MOVIT-LAB 2

User's Manual

Version 1.1

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For Your Safety Use

Thank you for your purchase of the MOVIT-LAB 2 (IF-100).
This document explains how to set up and operate IF-100. For proper operation of IF-100, please read this document before use.

■ WARNING

Stop the operation of the Interface Board immediately if smoke, odor or unusual sound is being emitted from the Interface Board. Such smoke, odor, or unusual sound could be a cause of electric shock or fire. In such case, turn off the power switch immediately and call ELEKIT DOCTOR SERVICE.

Never disassemble or remodel the Interface Board or cable, or it could cause injury, electric shock or fire.

Never let liquid or flammable objects reach the interior of the Interface Board, or it could cause injury, electric shock, or fire. If by any chance such liquid or objects gets inside the Interface Board, stop the operation immediately.

Do not touch either the Interface Board or a computer with a wet hand to avoid electric shock or any hazardous situation.

■CAUTION

Keep Interface Board out of the reach of small children, or it may drop or fall down and cause physical injury.

Do not place Interface Board unstable places such as an unstable table or uneven surface, or it may drop or fall down and cause physical injury.

Do not bend, drop, or damage Interface Board or cable, nor allow anything to rest on it, or it may cause malfunction or physical injury.

Do not place Interface Board in areas with dust or high humidity, or it may cause electric shock or fire.

Interface Board is a precision electronic device. Keep it away from the static electricity to avoid damage.

Do not use Interface Board near devices such as radio, TV, or any audio appliances; Interface Board emits high-frequency signals which may cause noise from such devices mentioned above.

When not in use, do not keep Interface Board in the following locations, or Interface Board may suffer damage;
- with direct sunlight or near a heating appliance
- with large temperature difference.
- with dust or dirt
- with high humidity.
- subject to vibration or shock
- near a device, such as a speaker, that generates magnetic or electromagnetic interference.

■Notes

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2. The contents, specification and the form of MOVIT-LAB 2 are subject to change without prior notice.

3. Considerable effort has been made to ensure that this textbook is free of inaccuracies and omissions. However, if you have found any inconvenience or incorrect information in this textbook, please contact us.

4. EK JAPAN Co., Ltd. is not liable for any results regardless of operation or the above condition 3.

5. EK JAPAN Co., Ltd. does not guarantee the data in your PC. Additionally, we are not liable for the opportunity loss or lost time caused by the trouble of the software and the hardware.

6. EK JAPAN Co., Ltd. is not liable for any damage caused by the repair or change done by anyone other than EK JAPAN Co., Ltd. or authorized dealers of EK JAPAN Co., Ltd..

7. Interface Board included in MOVIT-LAB 2 is manufactured exclusively for the software of this product, ROBOT ARM, and P!MOT, and applying it for other uses is prohibited.

8. It is prohibited to use Interface Board included in MOVIT-LAB 2 for operating or connecting products or components with specifications not approved by EK JAPAN Co., Ltd. without the express permission of EK JAPAN Co., Ltd. It is also prohibited to use Interface Board with a software other than the one included in this product for operating ROBOT ARM and P!MOT, or for operating or connecting the products or components with specifications not approved by EK JAPAN Co., Ltd..

9. EK JAPAN Co., Ltd. is not liable for any troubles caused by connecting to products or parts not authorized by EK JAPAN Co., Ltd..

Table of Contents

1. MOVIT-LAB 2 SET UP

Check the hardware and system requirements

The hardware and system requirements to run MOVIT-LAB 2 properly are as follows;

(TIPS)

You can check the system requirements by double-clicking the "system" icon in the control panel.

OS	: Windows XP Service Pack 2 / Vista™
CPU	: Pentium3, 1.0GHz or higher
Memory	: 256MB or higher
Hardware Disk Space	: 100MB or more
Display	: Super VGA (800x600) or higher
	Color monitor with high color 16 bits or higher
.NET Framework	: Microsoft® .NET Framework 2.0 or higher
	* When the above application is not installed, download
	from Microsoft® homepage and install.

Satisfying the above requirements does not guarantee the proper operation of the software under the specific PC environment of each user.

* Microsoft, Windows, and Vista are trademarks or registered trademarks of Microsoft Corporation in the united states and other countries.

How to install

First of all, access to ELEKIT (EK JAPAN Co., Ltd.) homepage (the link is below.).

http://www.elekit.co.jp./download/index.php

1. Follow the directions on the download screen, and save MOVIT-LAB 2 in an appropriate folder.
2. After downloading is complete, "MOVIT-LAB2****.exe" is created in the specified folder.
3. Double-click "MOVIT-LAB2****.exe" and follow the instructions on the screen for installation.
   * "****" refers to the version number. The description changes depending on the version.
   * End all applications when installing "MOVIT-LAB 2", or installation may not be executed properly.
4. Installation is successfully done when "Complete" message appears.

SET-UP procedure

1. Double-click "Setup.exe" icon.

Setup.exe

   * For Windows Vista, "User Account Control" screen will appear.
   Click "Allow".
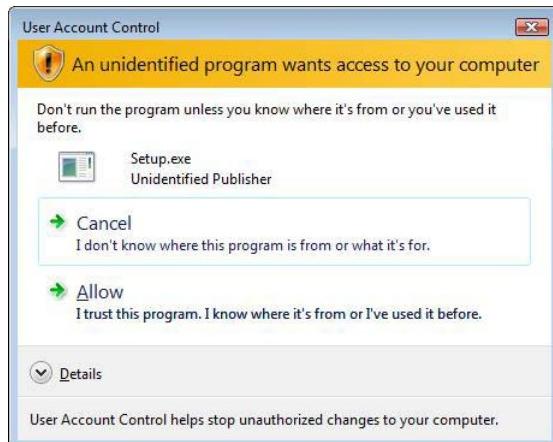
2. Launguage Select screen appears. Select English and click "OK".
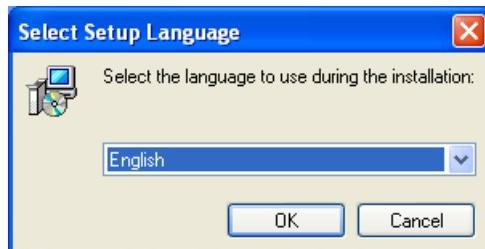

3. Click "Next".
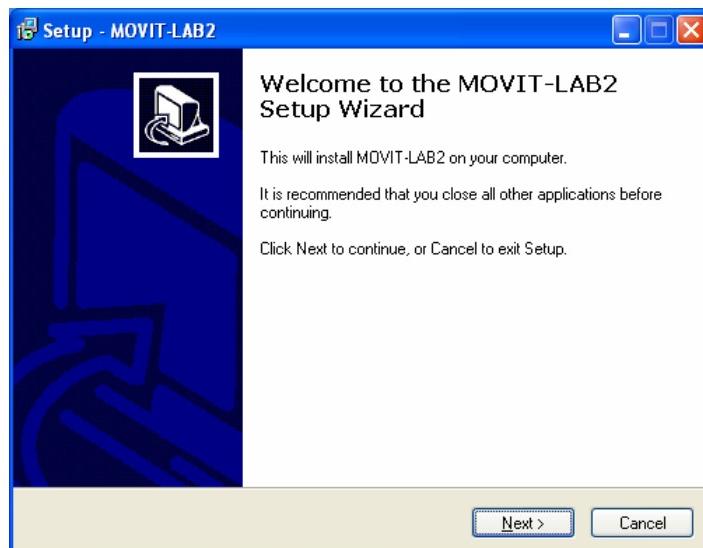
4. Select a folder. Normally the folder displayed by default is OK. Then, click "Next".
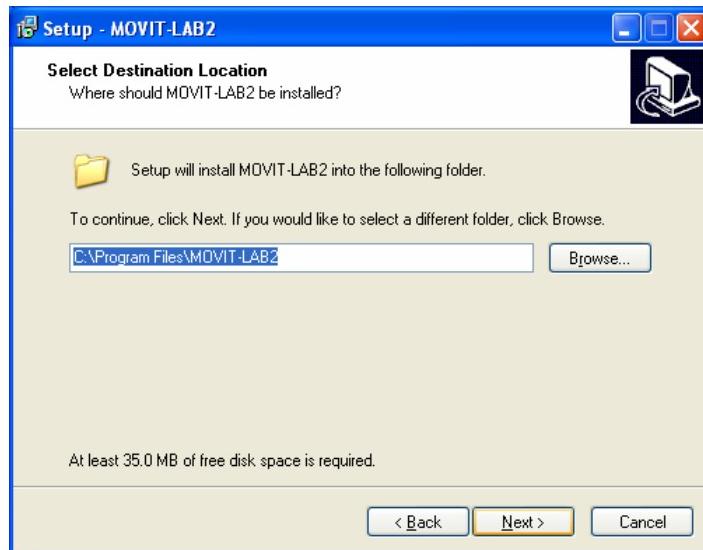
5. Specify a name of the folder of which you want to create a shortcut icon. Normally the folder displayed by default is OK. Then, click "Next".
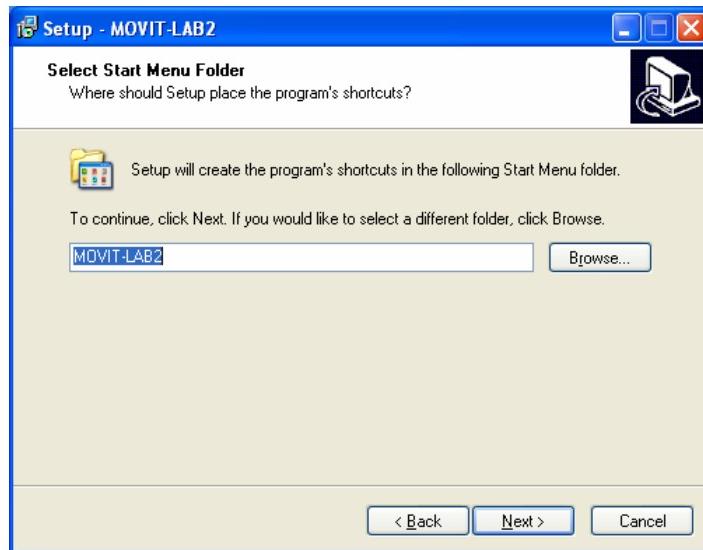

6. If you want to create a shortcut icon, then click the box, and click "Next".
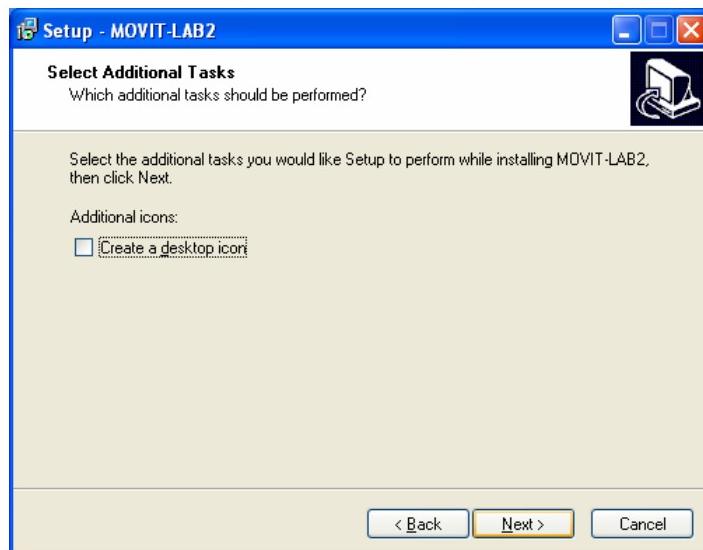
7. The items to be installed are displayed. ".NET Framework 2.0" is displayed as well when it needs to be installed. Click "Install". When ".NET Framework 2.0" does not need to be installed, then go on to No.11.

