Tag

During execution of the SYSTART instruction, if the conveyor position has already gone past STP, and in addition the allowable quantity (the maximum excess amount specified by \"OL=\") has been exceeded, the SYSTART instruction will be terminated, and conveyor synchronization will not be executed. Consequently, normally after the SYSTART instruction has been executed, the $B variable ($B008) is read using the GETS instruction, and a check is carried out \"to see if conveyor synchronization started normally\". If conveyor synchronization was not executed, the job execution destination is changed using a JUMP instruction.

```
SYSTART CV#(1)  STP=50.000  OL=10.0
GETS B000 $B008
JUMP *END IF B000=0
SYMOVL CV#(1)  CTP=60.000
SYMOVL CV#(1)  CTP=70.000
*END
SYEND CV#(1)
```
However, in the case of such a job configuration, it is not known whether
or not a JUMP instruction will be executed until the actual time of
execution, so a prior read operation (an operation for reducing the
instruction processing time by performing the necessary computation for
execution of the instruction in advance) cannot be executed.
Consequently, operation cannot take place continuously when a
SYSTART instruction is executed.
For this reason, a TRAP tag is added to the SYSTART instruction. When
a TRAP tag is used, a prior read operation takes place based on the
assumption that “conveyor synchronization is executed normally”.
When a TRAP tag is used, if conveyor synchronization was not executed
because the allowable quantity was exceeded, the program will jump to
the label position specified by the TRAP tag.

### 2.2 SYEND Instruction

The SYEND instruction is a instruction which indicates the end of the
conveyor synchronous operation section.

#### 2.2.1 Syntax Tree

![Syntax Tree Diagram]

#### 2.2.2 Addition of CONT Tag

Normally, when a SYEND instruction is executed, the conveyor origin
registration status is canceled, and when the conveyor origin limit switch is
subsequently turned ON, the conveyor origin is updated.
However, if the conveyor synchronization is switched over frequently, and
the conveyor waits for an input from the limit switch during each
switchover, the processing time will become long. To overcome this, the
program will be modified so that each time a conveyor SYSTART
instruction is executed, the conveyor position is not reset but remains
fixed, and conveyor synchronization control alone starts and ends.
When a CONT tag is added to the SYEND instruction, the conveyor
follow-up operation ends, but the conveyor origin registration status is not
canceled, permitting ongoing monitoring of the conveyor position.
Consequently, there is no need to input the conveyor origin limit each time
the conveyor synchronization is to be switched over.
2 Instructions Related to Continuous Operation Conveyor Synchronization

2.3 SYMOVL Instruction

The SYMOVL instruction is a instruction which executes the conveyor synchronized operation.

In the continuous conveyor synchronization system, TRAP tags and FPL= tags can be used under the SYMOVL instruction.

2.3.1 Addition of TRAP Tag

When TRAP tags are added to the SYMOVL instruction and one of the limit overs mentioned below occur during the SYMVOL instruction, the manipulator stops the instruction and jumps to the label set to the TRAP tag without alarming.

- Object limit over for the TRAP tag execution
  - Alarm 4414: EXCESSIVE SEGMENT
  - Alarm 4416: PULSE LIMIT
  - Alarm 4418: CUBE LIMIT
  - Alarm 4420: SPECIAL SOFTLIMIT
  - Alarm 4422: MECHANICAL INTERFERENCE
  - Alarm 4426: SPECIAL MECHANICAL INTRF
  - Alarm 4732: OVER ACCELERATION
  - Alarm 4902: CUBE INTERFERENCE (TCP)

When specifying the TRAP tag to the SYMOVL instruction, execute SYEND instruction at the destination of the jump operation and terminate the conveyor synchronizing status.

```plaintext
SYSTART CV#(1) STP=50.000 CONT OL=10.0
SYMOVL V=1500.0 CV#(1) CTP=300.000 TRAP *LMTOVER
SYMOVL V=1500.0 CV#(1) CTP=300.000 TRAP *LMTOVER

SYEND CV#(1) CONT
CVQUE CV#(1)
JUMP *NEXT

*LMTOVER <-- Terminate the conveyor synchronizing operation
SYEND CV#(1)
CVQUE CV#(1)
MOV L V=1500.0
```

In case a limit over occurs while SYMOVL instruction is executed, the instruction is discontinued and the manipulator moves to the label:*LMTOVER.
2.3.1.1 Registration of the Instruction

Register a TRAP tag when the cursor is in the address area of the JOB CONTENT window in the teach mode.

1. Select (JOB) under the main menu.
2. Select (JOB CONTENT).
3. Move the cursor to the move instruction to which the TRAP tag is to be registered.
4. Press [SELECT].
   - The move instruction is displayed in the input buffer line.
5. Change the additional item of the TRAP tag.
   - Move the cursor to the move instruction of the input buffer line and press [SELECT] to display the DETAIL EDIT window of the move instruction.
   - Move the cursor to “UNUSED” of “JUMP TO(ERROR)” and press [SELECT].
   - The selection dialog appears. Select “TRAP”.