* For Windows Vista, ".NET Frameork 2.0" is installed by default.
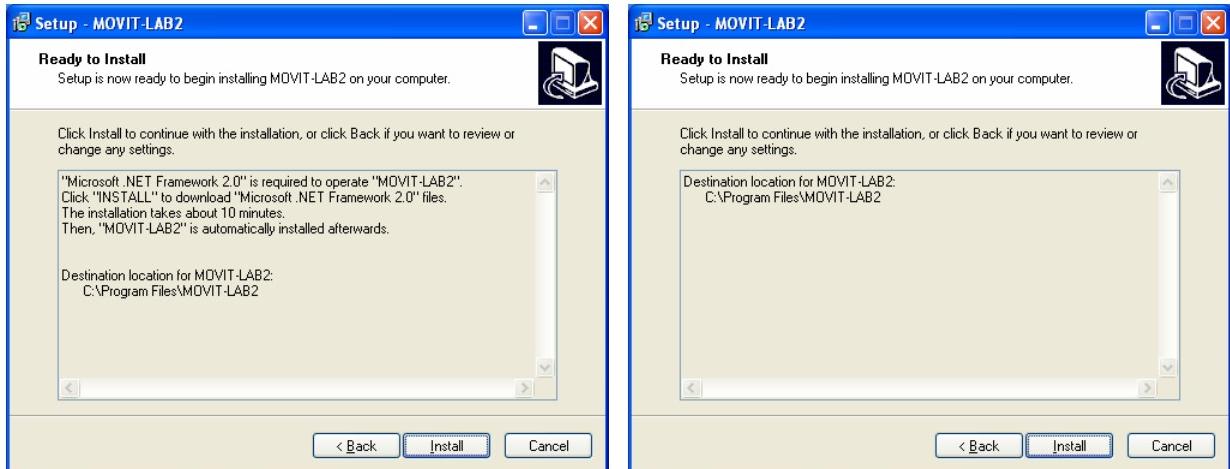
When ".NET Framework 2.0" needs to be installed.

When ".NET Framework 2.0" dose not need to be installed. (go to No.11)

8. Files required are downloaded from the Internet. After downloading, the below window is displayed. Click "Next".
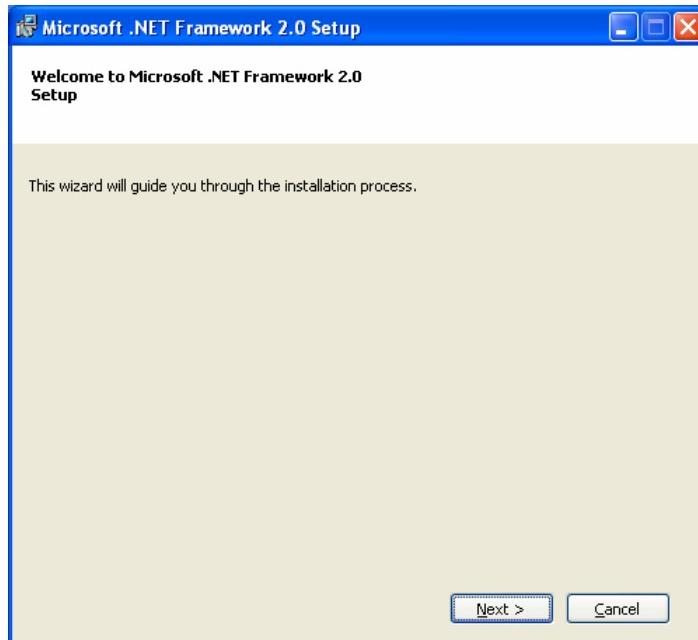

9. Check the box of "I accept…", and click "Install".

- 8 -
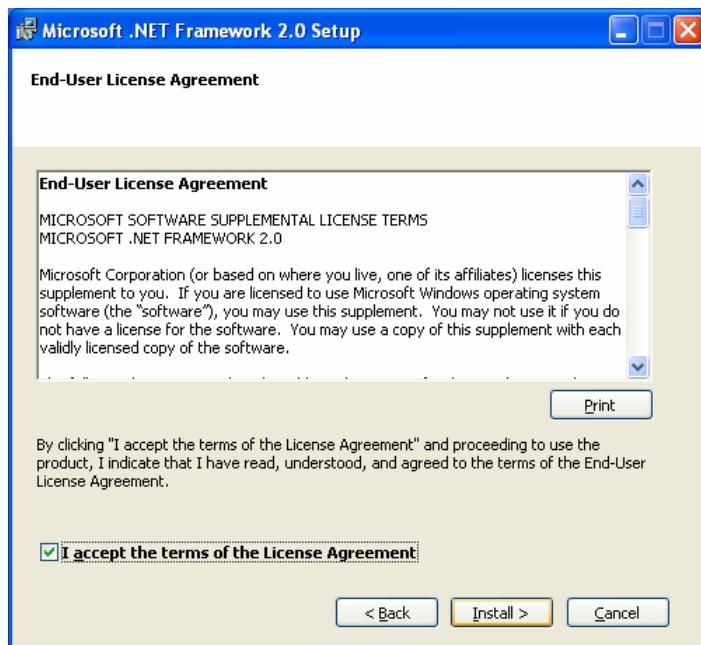
10. Wait until ".NET Framework 2.0" installation completes. The installation may take a few more than 10 minutes. When the installation is complete, click "Finish".
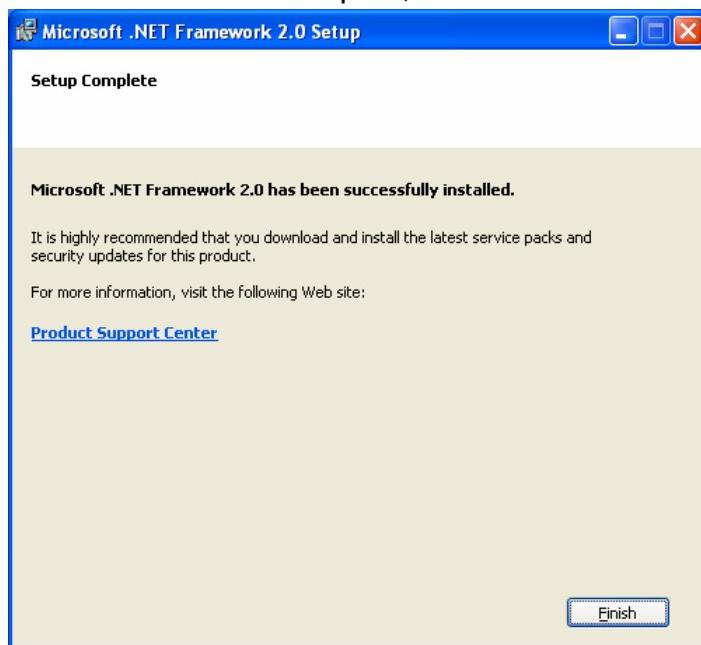
11. MOVIT-LAB 2 installation starts.
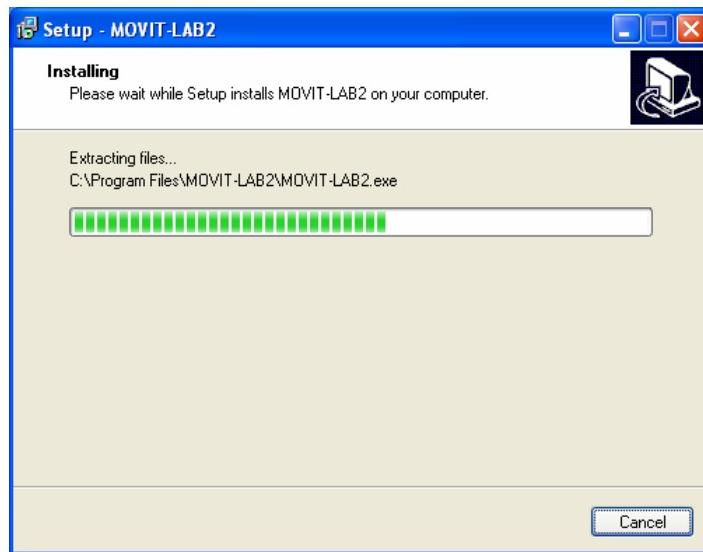
12. The installation is complete. Click "Finish".
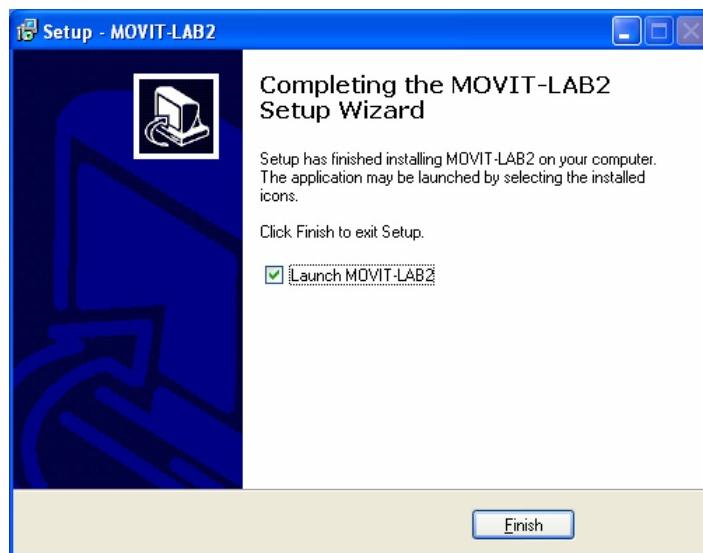
2. Operate ROBOT ARM from PC

Connect ROBOT ARM, Interface Board, and PC.

IMPORTANT: Make sure to follow the below instruction in descending order, otherwise ROBOT ARM might cause unexpected operation.

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1. Make sure the SW2 of Interface Board is as shown in the below photo.
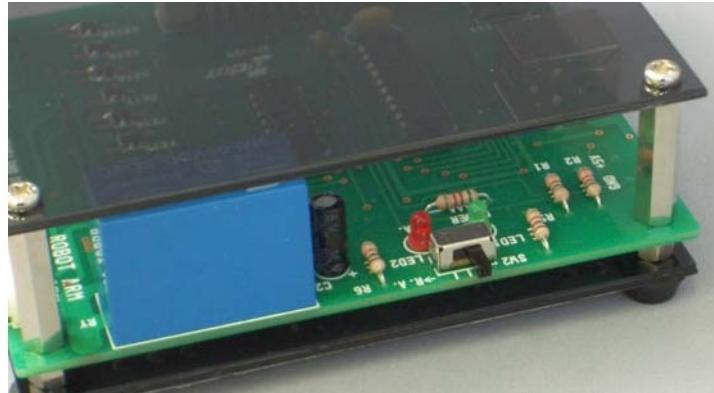
2. Connect Interface Board and PC with enclosed USB cable.

* Please note that, when Interface Board is connected to PC for the first time, it might take several tens of seconds for the PC to recognize Interface Board.

3. Connect the cable for robot to the connector, indicated as "ROBOT ARM" on Interface Board.

* Make sure to connect to a correct connector.

- 11 -

4. Connect the other end of the cable for robot to ROBOT ARM.

   * Make sure to connect to a correct connector.

5. Start up MOVIT-LAB 2 in your PC, and select ROBOT ARM and a mode you want to use.
    * Refer to "Start up MOVIT-LAB 2" for detail.

6. Set SW2 of Interface Board to "->R.A" and make sure the LED turns red. Refer to the photo below for detaill.

7. Operate ROBOT ARM in each mode.
    * As for the operation in each mode, please refer to **< Key Direct Mode >** and **<Program Mode>**.

IMPORTANT: Make sure to follow the below instructions, otherwise ROBOT ARM might execute unexpected operations.
● Make sure the LED2 (red) on Interface Board is OFF when connecting Interface Board and PC.
● Do not unplug the USB cable from Interface Board while MOVIT-LAB 2 is in Key Direct Mode or Program Mode. If you unplug by mistake, close the Mode screen, go back to ROBOT ARM – Mode Select screen, and select a mode again.

Start up MOVIT-LAB 2

* MOVIT-LAB 2 may not operate properly if other application programs are open when MOVIT-LAB 2 start up or other application is opened after MOVIT-LAB 2 is started up. Therefore, make sure to close all the application programs when starting up MOVIT-LAB 2. In addition, ROBOT ARM may not operate properly when a screen saver becomes active when it is operating. Make sure to set the screensaver to [None] when ROBOT ARM is operating.

1. Go to "Start" -> "All Programs" -> "MOVIT-LAB 2" -> "MOVIT-LAB 2".
2. Language select screen appears (Japanese or English is available). Select English.

* Refer to Japanese user's manual when you select Japanese language.

3. Robot Select screen appears. Click "ROBOT ARM".

- 13 -
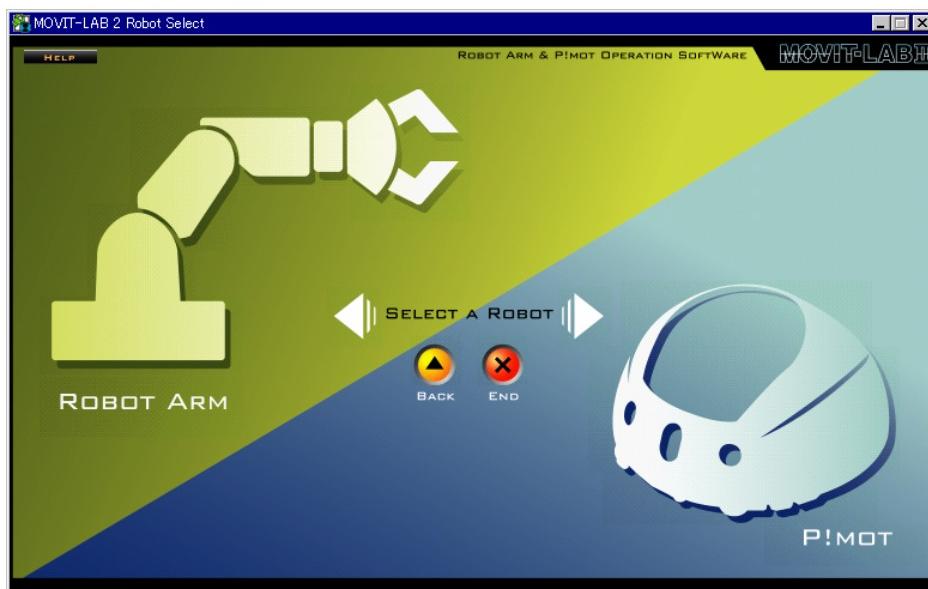
4. Mode Select screen appears. Click whichever mode you want to use. Each mode is explained in the following pages.

< Key Direct Mode >

In Key Direct Mode, you can operate ROBOT ARM by clicking the keyboards and buttons on the screen. In addition, the program performed in Key Direct Mode can be saved and inserted in Program Mode.

* To make ROBOT ARM operate continuously, press a corresponding key or the part button (Gripper, Wrist, Elbow, Shoulder, or Base) you want to move while pressing SHIFT key on the keyboard. To stop, press the corresponding key or click the part button again.

* To move ROBOT ARM with the corresponding key on the keyboards, make sure not to press multiple keys at the same time, or ROBOT ARM may not operate properly.

Corresponding keys

Location	Operation	Corresponding key	Mouse operation
Finger	OPEN	A	Right
	CLOSE	Z	Left
Wrist	RIGHT	S	Right
	LEFT	X	Left
Elbow	UP	D	Right
	DOWN	C	Left
Shoulder	UP	F	Right
	DOWN	V	Left
Base	CW	G	Right
	CCW	B	Left

ROBOT ARM movement

Left turn
Right turn

CCW
CW
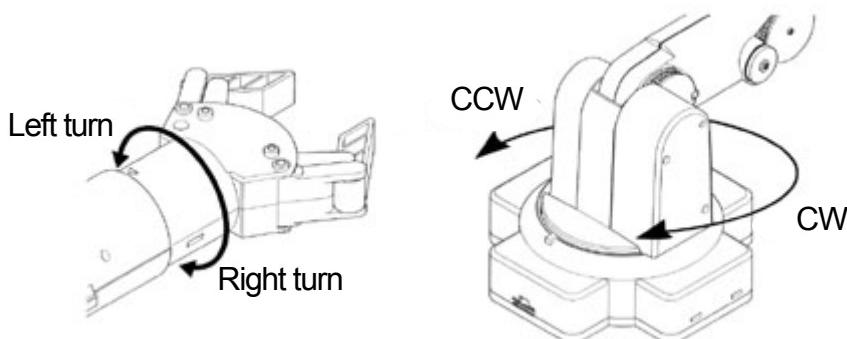
Screen

Operation button area

Total time display area

Program display area
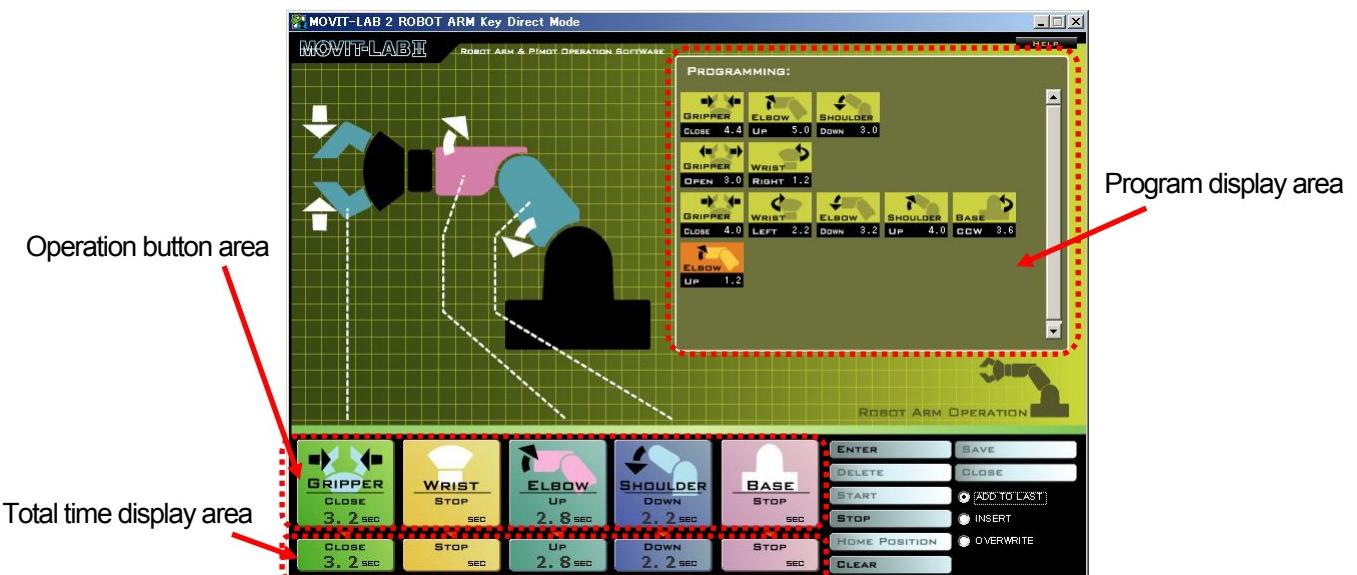
Operation button area	When using a mouse, put the pointer to the part button where you want to operate and right-click or left-click to operate the part.
Total time display area	The total operation time is displayed.
Program display area	Fixed operation commands and the total operation time are displayed.
ENTER	Fix the total operation time in the program display area.
DELETE	Selected command in the program display area is deleted.
START	The program in the program display area is executed.
STOP	The program under execution is stopped.
HOME POSITION	When this button is pressed, an operation is reversed for the time specified in the program display area and ROBOT ARM goes back to the original position. * ROBOT ARM might not go back to exactly the same position due to the assembly condition, the operation condition, etc.
CLEAR	The timer is reset to "0". All the movements of all the parts of ROBOT ARM are stopped when ROBOT ARM is operating continuously.
SAVE	Press this to save the program in the program display area. The saved data can be imported when in Program Mode of ROBOT ARM.
CLOSE	The display goes back to ROBOT ARM Menu.

< Program Mode >

In Program Mode, you can create a program to operate ROBOT ARM by clicking the buttons on the screen in order.
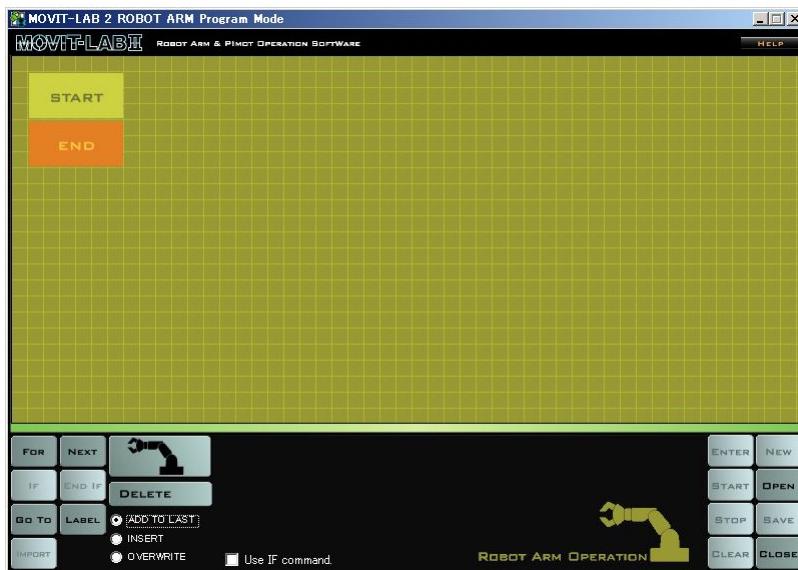
Screen

A property setting screen appears when one of the program buttons on the left side is clicked.

< [ROBOT ARM] button >

This [ROBOT ARM] button is to set the operation direction and the operation time of each part of ROBOT ARM. After setting the conditions, click [ENTER] button. Then the operation time is fixed and displayed in the program display area.

The operation time can be set by either dragging the time bar or inputting a value in the box.

< [FOR] and [NEXT] buttons >

Click [FOR] and [NEXT] buttons to repeat a specific command. [FOR] and [NEXT] are to be used always in a pair. Click [FOR] and set the number of times you want to repeat a specified movement, and click [ENTER]. Then, [FOR] and [NEXT] are displayed at the same time in the program display area. To input a program you want to repeat, click [NEXT] and select [INSERT], or delete [NEXT] for now and input a program you want to repeat, then click [NEXT].
The commands between [FOR] and [NEXT] are repeated as many times as specified after [FOR].