![Screenshot of the DETAIL EDIT window showing the selection dialog]

- Speed: Y=1000.0
- Connector File: CW()1
- Teaching Pos.: CTP=50.000
- Pos Level: unused
- Wait: unused
- Until: unused
- Accel Ratio: unused
- Decel Ratio: unused
- Jump To Error: unused
- Trap: selected

SYMOV L Y=1000.0 CW(1) CTP=50.000

Main Menu Simple Menu
2 Instructions Related to Continuous Operation Conveyor
Synchronization

2.3 SYMOVIL Instruction

- After the DETAIL EDIT window of the TRAP tag appears, specify the label of jump destination to “JUMP TO”.

- Press [ENTER] to close the DETAIL EDIT window of the TRAP tag and display the DETAIL EDIT window of the move instruction.

- Press [ENTER] to close the DETAIL EDIT window of the move instruction and display the JOB CONTENT window.

6. Press [ENTER].

- The instruction displayed in the input buffer line is registered.
2.3.2 Addition of FPL= Tag

When the FPL= tag is added to the SYMOVL instruction, feedback positioning level function operates during execution of the SYMOVL instruction.

2.3.2.1 Feedback Positioning Level Function

The feedback positioning level function monitors that the actual manipulator control point (feedback position) passes the point specified from the teaching position in real time. At the passing timing, the function starts the continuous operation (outputting the operation command of the next move instruction).

This function enables to start the continuous operation at the specified position independently from the operation speed.
2.3.2.2 Details of the Instruction

The feedback positioning level function starts to output the next step operation command at the timing when the manipulator control point passes the continuous operation start point specified by the "HIGH POS LEVEL tag" (FPL=) which is added to the move instruction.

(A) HIGH POS LEVEL tag (FPL=)

Specifies the continuous operation start point at intervals of 0.1[mm] from the teaching position.
(Setting range: 0.0 to 6553.5 [mm])

If FPL= 0.0 is specified, the continuous operation starts at the timing when the actual manipulator control point reaches the teaching position as shown in (a) of fig. 2-1 “Operation Path by FPL= tag”.

<Job example 1>:
SYMOVL (teaching position A) V=1500.0 CV#(1)
SYMOVL (teaching position B) V=1500.0 CV#(1) FPL=0.0
SYMOVL (teaching position C) V=1500.0 CV#(1)

If a bigger value than FPL= 0.0 is specified, the continuous operation starts before the actual manipulator control point reaches the teaching position. The cycle time becomes shorter as shown in (b) of fig. 2-1.

<Job example 2>:
SYMOVL (teaching position A) V=1500.0 CV#(1)
SYMOVL (teaching position B) V=1500.0 CV#(1) FPL=10.0
SYMOVL (teaching position C) V=1500.0 CV#(1)
2 Instructions Related to Continuous Operation Conveyor Synchronization

2.3 SYMOVL Instruction

Fig. 2-1: Operation Path by FPL= tag

(a): When FPL=0.0 (Job example 1)  (b): When FPL=10.0 (Job example 2)

NOTE
The "HIGH POS LEVEL tag" (FPL=) can be added only to MOVL instruction and SYMOVL instruction among move instructions.
2.3.2.3 Registration of the Instruction

Register a FPL= tag when the cursor is in the address area of the JOB CONTENT window in the teach mode.

1. Select {JOB} under the main menu.
2. Select {JOB CONTENT}.
3. Move the cursor to the move instruction to which the FPL= tag is to be registered.
4. Press [SELECT].
   – The move instruction is displayed in the input buffer line.
5. Change the additional item of the FPL= tag.
   – Move the cursor to the move instruction of the input buffer line and press [SELECT] to display the DETAIL EDIT window of the move instruction.
   – Move the cursor to “UNUSED” of “POS LEVEL” and press [SELECT].
   – The selection dialog appears. Select “FPL=“.
   – Press [ENTER] to close the DETAIL EDIT window of the move instruction and display the JOB CONTENT window.
6. Press [ENTER].
   – The instruction displayed in the input buffer line is registered.
The feedback positioning level function monitors the feedback position after the operation command (current value) reaches the teaching position. When a big value is input to the "HIGH POS LEVEL tag" (FPL=), the continuous operation does not start at the input FPL position but starts after the manipulator operation command reaches the teaching position.

**NOTE**

The feedback positioning level function enables to adjust the continuous operation start position independently from the operation speed. However, the operation path may be changed when the operation speed is changed.
2.4 GETS Instruction

In order to make an STP specification using a SYSTART instruction, or set the value of a CTP specification of an SYMOVL instruction to a value that corresponds to the position of the work piece or the tray with respect to the conveyor, it is necessary to acquire the conveyor position as the “instant at which the work piece is detected using a vision camera” or the “instant at which the tray is detected by the sensor”, for example. When a GETS instruction is used, the present position of the conveyor can be acquired as a double accuracy type variable (D variable).