- 17 -

[NEXT] indicates the end of the program you want to repeat. After the program is repeated for the number of times specified after [FOR], the program goes on up to the command after [NEXT]. The commands between [FOR] and [NEXT] are repeated for the specified time. The commands are repeated endlessly when it is set to "0" after [FOR] .
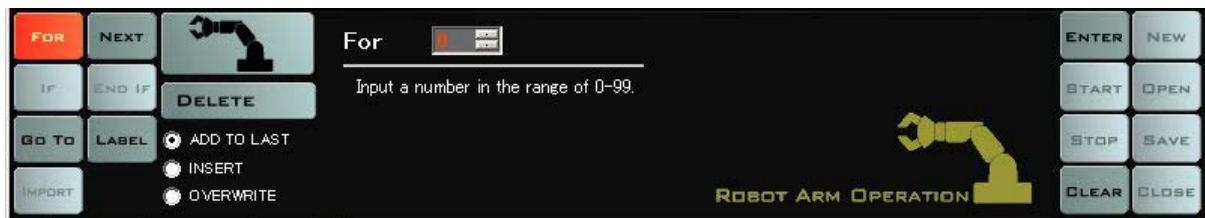

< [GO TO] button >

To jump to a command of the specified LABEL. Click this button, and specify the number of the LABEL you want to jump to.
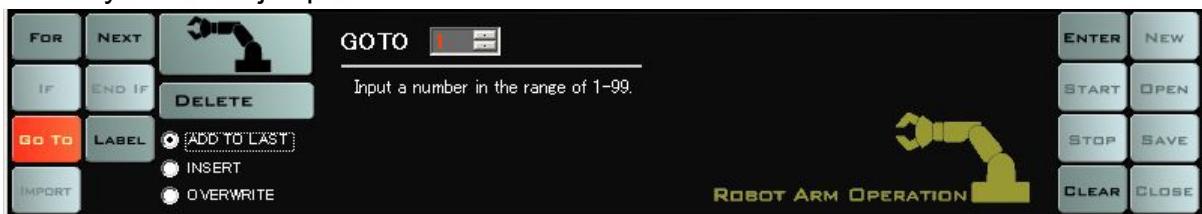
< [LABEL] button >

To set the jump destination of [GO TO]. Click this button, and set the number of a LABEL.
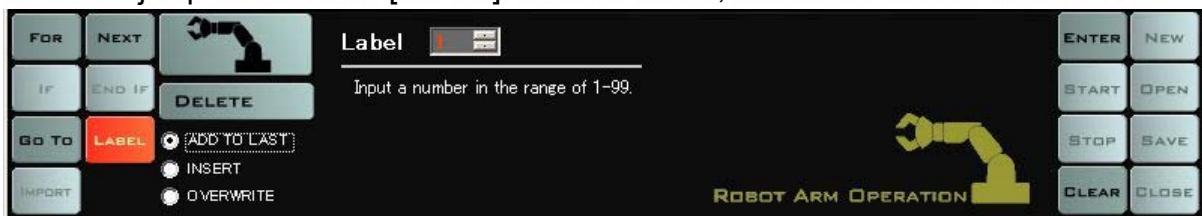
< [IMPORT] button >

To insert a program created in Key Direct Mode. Click this button, and select a file you want to insert in the program.

< Editing buttons >

ENTER	Enter a program in process in the program display area.
START	Execute a created program and move ROBOT ARM.
STOP	Stop a program in execution.
CLEAR	Clear a program not yet fixed.
NEW	Create a new program.
OPEN	Open a saved program file.
SAVE	Save a created program.
CLOSE	Go back to ROBOT ARM menu.

< [IF], [END IF] buttons >

To make a conditional judgment. [IF] and [END IF] are to be used always in a pair. The further process depends on the condition set after [IF]. Click [IF] and set a condition, then click [ENTER]. Then, [IF] and [END IF] are concurrently displayed in the program display area. Input a program that is to be executed when the conditions are satisfied by clicking [END IF] and selecting [INSERT], or delete [END IF] for now, input a program you want to repeat and click [END IF].

* MOVIT-LAB 2 (IF-100) and ROBOT ARM (MR-999E) do not have a sensor, and without a sensor, [IF] and [END IF] commands do not function properly. Please add a sensor by yourself according to need; there are sensor input terminals (SENS1 and SENS2) on IF-100 interface for a sensor such as a push switch. Please note, however, that we are not liable for any damage or trouble caused by installing a sensor.

* Check the box of "Use IF command" when you use "IF" and "END IF" buttons and sensors are additionally installed to ROBOT ARM.

- 19 -

SENSOR 1=ON	When SENS1 is ON, the commands after [IF] are executed, otherwise the operation starts from the command after [END IF].
SENSOR 1=OFF	When SENS 1 is OFF, the commands after [IF] are executed, otherwise the operation starts from the command after [END IF].
SENSOR 2=ON	When SENS 2 is ON, the commands after [IF] are executed, otherwise the operation starts from the command after [END IF].
SENSOR 2=OFF	When SENS 2 is OFF, the commands after [IF] are executed, otherwise the operation starts from the command after [END IF].

<< Programming in Program Mode >>

Following explains how to create a program to operate ROBOT ARM with some examples.

(EX)　Let's create a program where ROBOT ARM moves as follows;
Gripper: Close for 5 seconds
Wrist: RIGHT(rotation) for 3 seconds
Elbow: DOWN for 10 seconds
Shoulder: DOWN for 10 seconds
Base: CW (rotation) for 15 seconds

<Program EX1>

When programming 1 movement in 1 line;

1. Click [image] button, check [CLOSE] of Gripper and set to 5 seconds, and click [ENTER].

2. Click ![robot button] button, check [RIGHT] of Wrist and set to 3 seconds, and click [ENTER].

3. Click ![robot button] button, check [DOWN] of Elbow and set to 10 seconds, and click [ENTER].

4. Click ![robot button] button, check [DOWN] of Shoulder and set to 10 seconds, and click [ENTER].

5. Click ![robot button] button, check [CW] of Base and set to 15 seconds, and click [ENTER].

Now, the program EX1 is complete.

* Click [START] button to execute this program.
* To save the program, click [SAVE], select an appropriate folder where you want to save the program, name the file, and save.
* Click [START], and the error check is automatically executed on the program. Correct the program when there is an error.

<Program EX2>

When programming all the movements in 1 line;
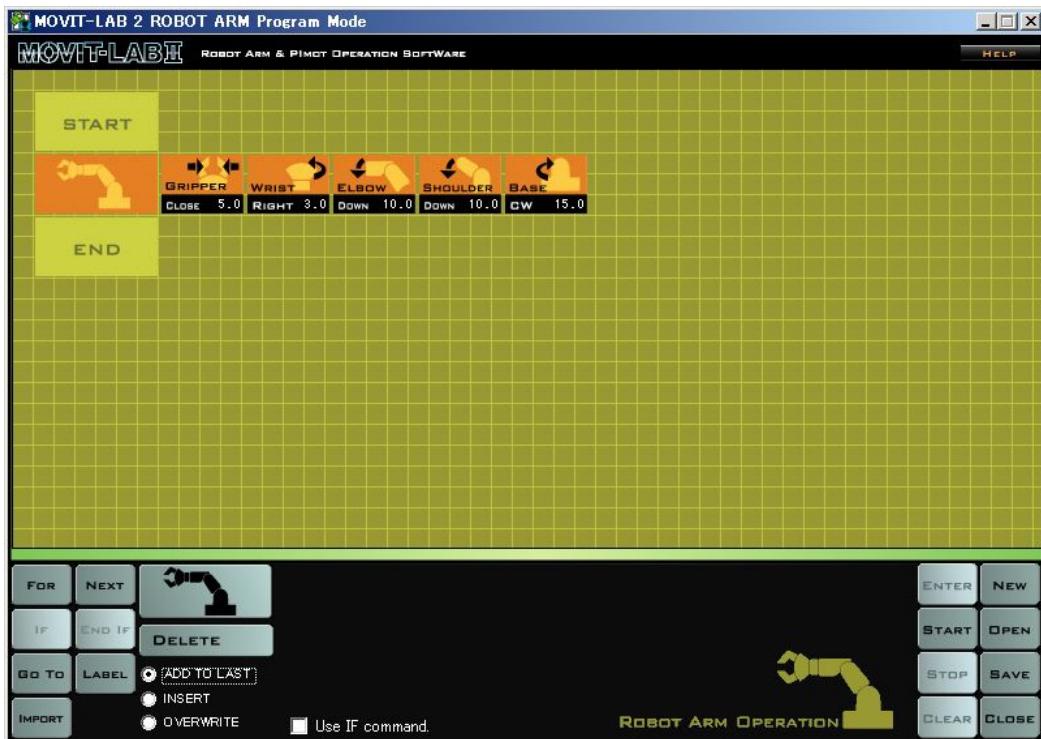
1. Click button, check [CLOSE] of Gripper and set to 5 seconds, check [RIGHT] of Wrist

and set to 3 seconds, check [DOWN] of Elbow and set to 10 seconds, check [DOWN] of Shoulder
and set to 10 seconds, click [CW] of Base and set to 15 seconds, and click [ENTER] at the end.

Now, the program EX2 is complete.

* Click [START] button to execute this program.
* To save this program, click [SAVE], select an appropriate folder where you want to save the
  program, name the file, and save.
* Click [START], and the error check is automatically executed on the program. Correct the
  program when there is an error.

How to make a program from [FOR] to [NEXT]

<Program EX3>

Repeat the program EX2 twice.

1. Click in the program display area, and select [INSERT].
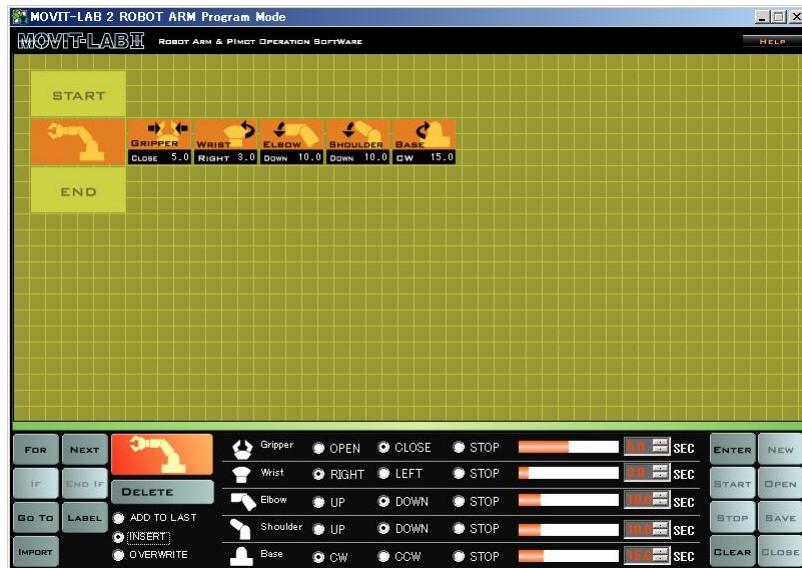
2. Click [FOR], and set the number of times to repeat. To repeat the program for 2 times, select "2" and click [ENTER].

3. [FOR 2] and [NEXT] are displayed at the same time. However, since a program has to be between [FOR 2] and [NEXT] to be repeated, click [NEXT] in the program display area for now, and click [DELETE].

4. Select "Add to last" and click [NEXT]. Then [NEXT] is added to the end of the program (before [END]). Now, the program to repeat the program EX2 is complete.

5. With the above program, the program is repeated for 2 times in the same direction. Therefore, it is recommended to insert a command to go back to the original position. Click [NEXT], select [INSERT], make a program as follows, and click [ENTER].
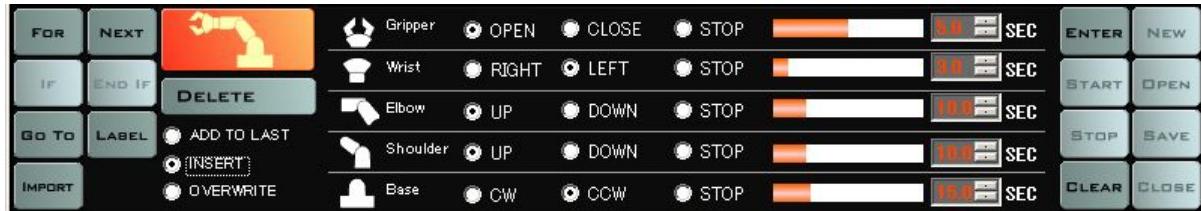
Execute this program, and the movement of the program EX2 is repeated twice.
As you see, [FOR] and [NEXT] are the commands to repeat the command between [FOR] and [NEXT] as many times as specified.

How to make a program with [GO TO] and [LABEL]

<Program EX4>

A program using [GO TO] and [LABEL], where the following command is repeated endlessly; OPEN Gripper for 3 seconds, DOWN Shoulder for 5 seconds, CLOSE Gripper for 3 seconds, and UP Shoulder for 5 seconds.