$D004 : \text{Present position of conveyor CV\# (1)}$
$D005 : \text{Present position of conveyor CV\# (2)}$
$D006 : \text{Present position of conveyor CV\# (3)}$
$D007 : \text{Present position of conveyor CV\# (4)}$
$D008 : \text{Present position of conveyor CV\# (5)}$
$D009 : \text{Present position of conveyor CV\# (6)}$

* Unit : 0.001 mm

Method of use

GETS D0010 $D004  ... The present position of the CV\#(1) conveyor is stored in D0010.
2.5 SYPICK/SYPLACE Instruction

2.5.1 Function

SYPICK/SYPLACE instruction realizes workpiece picking/placing operations while the arm is synchronizing with the conveyor.

By making the workpiece picking/placing operations with a single instruction, which used to be made by the combination of instructions such as SYSTART and SYMOVL instructions, the workpiece picking/placing jobs synchronizing with the conveyor can be made with less difficulties.

After specifying conditions shown below to the tag, a series of operation is enabled.

- Position variables (P variable) to which the position of a workpiece is registered
- Operation speed
- Conveyor number
- Shift value to the via position (approach position) before the position where the manipulator picks/releases a workpiece
- Shift value to specify the raised position of the manipulator’s arm after the arm picks/releases a workpiece
- Conveyor start position for the conveyor synchronized operation
- Conveyor position to correspond to the workpiece for the conveyor synchronized operation
- The hand number
- Waiting time for the manipulator to pick/release a workpiece
- B variable to store the operation result, etc.

SYPICK/SYPLACE instructions are available only in the system where the “Continuous operation conveyor synchronized function” is valid.
2.5.1.1 SYPick Instruction

SYPick instruction enables the manipulator to pick up a workpiece which is at a specified position on the conveyor.

This instruction executes the following operations continuously while the conveyor synchronized function is valid.

7. Move the manipulator's arm to the approach point (overhead position of the workpiece)
8. Move it to the workpiece position
9. Turn ON the specified hand signal
10. Instruct the arm to follow the workpiece on the conveyor only during the specified time
11. Move the arm to the raised position (overhead position of the workpiece)
2.5.1.2 SYPLACE Instruction

SYPLACE instruction enables the manipulator to place a workpiece to a specified position on the conveyor.

This instruction moves the manipulator almost the same operation as SYPICK instruction except turning OFF the hand signal at the specified workpiece position on the conveyor.

This instruction executes the following operations continuously while the conveyor synchronized function is valid.

1. Move the manipulator’s arm to the approach point (overhead position of the workpiece)
2. Move it to the workpiece position.
3. Turn OFF the specified hand signal.
4. Instruct the arm to follow the workpiece on the conveyor only during the specified time by the timer.
5. Move the arm to the raised position (overhead position of the workpiece)
2.5 SYPICK/SYPLACE Instruction

2.5.2 Details of SYPICK/SYPLACE Instructions

The difference between SYPICK and SYPLACE instructions is whether the instruction turns ON or OFF the control signal of the specified number of the hand. And the meanings of the tag at each instruction is almost the same.

Description of each tag

1. **Position Variable (manipulator)**
   - Specify the workpiece position (positions to be picked placed) with the position variable. (mandatory)

2. **Speed (V=)**
   - Specify the operation speed. (mandatory)
   - When only this basic operation speed is specified and speeds for other operations are not specified, they conform to this speed.

3. **Control Point Speed (P) (VP=)**
   - Specify the operation speed from the approach point to the workpiece position. If this setting is omitted, the arm will move with the same speed as Speed (V=) during this operation.
   - Set a value when different speed from Speed (V=) is required.

4. **Control Point Speed (B) (VB=)**
   - Specify the operation speed from the workpiece position to the raised position. If this setting is omitted, the arm will move with the same speed as Speed (V=) during this operation.
   - Set a value when different speed from Speed (V=) is required.

5. **Conveyor Condition File (CV#( ))**
   - Specify the conveyor number with which the manipulator synchronizes its motion. (mandatory)
2 Instructions Related to Continuous Operation Conveyor Synchronization

2.5 SY PICK/SY PLACE Instruction

② Shift Value (A) (SFTA:)
Specify the shift values from the workpiece to the approach point or to the raised point by the position variables (P variable or LP variable). (mandatory)
The shift value can be specified only by using the base coordinate system.

NOTE
The shift value should be specified by using the “base coordinate system”.
Please be careful with the direction of the shift value.

② Shift Value (B) (SFTB:)
Specify the shift values from the workpiece to the raised point by the position variables (P variable or LP variable). (mandatory)
If this setting is omitted, this value conforms to the Shift value (A).
The shift value can be specified only by using the base coordinate system.

② Synchronizing Operation Start Position (STP=)
Specify the conveyor position to start the synchronized operation with the manipulator. When the conveyor exceeds this position, the synchronized operation starts.
It is same as STP in SY START instruction. (mandatory)

② Allowable Limit (OL=)
Specify the maximum tolerable exceeding limit position on the conveyor after the conveyor exceeds the start position (STP=) at the time instruction is executed. (mandatory)
If “0” is set, (OL=) will not be checked.
It is same as OL in SY START instruction.
In case the conveyor position has exceeded STP+OL position at the time instruction is executed, the instruction is terminated and “1” is set to the result flag.