* [FOR] and [NEXT] enable to make the command between [FOR] and [NEXT] to be repeated endlessly. However, in this section, we shall make a repetition command using [GO TO] and [LABEL].

1. Click [LABEL] and set to "1".
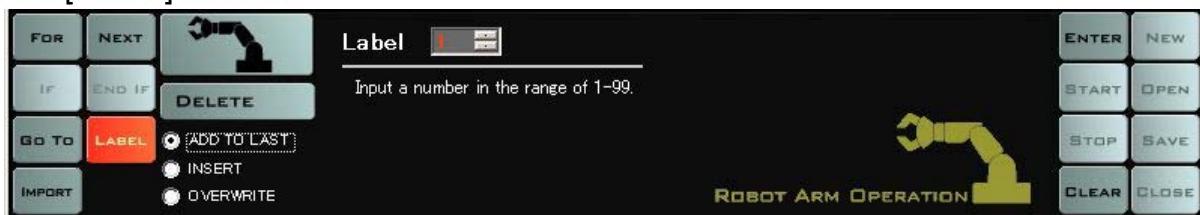
2. Click , select [OPEN] of Gripper, set to "3", and click [ENTER].

3. Click [GO TO] and set to "2".
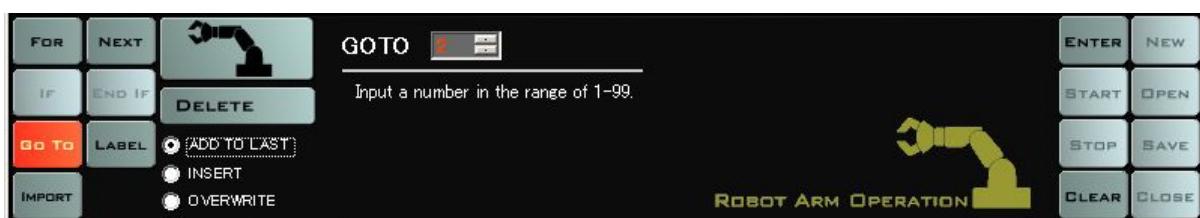
4. Click [LABEL] and set to "3".

5. Click , select [CLOSE] of Gripper, set to "3", and click [ENTER].

6. Click [GO TO] and set to "4".
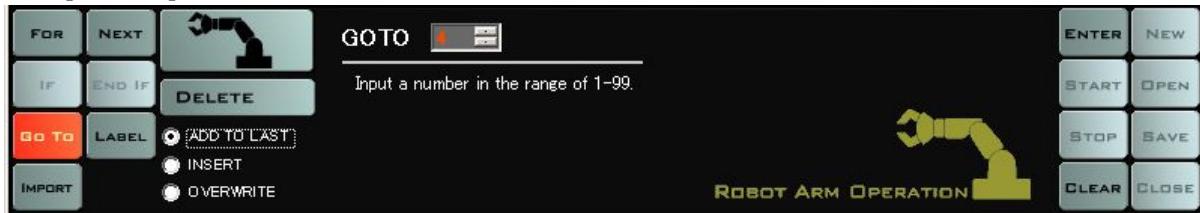

7. Click [LABEL] and set to "2".
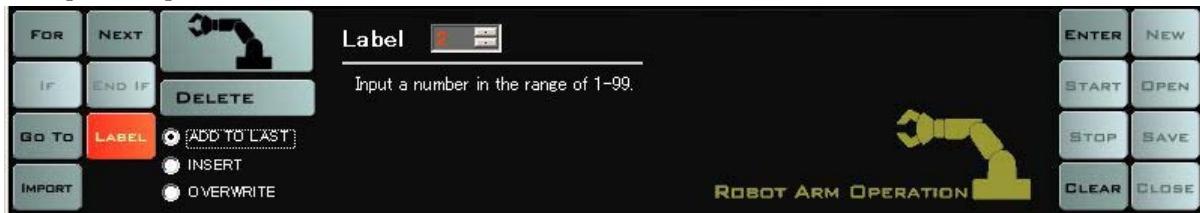
8. Click [image], select [DOWN] of Shoulder, set to "5", and click [ENTER].

9. Click [GO TO] and set to "3".
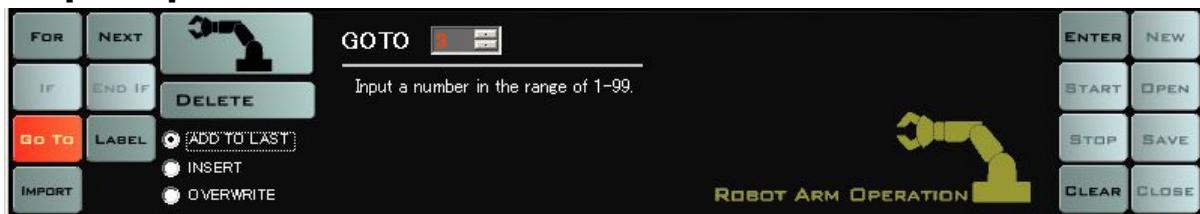

10. Click [LABEL] and set to "4".
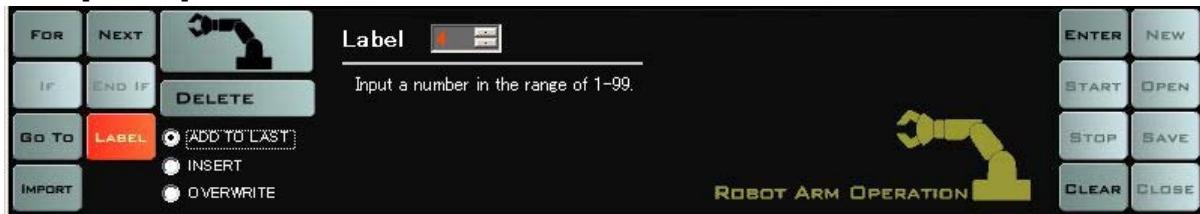
11. Click [image], select [UP] of Shoulder, set to "5", and click [ENTER].

- 28 -

12. Click [GO TO] and set to "1".
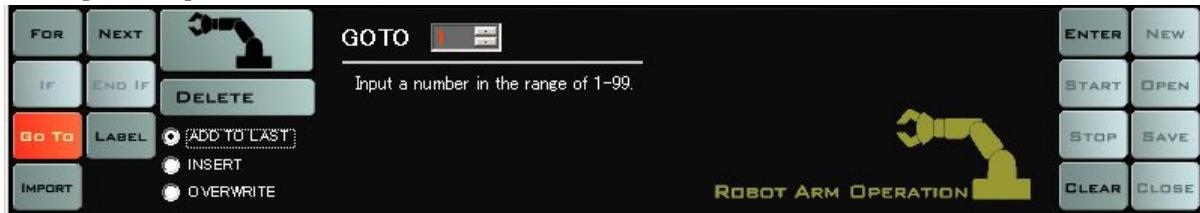
Now, the program EX4 is complete.

When this program is executed, ROBOT ARM first executes the command "OPEN Gripper for 3 seconds". Then, since there is [GO TO 2] command, the program jumps to [LABEL 2] and ROBOT ARM executes the command "DOWN Shoulder for 5 seconds". Then, there is [GO TO 3] and the program jumps to [LABEL 3] and executes the command "CLOSE Gripper for 3 seconds". Then, there is [GO TO 4] command and the program jumps to [LABEL 4] and executes the command "UP Shoulder for 5 seconds". Then, there is [GO TO 1] and it jumps to [LABEL 1] and repeats the commands from the start. As mentioned above, the number that comes after [GO TO] indicates each corresponding label. As you see, this is the command to jump to a specified label number. Although the operation sequence of this program seems different from that of the program EX4, you can see that [GO TO] command makes ROBOT ARM operate in the order.

How to create a program of [IF] and [END IF]

* MOVIT-LAB 2 (IF-100) and ROBOT ARM (MR-999E) do not have a sensor, and without a sensor, [IF] and [END IF] commands do not function properly. Please add a sensor by yourself according to need; there are sensor input terminals (SENS1 and SENS2) on IF-100 interface for a sensor such as a push switch. Please note, however, that we are not liable for any damage or trouble caused by installing a sensor.

* Check the box of "Use IF command" when you use "IF" and "END IF" buttons and sensors are additionally installed to ROBOT ARM.
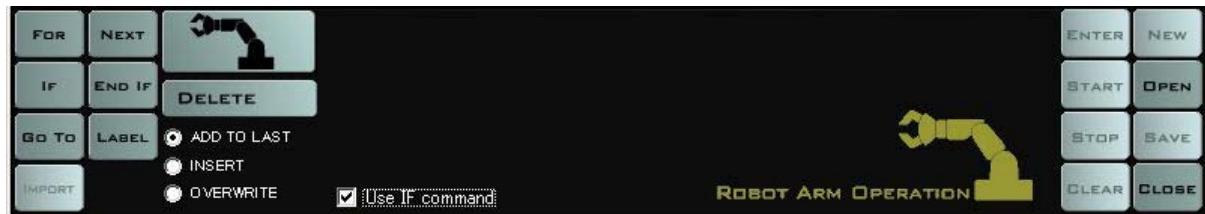
< Program EX5 >

The program EX3 is executed when SENS1 is ON, otherwise the movement where Base rotates in CW direction for 5 seconds is repeated endlessly.
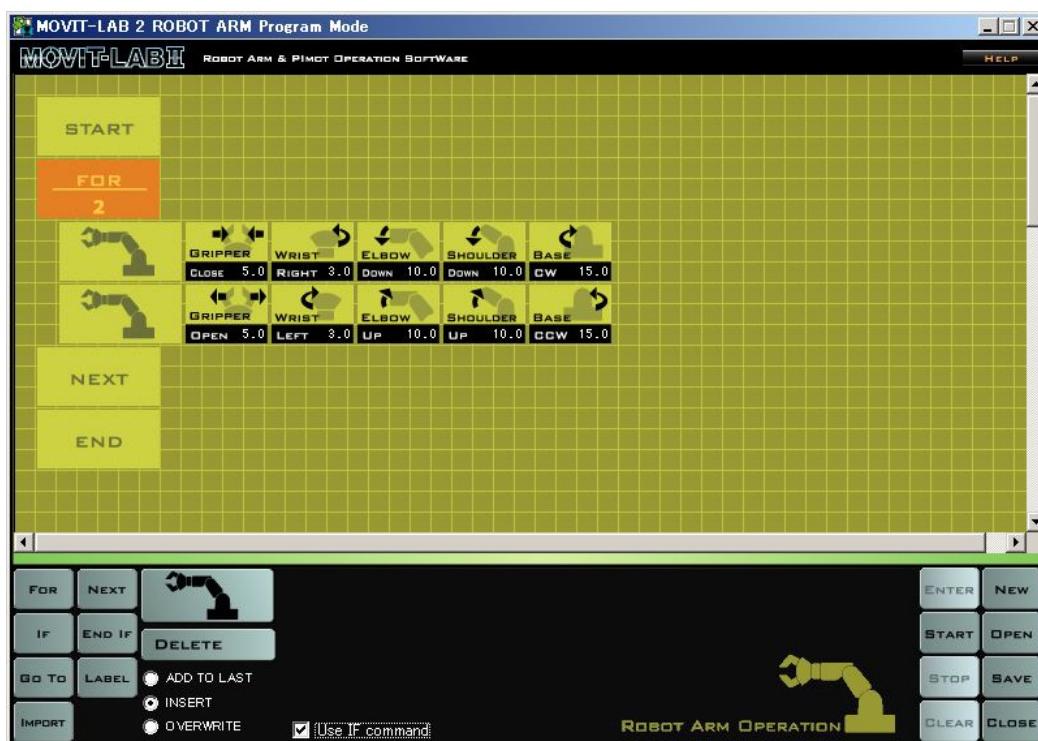
Program EX3

1. Make a program so that ROBOT ARM repeats the program EX2 endlessly. Click , and select [INSERT].
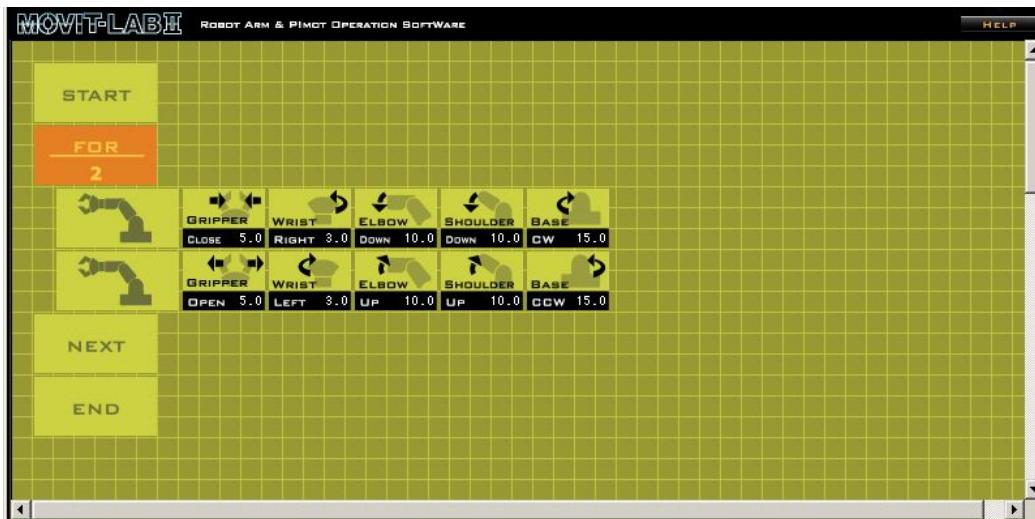
2. To repeat endlessly, set to "0" and click [ENTER].
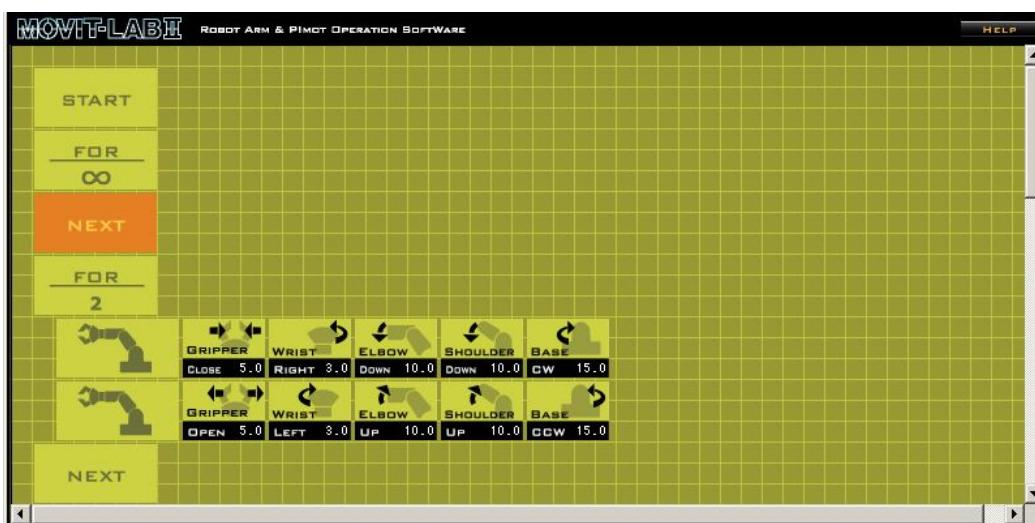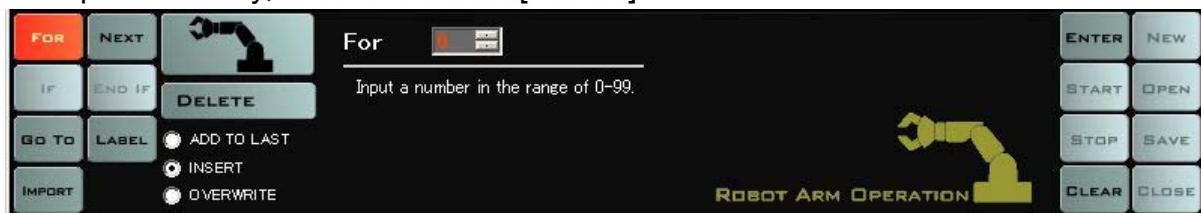
3. ![FOR ∞] and ![NEXT] are displayed at the same time. Therefore, click ![NEXT] for now, and then click [DELETE].

- 31 -
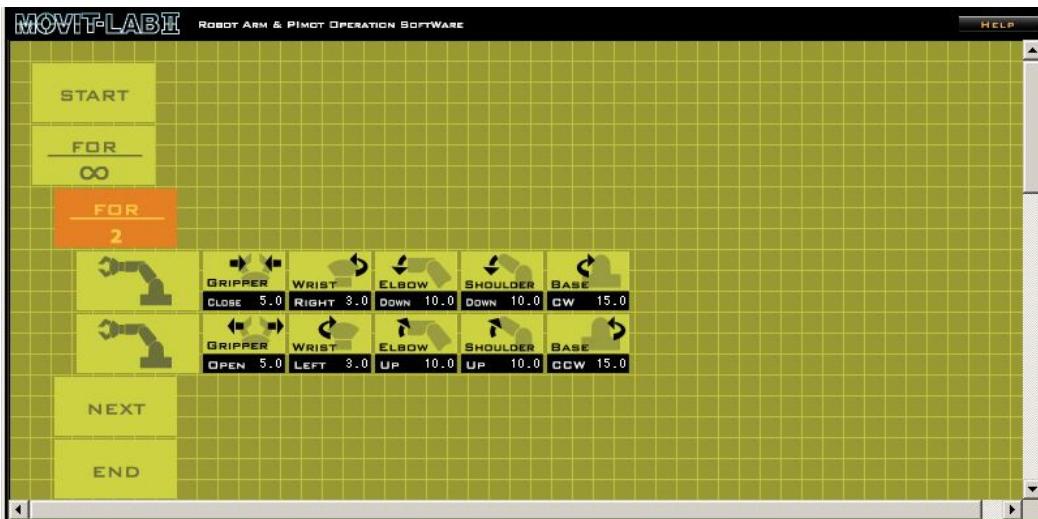
4. Now the sensor conditions are set. The program EX3 needs to be executed when SENS1 is ON.

   Therefore, click the first [FOR 2] and then select "INSERT".
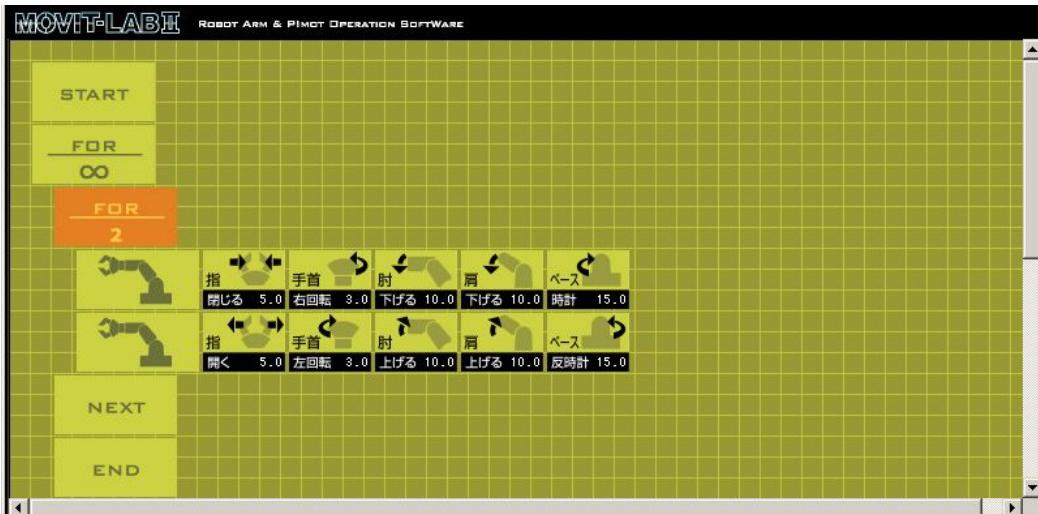
5. Click [IF], select "SENS1" and "ON", and click [ENTER].
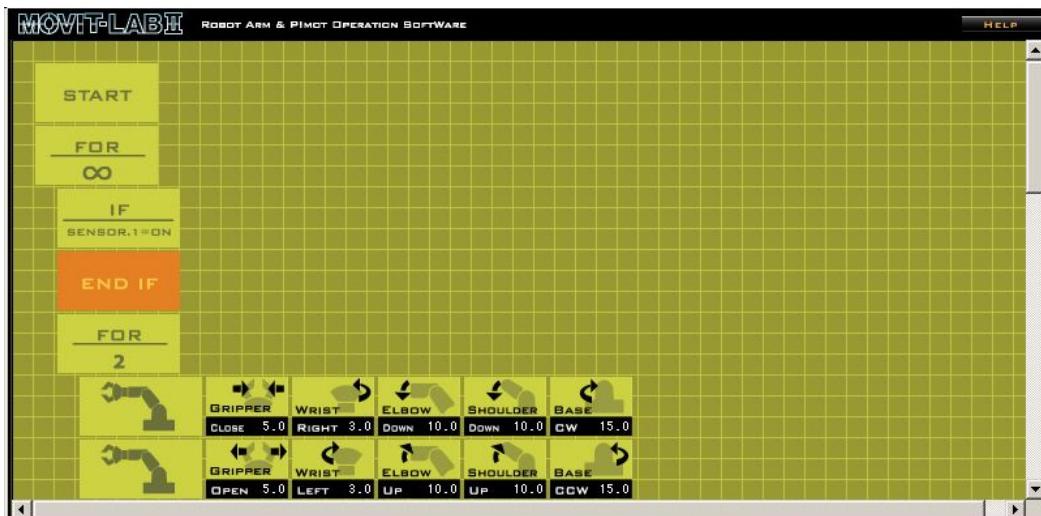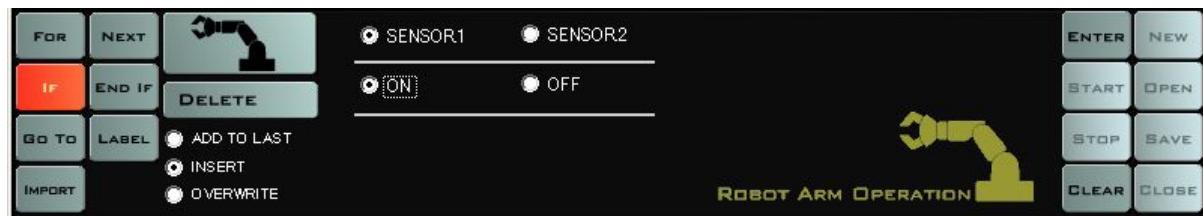
6. and are displayed at the same time. However, the program EX3, which was executed when SENS1 is ON, has to be between and . So click in the program display area for now, and click [DELETE].
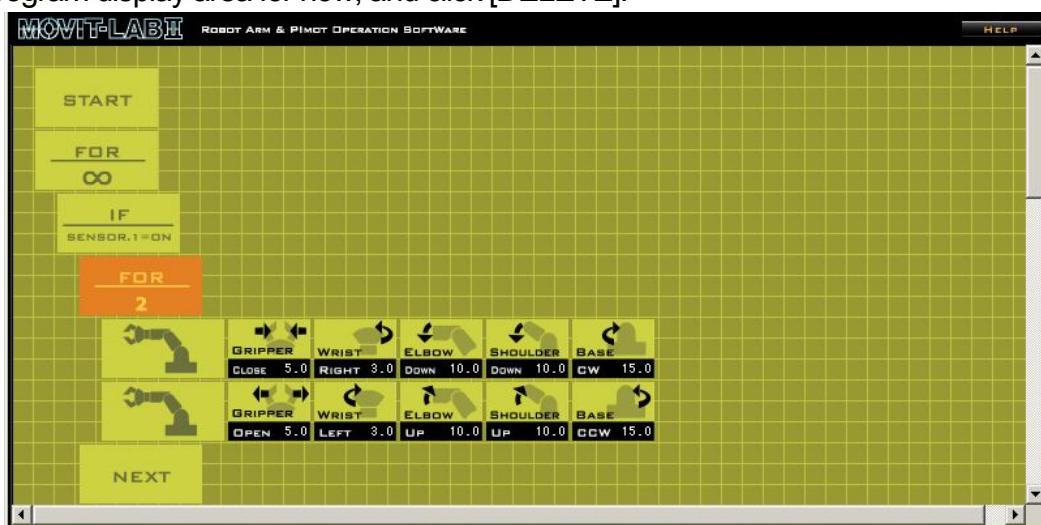
7. Select "Add to last" and click [END IF]. END IF is added to the last, before [END], and the program executed when SENS1 is ON is complete.
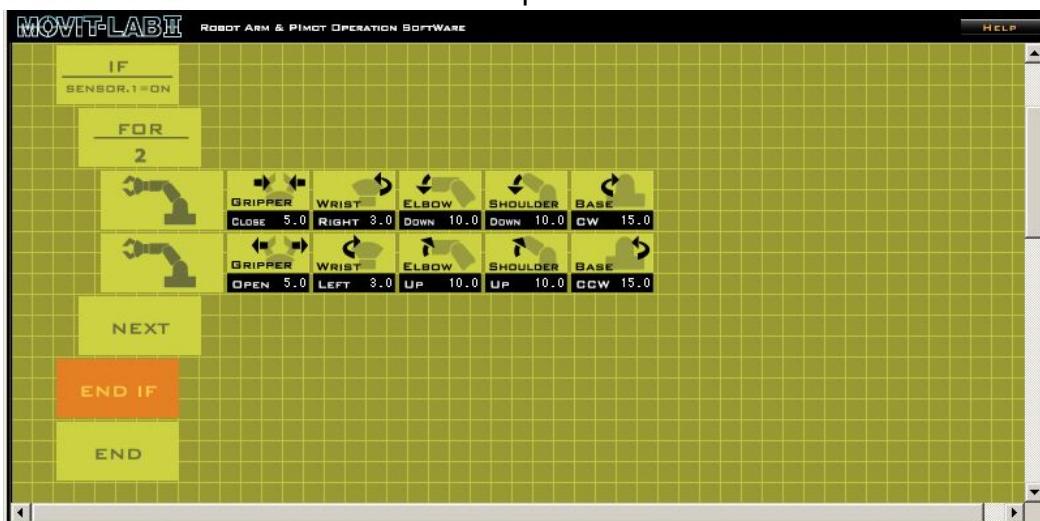
8. Next, a program that is executed when SENS1 condition is not satisfied (when SENS1 is OFF) needs to be added. Make a program to rotate the Base in CW direction for 5 seconds.