② Teaching Position (CTP=)
Specify the conveyor position over the workpiece position.
It is same as CTP in SY MOVVL instruction. (mandatory)

② Hand Number Specification (HAND#*)
Specify the number of hand whose signal is to be switched when the arm reaches to the workpiece position.
The signal is switched to “ON” under SY PICK instruction and switched to “OFF” under SY PLACE instruction. More than two hand numbers from HAND #1 to #4 can be specified at a time.

② “PICK” Keep Time (T=)
Set the timer for the arm to hold to pick/place the workpiece when it reaches to the workpiece position. (mandatory)
The arm keeps holding at the workpiece position for the specified time while following the conveyor movement.

② Inner Path Determination LV (A) (PLA=)
Specify the inner path from the start position to workpiece position by way of the approach point. The determination level ranges from 1 to 8.
It is same as position level (PL=) in MOV□ instruction.

② Inner Path Determination LV (B) (PLB=)
Specify the inner path from start position to workpiece position by way of the raised point.
This instruction is valid only in the status when the next instruction such as SY PICK is ready to be executed.
2 Instructions Related to Continuous Operation Conveyor Synchronization

2.5 SY PICK/SY PLACE Instruction

**Result Flag**
Specify the byte variable (B variable or LB variable) to which the execution result is stored. (mandatory)
SY PICK instruction execution result can be stored in the B variable. The stored result to the B variable can be used to determine the succeeding actions to the respective results below.

1. The arm failed to pick/place the workpiece because the conveyor exceeded the specified position.
2. The arm was able to pick the workpiece (the hand signal was turned ON) but failed to move to the raised point.
3. All the operation was done normally.
2.5.3 Notes

- Both SYPICK and SYPLACE instructions cannot be used with SFTON instruction. The shift value is canceled when those instructions are executed.

- Under the [FWD] operation, whole series of the instruction is executed continuously. Therefore, the manipulator cannot stop at the approach point. Also, the [BWD] operation is invalid. (In case [BWD] is pressed, the arm moves to the workpiece position.)

- Under SYPICK or SYPLACE instruction:
  - In case the conveyor position is already exceeded STP+ PL position when the instruction is executed, the instruction is terminated without executing synchronized operation with the conveyor.
  - The instruction is terminated and synchronized operation with the conveyor is cutoff in case the manipulator exceeded its range of motion during the movement to/from the approach point, work position or raised point.
    The manipulator may stop by the alarm if it exceeded the range while it keeps holding status (for picking/placing the workpiece) for the specified time set by the timer.
    To improve the cycle time for workpiece pick/place operations, please do not omit setting STP and OL so that all the operation is completely done.

2.5.4 Registration of Instruction

Details of SYPICK/SYPLACE instruction can be registered with the list of DEVICE instruction.

1. Move the cursor to the line just before the column to which the instruction is registered.
2. Press [INFORM LIST].
3. Select {DEVICE}. 

![Image of registration process]
2 Instructions Related to Continuous Operation Conveyor Synchronization

2.5 SY PICK/SY PLACE Instruction

4. Select either {SY PICK} or {SY PLACE}.

- SY PICK or SY PLACE instruction appears in the input buffer line.

5. When adding/modifying the additional item, press [SELECT] and move the cursor to the input buffer line. Then, move the cursor to the instruction and press [SELECT]. The DETAIL EDIT window appears.

6. Press [INSERT] and [ENTER].

- The instruction indicated in the input buffer line is registered.
2.5.5 Example

```
*PICK
CALL JOB:PICKPOSCALC
SY PICK P100 V=2000.0 VB=1500.0 CV#(1) SFT A:P200 STP=D000 OL=100.0
  CTP=D000 HAND#1 T=0.020 PLA=8 FLAG:LB000
JUMP *PLACE IF LB000=3
MOV L P099 V=500.0
JUMP *PICK IF LB000=1
*PLACE
CALL JOB:PLACEPOSCALC
SYPLACE P101 V=1800.0 VP=1900.0 VB=1500.0 CV#(1) SFTA:P201 STP=D000 OL=100.0
  CTP=D000 HAND#1 T=0.020 PLA=4 FLAG:LB001
JUMP *PICK IF LB001=3
MOV L P099 V=500.0
JUMP *PLACE IF LB001=1
```
2.5.6 Hand Control Signal Setting Window

2.5.6.1 User I/O Number Allocation to Hand Number

When using SYPICK/SYPLACE instruction, on the Hand Control Signal setting window, advanced allocation of user output signal which turns ON or OFF the hand, such as absorption pad, to any of #1 to #4 hand is necessary.

1. Select {GENERAL} on the main menu.

2. Select {HAND CONTROL SIGNAL}.
   - HAND CONTROL SIGNAL window appears.
2 Instructions Related to Continuous Operation Conveyor Synchronization

2.5 SY PICK/SY PLACE Instruction

3. Move the cursor to “OT OUTPUT” at the desired hand number, then press [SELECT]. Input values to specify the user output signal for controlling the hand.
2.5.6.2 Precedence/Following Output of Hand Control Signal

Fine adjustment of the output timing for each output signal is possible by setting the desired time to “ON POS” or “OFF POS” on the hand control signal setting window.