9. Lastly, add [NEXT] to repeat the commands endlessly, and the program is complete.
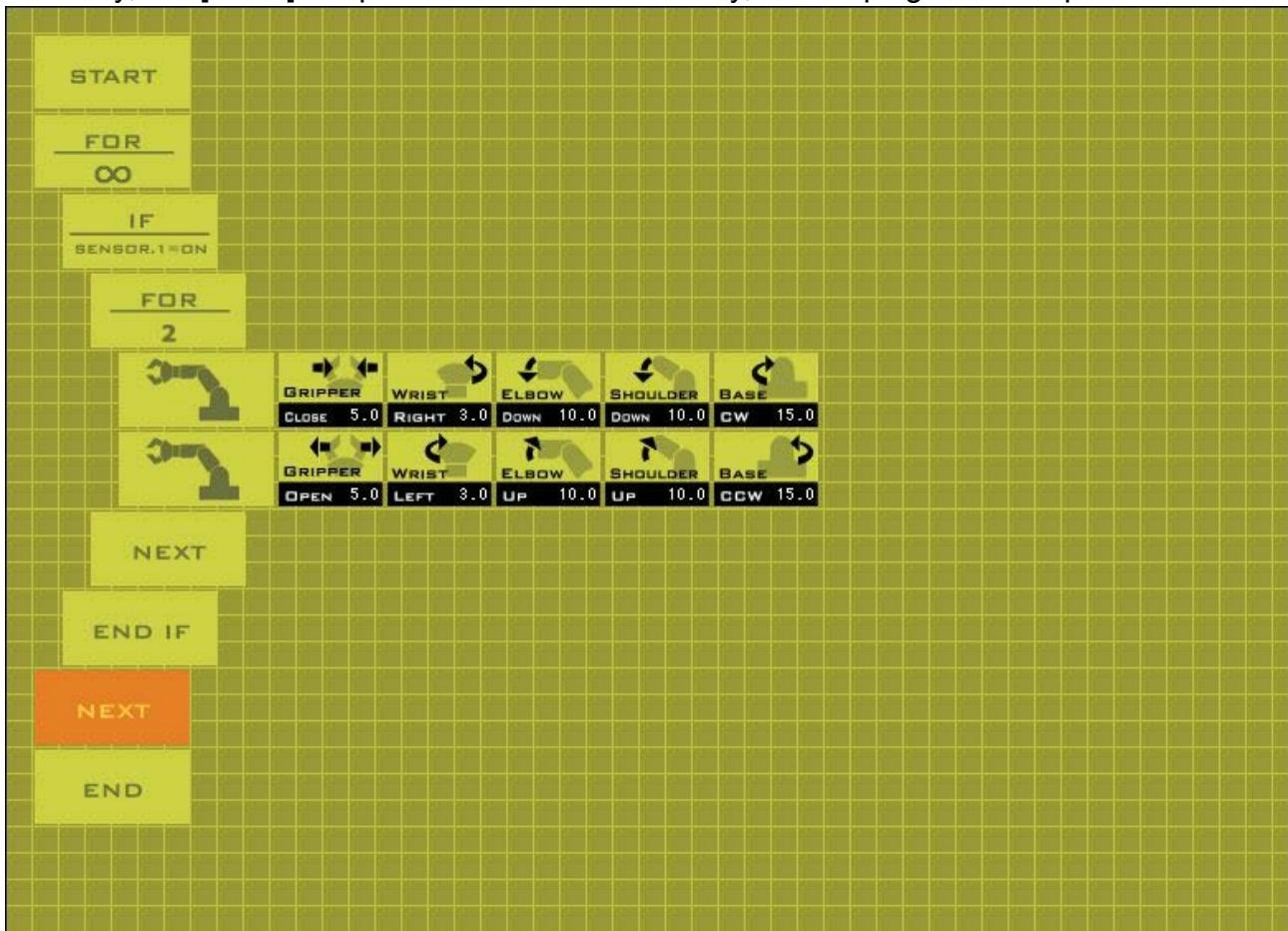
Now, the program EX5 is complete.

When this program is executed, the base rotates in CW direction for 5 seconds endlessly when SENS1 is OFF, but when ON, the program EX3 is executed.

However, the movement does not switch right away when SENS1 turns ON; the program EX3 is

executed only when the sensor is ON at the moment the program is at ![IF SENSOR.1=ON], when it checks the condition of SENS1.

- 35 -

3. Let's transmit a program from PC to P!MOT!

#### Connect P!MOT, Interface board, and PC.

1) Make sure the SW2 of Interface Board is as shown in the below photo.
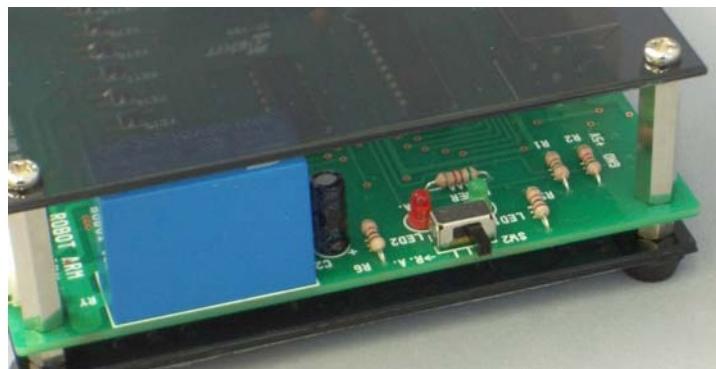
* Make sure the inserting direction.

2) Connect the enclosed cable for robot to the connector indicated as "P!MOT" on the interface board.
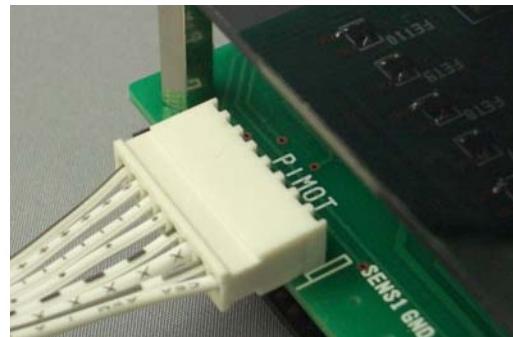
* Make sure the inserting direction.

3) Connect other end of the cable for robot to P!MOT.
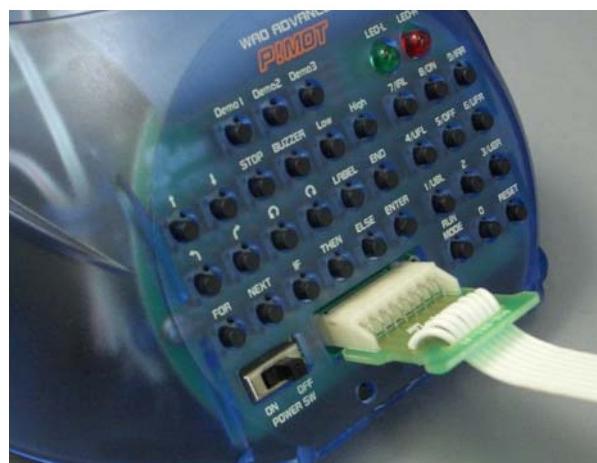
4) Connect the interface board and PC with the enclosed USB cable.
  * Please note that, when Interface Board is connected to PC for the first time, it might take several tens of seconds for the PC to recognize Interface Board.

Start up MOVIT-LAB 2

   * Make sure no application programs other than MOVIT-LAB 2 are open or active, otherwise MOVIT-LAB 2 might not operate properly. In addition, MOVIT-LAB 2 might not operate properly also when a screensaver function becomes active while a program is being transmitted to P!MOT or when a P!MOT simulation is being executed. Therefore, make sure to set the screensaver to [None].

1) Go to "Start" -> "All Programs" -> "MOVIT-LAB 2" -> "MOVIT-LAB 2".
2) Language Select screen appears (Japanese or English is available). Select English.

* Refer to Japanese user's manual when you select Japanese language.