Based on the arm reaching time to the workpiece, the timing to alternate the hand signal can be fine adjusted; just before or after the reaching time.

If a positive value is set, the signal alternates just after the reaching time, and it alternates just before the time if a negative value is set.

1. Select {GENERAL} on the main menu.
2. Select {HAND CONTROL SIGNAL}.

– HAND CONTROL SIGNAL setting window appears.
2 Instructions Related to Continuous Operation Conveyor Synchronization
2.5 SY PICK/SY PLACE Instruction

3. Move the cursor to “ON TIME” or “OFF TIME” and press [SELECT]. Then, input a value.
3 Application Example

The continuous operation conveyor synchronized function is a helpful function which is used in a system that necessitates frequent switchover of synchronization control for a different conveyor. Concretely, this function can be used with the following picking system, for example.

3.1 System Configuration

- The workpiece supplied randomly from the “carry-in side conveyor” (CV#1) are lined up by the guide, then the limit switch for workpiece detection detects the front-edge of the workpiece.
- Buckets for receiving the workpieces are set at a regular intervals on the “carry-out side conveyor” (CV#2). And the limit switch for bucket detection detects the front-edge of the bucket.
- Each limit switch is connected to the YRC1000micro to output its data.
- Also, each conveyor is connected to the YRC1000micro to output its data.

3.2 Overall Processing Flow

- The workpiece that are supplied to CV#1 are picked in turn. However, if the workpiece has passed the specified area, it is not picked and flows to the down stream.
- When the workpiece is picked from CV#1, it is carried to the first bucket within the specified area on CV#2. If no workpiece is picked, the bucket flows to the down stream without a workpiece in it.

Repeat the above operation.
3.3 Example of a Job

- Every time the limit switch is turned ON, both CV#1 and CV#2 import their data to the conveyor cue using the start shift function of the conveyor synchronized function with shift function.

- Picking operation is enabled by repeating “PICK” and “PLACE” operations in turn as explained below.

[Picking operation]

1. Execute SYSTART instruction to CV#1.

2-A. In case the workpiece is already passed the specified area (STP+OL of =SYSTART) on the conveyor.
   Execute CVQUE instruction to switch the conveyor cue to the next cue, then execute SYSTART again.

2-B. In case the workpiece is within the specified area on the conveyor
   Execute “PICK” operation of the workpiece while synchronizing with CV#1.

3. Execute CVQUE instruction

4. Execute SYEND instruction

5. Shift to “PLACE” operation.

[Placing operation]

1. Execute SYSTART instruction to CV#2.

2-A. In case the workpiece is already passed the specified area (STP+OL of =SYSTART) on the conveyor.
   Execute CVQUE to switch the conveyor cue to the next cue, then execute SYSTART again.

2-B. In case the workpiece is within the specified area on the conveyor
   Execute “PLACE” operation of the workpieces while synchronizing with CV#2.

3. Execute CVQUE instruction

4. Execute SYEND instruction

5. Shift back to “PICK” operation.
3 Application Example

3.3 Example of a Job

- Initialization (SYEND, etc.)
  - PICK-START
  - SYSTART
  - DOUT Absorb signal ON
  - SYMOVL
  - TIMER
  - SYMOVL
  - CYQUE
  - SYEND

- PLACE-START
  - SYSTART
  - Within OL area?
  - SYMOVL
  - SYMOVL
  - DOUT Absorb signal OFF
  - TIMER
  - SYMOVL
  - CYQUE
  - SYEND
Followings are the jobs that enable the previously mentioned operations.

To reset the conveyor home position, execute SYEND at the beginning without fail.
(Do not tag CONT)

Clear all the conveyor cue

OFF the absorb signal (OT#(1)) of the hand

Move to the operation start position

Wait the operation start position signal (OT#(10)) to be turned ON

Followings are the jobs that enable the previously mentioned operations.

To reset the conveyor home position, execute SYEND at the beginning without fail.
(Do not tag CONT)

Clear all the conveyor cue

OFF the absorb signal (OT#(1)) of the hand

Move to the operation start position

Wait the operation start position signal (OT#(10)) to be turned ON
3 Application Example
3.3 Example of a Job

Followings are the jobs if previously mentioned operations are realized with SYPICK/SYPLACE operations.

```
0000   NOP
0001   **** Initialize
0002   SYEND CV(1)
0003   SYEND CV(2)
0004   SET LB000 D
0005   *)
0006   INC LB000
0007   CVQUE CV(1)
0008   CVQUE CV(2)
0009   JUMP *DIF LB000<69
0010   DOOUT (1) OFF
0011   MOVLD CO0000 V=1000.0
0012   WAIT INH(1)=ON
0013   ' **** PICK
0014   **** PICK
0015   SYPICK  PO100 V=3000.0 CV(1) SFTA PO202 STP=200.000
0016   OL=150.0 CTP=300.000 HAND#1 T=0.020 FLAG LB001
0017   CVQUE CV(1)
0018   JUMP *PICK-NXT IF LB001=1
0019   JUMP *PLACE-ST
0020   '.
0021   *PLACE-NXT
0022   GETS LPX0000 SPX0000
0023   MOVLP PO0000 V=100.0
0024   JUMP *PICK-ST
0025   '.
0026   **** PLACE
0027   **** PLACE
0028   SYPLACE PO101 V=5000.0 CV(2) SFTA PO201 STP=400.000
0029   OL=200.0 CTP=500.000 HAND#1 T=0.020 FLAG LB002
0030   CVQUE CV(2)
0031   JUMP *PLACE-NXT IF LB002=1
0032   JUMP *PICK-ST
0033   '.
0034   *PLACE-NXT
0035   GETS LPX0000 SPX0000
0036   MOVLP PO0000 V=100.0
0037   JUMP *PLACE-ST
0038   END
```

To reset the conveyor home position, execute SYEND at the beginning of the operation without fail. (Do not tag CONT)

Clear all the conveyor cue.

Move to the operation start point after the job is started up.

PICK operation start
Execute SYPICK instruction
Shift the conveyor information to the next workpiece if the result flag is 1
The workpiece position on the conveyor has passed OL
JUMP to *PICK-NXT (to A)
PLACE operation is finished, and JUMP to the beginning of PICK operation
Destination of JUMP instruction when the workpieces are passed OL when SYSSTART (A)
Import the present position to LP variable
Execute MOV instruction to the present position
Return to the beginning of PICK operation

PLACE operation start
Execute SYPLACE instruction
Shift the conveyor information to the next workpiece if the result flag =1
The workpiece position on the conveyor has passed OL
JUMP to *PLACE-NXT (to B)
PLACE operation is finished, and JUMP to the beginning of PICK operation
Destination of JUMP instruction when the workpieces are passed OL when SYSTAT (B)
Import the present position to LP variable
Execute MOV instruction to the present position
Return to the beginning of PLACE operation

(Shift value of the desired position, approach point and raised point should be registered to the P variable in advance.)

PO100: Desired position for PICK
PO101: Desired position for PLACE
PO200: Shift value for PICK
PO201: Shift value for PLACE
### 3 Application Example

#### 3.3 Example of a Job

○ Addition of the TRAP tag to the SYMOVLL instruction

When TRAP tags are added to the SYMOVLL instruction and a manipulator is about to exceed the limit during the instruction, the manipulator can be jumped to the specified label without alarming.

With this tag operation, a job in which a manipulator discontinues an operation and re-start a new operation can be constructed when the manipulator exceeds the range of motion while following a conveyor.

When reaching the destination of the jump, do not fail to execute SYEND instruction to terminate the conveyor synchronizing operation.

Following is an example of the job.

Bold-faced characters are added to the basic job which is mentioned earlier.

By setting a value to a local variable (LB001 or LB002) during the operation, the system judges which SYMOVLs are executed, and then switches the operations.

```
0000  NOP
0001  ' === Initialize
0002  SYEND CV#(1)
0003  SYEND CV#(2)
0004  SET LB000 0
0005  '0
0006  INC LB000
0007  CVQUE CV#(1)
0008  CVQUE CV#(2)
0009  JUMP '0 IF LB000<99
0010  DOUT OT#(absorb) OFF
0011  MOV L C00000 V=1500.0
0012  WAIT IN#(start operation)=ON
0013  '
0014  ' === PICK
0015  'PICK-ST  
0016  SET LB001 0                  [PICK operation start]
0017  SYSSTRT CV#(1) STP=200.000 CONT
   OL=150.0 TRAP *PICK-NXT
0018  SYMOVLL C00001 V=3000.0 CV#(1)  
   CTP=200.000
   TRAP *LMTOV1
0019  DOUT OT#(absorb) ON
0020  SYMOVLL C00002 V=3000.0 CV#(1)  
   CTP=200.000
   TRAP *LMTOV1
0021  SET LB001 1
0022  TIMER T=0.020
0023  SYMOVLL C00003 V=3000.0 CV#(1)  
   CTP=200.000
   TRAP *LMTOV1
0024  SYEND CV#(1) CONT
0025  CVQUE CV#(1)
0026  JUMP *PLACE-ST
0027  '
```

Set "0" to variable: LB001

When a limit over occurs during the SYMOVLL instruction, the manipulator jumps to label: "LMTOV1."

When the hand finishes descending, set "1" to variable: LB001.
3 Application Example

3.3 Example of a Job

0028 *PICK-NXT
0029 CVQUE CV#(1)
0030 GETS LPX0000 $PX0001
0031 MOVL LP0000 V=100.0
0032 JUMP *PICK-ST
0033 
0034 *LMTOV1

0035 *LMTOV1

0036 SYEND CV#(1)
0037 CVQUE CV#(1)
0038 GETS LPX0000 $PX0001
0039 SETE LP0000 (3) 1300000
0040 MOVL LP0000 V=1000.0
0041 JUMP *PLACE-ST IF LB001=1
0042 JUMP *PICK-ST
0043 
0044 *PLACE-ST
0045 SET LB002 0
0046 SYSTART CV#(2) STP=300.000 CONT
0047 SYMOVL C00004 V=3000.0 CV#(2)
0048 SYMOVL C00005 V=3000.0 CV#(2)
0049 DOUT OT#(absorb) OFF
0050 SET LB002 1
0051 TIMER T=0.020
0052 SYMOVL C00006 V=3000.0 CV#(2)
0053 SYEND CV#(2) CONT
0054 CVQUE CV#(2)
0055 JUMP *PLACE-ST
0056 
0057 *PICK-NXT
0058 CVQUE CV#(2)
0059 GETS LPX0000 $PX0001
0060 MOVL LP0000 V=100.0
0061 JUMP *PLACE-ST
0062 
0063 *LMTOV2

[Destination of the jump when a limit over occurs during the SYMOVL instruction]

0064 *PICK-NXT
0065 CVQUE CV#(2)
0066 GETS LPX0000 $PX0001
0067 SETE LP0000 (3) 1300000
0068 MOVL LP0000 V=1000.0

[Destination of the jump when a limit over occurs during the SYMOVL instruction]

[Place operation start]

Set “0” to variable: LB002

When a limit over occurs during the SYMOVL instruction, the manipulator jumps to label: *LMTOV2.

When the hand finishes descending, set “1” to variable: LB002.

[Place operation start]

Terminate the conveyor synchronized operation

Switch the conveyor information to the next work

Write the present position to the LP variable and re-write the Z-direction value, and regard this as an approach potentation.

Execute the move to the approach position.
3 Application Example
3.3 Example of a Job

0069  JUMP *PICK-ST IF LB002=1
If “1” is set to LB002, jump to the head of PLACE operation because the manipulator has gripped a workpieces.

0070  JUMP *PLACE-ST
(If “0” is set to LB002, returns to the head of PICK operation.)

0071  '
0072  END
3.4 Notes on Job Creation

In the system where the conveyor synchronized function with shift function is available, execute SYEND instruction right after the YRC1000micro is turned ON or it won't receive any data output from the limit switch.

Set “SYEND” instruction to be executed to the top of the master job, etc. (Do NOT tag “CONT” at this time.)

- When SYSTART instruction, to which CONT is tagged, has executed JUMP to the TRAP label, execute CVQUE instruction first, then execute MOV* instruction before executing the next SYSTART instruction. (Refer to chapter 3.3 “Example of a Job”.)

  *PICK-ST
  SYSTART CV#(1) CONT TRAP *PICK-NXT

  *PICK-NXT
  CVQUE CV#(1)
  GETS LPX000 $PX000
  MOVL LP000
  JUMP *PICK-ST

Execution of MOV* instruction before executing the next SYSTART instruction is necessary to reset the start point of conveyor synchronized operation.
If failure to execute this, the manipulator may operate in a very high-speed, for only a moment, trying to catch up the process for the distance that the conveyor has shifted by JUMP instruction or the alarm “EXCESSIVE SEGMENT (HIGH SPEED)” occurs when the next SYMOVL instruction is started.

- By combining the speed reducing area of the previous step and the speed increasing area of the following step, the manipulator can continuously operate between move instructions.

However, it will not operate continuously under the following conditions.
- When TIMER instruction exists between move instructions.
- When JUMP instruction to TRAP label is executed by SYSTART instruction.
- MOV* instruction is executed between SYMOV* instructions.
3.5 Notes on Teaching

- When JUMP IF instruction or CALL IF instruction is set between move instructions so that the condition is changed on the way.
  
  Ex.
  
  ```
  MOV L C0000
  JUMP *LABEL  IF  IN#(1)=ON
  MOV L C0001
  *LABEL
  MOV L C0002
  ```

  C0000 and C0002 will NOT continuously operated when
  IN#(1) is turned OFF before MOV L C0000 is executed and
  IN#(1) is switched to ON while MOV L C0000 is executed.

- When WAIT instruction is set between move instructions, however any conditions are established yet when the instruction is executed.

- When WAIT instruction is set between move instructions under the system in which independent control function is valid. (Even if the conditions are established from the beginning, still it decelerates.)

3.5 Notes on Teaching

- Teaching positions before and after the SYSTART instruction.

  The moving distance of the SYMOV L instruction executed first time after the SYSTART instruction varies depending on the position of the conveyor when the SYSTART instruction is executed.

  If the conveyor position when the SYSTART instruction is executed is:
  - closer to the starting point ((B) in the figure below) than the CTP position of the SYMOV L instruction, the motion speed becomes relatively slow because the moving distance is short.
  - further from the starting point ((A) in the figure below) than the CTP position of the SYMOV L instruction, the operation speed becomes relatively fast because the moving distance is long.

  ![Diagram](image)

  [Teaching position]

  (A) (B)

  [Starting point]

  The motion of the manipulator is defined regardless of the practical moving distance but the moving time specified by the teaching position. Therefore, the speed of the manipulator becomes:
  - (A) relatively fast when it moves toward further point than the teaching position.
  - (B) relatively slow when it moves toward closer point than the teaching position.
When the manipulator’s moving distance between the starting point and the conveyor position is longer than the distance between the starting point and the teaching position, its operation speed becomes relatively fast and it may cause "EXCESSIVE SEGMENT" alarm.

To avoid those alarms to occur, to the moving distance of the SYMOV FL instruction executed first time after the SYSTART instruction, teach to set the distance between the starting point and the teaching position to be the maximum insofar as possible.
Following is an example of an ordinal picking system on the double conveyor.

Refer this as a guide when teaching the manipulator.

PA1 Workpiece picking position at the conveyor synchronized operation starting point on the picking side conveyor.
(=STP position of the SYSTART instruction)

PA2 Workpiece picking start limit position at the conveyor synchronized operation starting point on the picking side conveyor.
(=STP position of the SYSTART instruction + OL)

PB1 Workpiece placing position at the conveyor synchronized operation starting point on the placing side conveyor.
(=STP position of the SYSTART instruction)

PB2 Workpiece placing start limit position at the conveyor synchronized operation starting point on the placing side conveyor.
(=STP position of the SYSTART instruction + OL)

Combinations of teaching positions are as follows:

“PA1 to PB1”, “PA1 to PB2”, “PA2 to PB1”, “PA2 to PB2”

From the above mentioned combinations of positions, choose one with the longest distance when teaching.
For the shortest cycle time, set OL distance and distances of PICK area and PLACE area to be the shortest. (Refer to “Figure (a) below.)

When the OL distance and distances of PICK area and PLACE area are long, distance between the teaching positions become also relatively long and thus the cycle time becomes long. (Refer to “Figure (b) below.)

- OL is short.
- Close PICK area and PLACE area
  - Short moving distance = Short cycle time
  [Figure (a)]

- OL is long.
- Distant PICK area and PLACE area
  - Long moving distance = Long cycle time
  [Figure (b)]
[Example]
Following example has the longest distance between “PA1 and PB2”.
In this example, to the “CTP” of the PICK side SYMOVL instruction, teach “STP” position of the SYSTART instruction.
And to the “CTP” of the PLACE side SYMOVL instruction, teach “STP + OL” position of the SYSTART instruction.

**Conveyor flowing direction**

**PICK side teaching position** (CTP=250)

STP = 250
OL = 400

**PLACE side teaching position** (CTP=600)

STP = 150
OL = 450

```
: : :
' PICK
SYSTART CV#(1) STP=250.000 OL=400.0
SYMOVL CV#(1) CTP=250.000
SYMOVL CV#(1) CTP=250.000
DOUT OT#(1) ON
SYMOVL CV#(1) CTP=250.000
SYEND CV#(1)
CVQUE CV#(1)
: : :

' PLACE
SYSTART CV#(2) STP=150.000 OL=450.0
SYMOVL CV#(1) CTP=600.000
SYMOVL CV#(1) CTP=600.000
DOUT OT#(1) ON
SYMOVL CV#(1) CTP=600.000
SYEND CV#(1)
CVQUE CV#(1)
: : :
```
Undesirable example

When above mentioned teaching is done, the manipulator may move longer distance than the distance between teaching positions as shown in the figure below.
As mentioned above, the manipulator will have to move longer distance than between the teaching positions during the fixed moving time with the increased speed. This can cause “EXCESSIVE SEGMENT” or “OVER ACCELERATION (only for MPP3)” alarm because the operation speed of the manipulator becomes relatively fast. To avoid the alarm to occur, change the teaching to set the distance between the starting positions to be the maximum insofar as possible.

For the shorter cycle time with shorter moving distance, set shorter synchronized operation start allowable range (=specification of OL for SYSTART instruction) so that the distance between the teaching points becomes shorter.

In this case, some workpieces can be left due to the shorter allowable range (OL).
3.6 Notes on Operation

Resume the synchronized operation after the manipulator is stopped.

In case the manipulator stopped during the conveyor synchronized operation, it will resume the operation by the restarting operation. This restart is executed after the following stops.

- Stop by the MINOR ALARM
- Stop by the EMERGENCY STOP or EXTERNAL EMERGENCYSTOP
- Stop by the MODE SWITCH
  (switch between the play mode and the teach mode)
- Stop by the motion cycle switching

The conveyor synchronizing status started by the SYSTART instruction does not stop till execution of SYEND instruction or turning OFF of the YRC1000micro power supply even if above mentioned stops occurred.

Therefore, during the conveyor synchronized operation, the conveyor kept on flowing even if the manipulator stops. And when the manipulator is re-started, it will try moving toward the workpieces on the distant conveyor.

Followings are the notes on operations.

- If the manipulator stopped and resuming of the synchronized operation is required, stop the motion of conveyor at the same time or before the manipulator stops its motion. And resume the conveyor motion at the same time or after the manipulator resumes its motion.

- If above mentioned procedures cannot be executed, execute SYEND instruction to terminate the conveyor synchronized operation, and then, execute the operation by the SYSTART instruction again. (for example, start the job from the head of the master job, etc.)
YRC1000 micro OPTIONS
INSTRUCTIONS

FOR CONVEYOR SYNCHRONIZED FUNCTION

SUPPLEMENTARY FOR CONTINUOUS OPERATION CONVEYOR SYNCHRONIZED FUNCTION