3) Robot Select screen appears. Click "P!MOT".
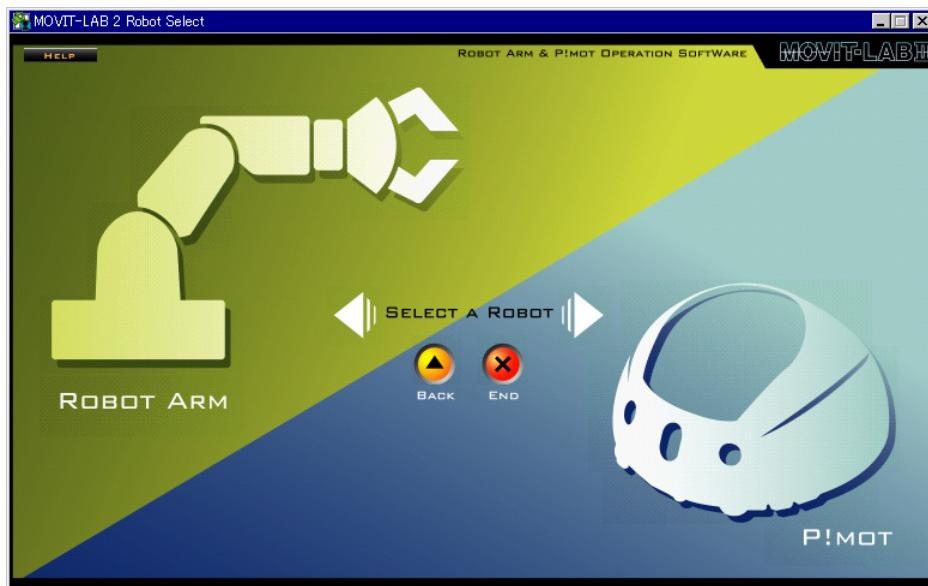
4) Mode Select screen appears. Click either Program Mode or Simulation Mode. Each mode is explained in the following pages.

< Program Mode >

In Program Mode, you can create a program to operate P!MOT by clicking the buttons on the screen in order.

Screen

Program title display area

Program display area

Comment display area

File button area

Edit button area

Operation button area

Numerical keypad
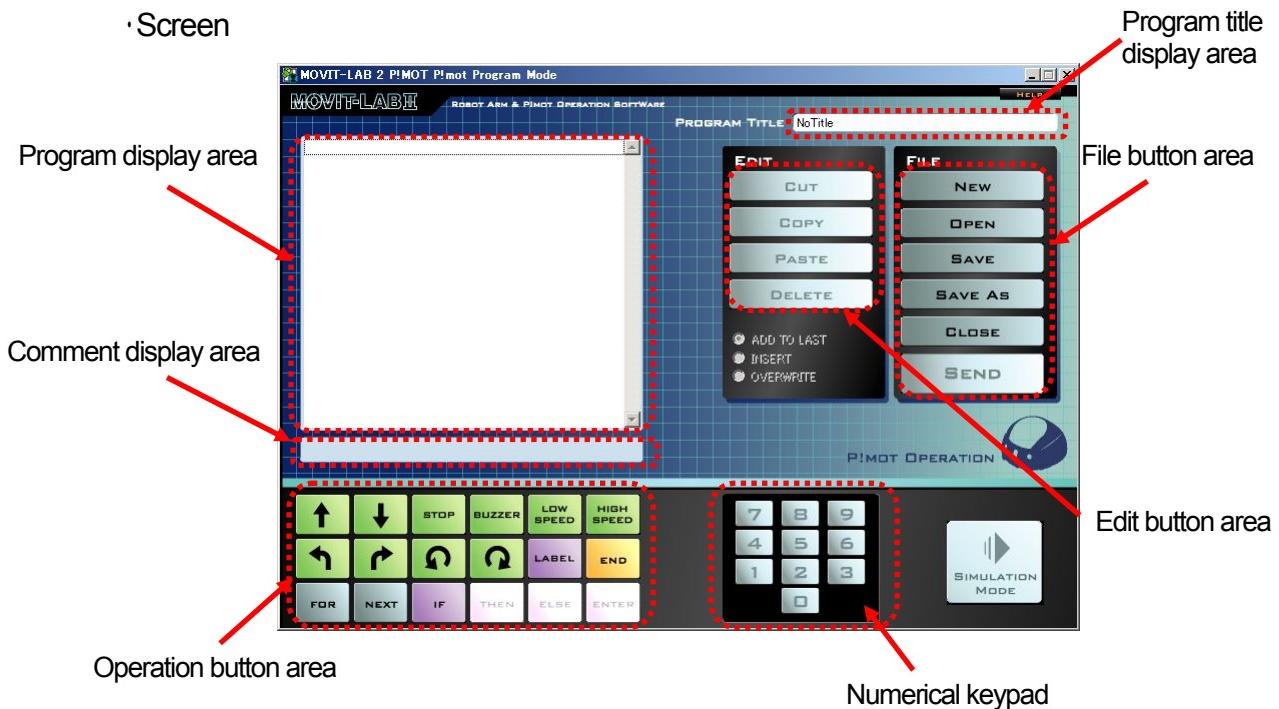
Program display area	Fixed program is displayed in this area when [ENTER] is clicked.
Comment display area	A selected line in the Program display area is described.
Operation button area	To create a program to operate P!MOT by clicking the buttons and numerical keys in this area in order. Once a button is clicked, the command is displayed in the Program display area, and fixed when [ENTER] is clicked. Refer to the separate chart as for the function of each button.
Numerical pad	The operation time or the operation angle can be set. These buttons switch to condition setting buttons when [IF] is clicked. As for the detail, refer to the separate chart.
Edit button area	A program in the Program display area can be cut, copied, pasted, or deleted.
File button area	To open a saved program, save a program, or transmit ([SEND]) a program in the Program display area to P!MOT.
Program title display area	To title a program. Click anywhere in the column to input the file name.

Operation button area

↑	FD	P!MOT moves forward.
↓	BK	P!MOT moves backward.
STOP	STOP	P!MOT stops.
BUZZER	BUZZ	P!MOT makes a buzzer sound.
LOW SPEED	L	P!MOT moves in a low speed.
HIGH SPEED	H	P!MOT moves in a high speed.
↰	LT	P!MOT turns left.
↱	RT	P!MOT turns right.
↺	LR	P!MOT rotates left in place.
↻	RR	P!MOT rotates right in place.
LABEL	LABEL	To input a label.
END	END	To end a program.
FOR	FOR	To repeat a program.
NEXT	NEXT	End of repeated program
IF	IF	To set the condition of IF clause. Numerical buttons switch to sensor selecting buttons when [IF] button is pressed. (See below)
THEN	THEN	To set a sequence of movement of IF clause.
ELSE	ELSE	To set a sequence of movement that does not suit IF clause.
ENTER	ENTER	To fix a program.

The numerical keypad that appears when [IF] button is clicked

  When [IF] button is clicked, the numerical buttons switch to sensor selecting buttons. Press the button of corresponding sensor and press either ON or OFF button to set the IF condition.

IRL	Infrared sensor, left
IRR	Infrared sensor, right
UFL	Floor sensor, left front
UFR	Floor sensor, right front
UBL	Floor sensor, left back
UBR	Floor sensor, right back

<< Programming in Program Mode >>

Following explains how to create a program to operate P!MOT with some examples.

(Program EX1)

Let's create a program where P!MOT moves in a square in a middle speed. The operation time is "2" for all the movements.

* Since a direct current motor is used in P!MOT, the driving distance or the turning angle of P!MOT is not always accurate; the square movement is not exactly square. However, accuracy of the turning angle can be improved by setting the spinning time. As for the detail, please refer to the assembly instruction manual of P!MOT.

1 Click in the order of [↑] → "2" → [ENTER].

2 Click in the order of [STOP] → "1" → [ENTER].

3 Click in the order of [↺] → "4" → [ENTER].

4 Click in the order of [STOP] → "1" → [ENTER].

5 Click in the order of [↑] → "2" → [ENTER].
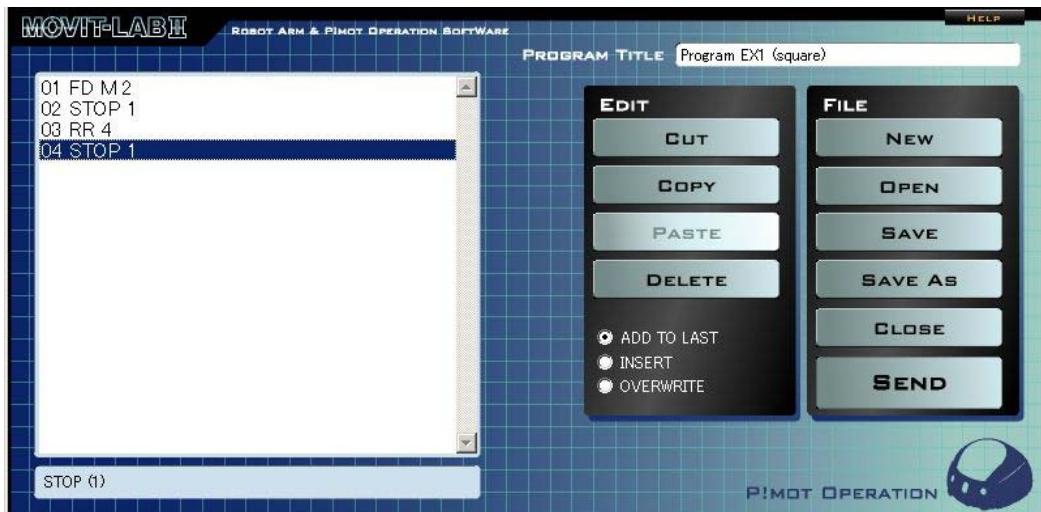
6 Click in the order of [STOP] → "1" → [ENTER].

7 Click in the order of [↺] → "4" → [ENTER].

8 Click in the order of [STOP] → "1" → [ENTER].

9 Click in the order of [↑] → "2" → [ENTER].

10 Click in the order of [STOP] → "1" → [ENTER].

11 Click in the order of [↻] → "4" → [ENTER].

12 Click in the order of [STOP] → "1" → [ENTER].

13 Click in the order of [↑] → "2" → [ENTER].

14 Click in the order of [STOP] → "1" → [ENTER].

15 Click in the order of [↻] → "4" → [ENTER].

16 Click in the order of [STOP] → "1" → [ENTER].
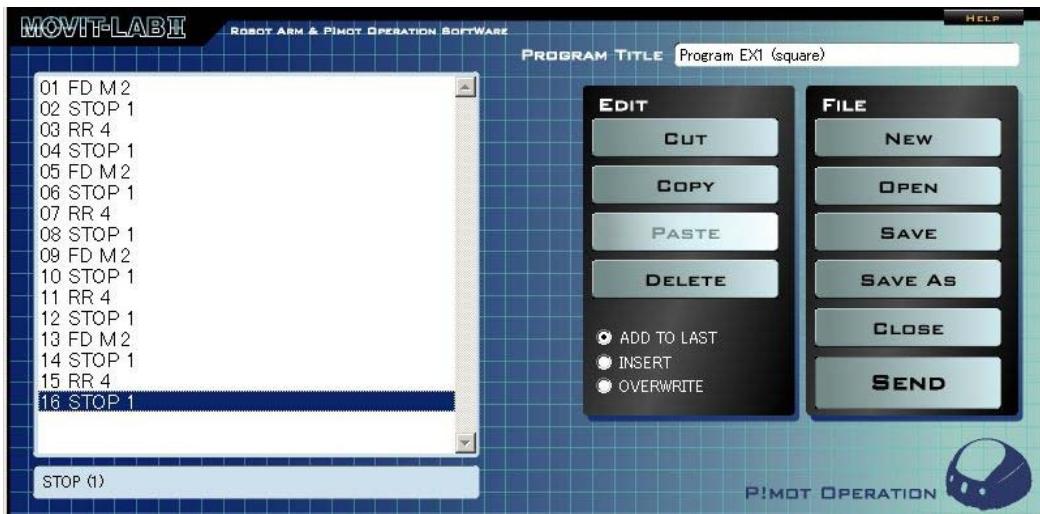
Now, the program EX1 is complete.

   * As for the program transmission to P!MOT and the program execution, please refer to "Program transmission and execution" on Page 51.
   * To save the program, click [SAVE], select an appropriate folder, name the file, and save.
   * Click [SEND], and the error check is automatically executed on the program. Correct the program when there is an error.

How to make a program from [FOR] to [NEXT]

(Program EX2)
   Let's create a program of the same sequence of movement as EX1 using [FOR] and [NEXT].

1 Click in the order of [FOR] → "4" → [ENTER].

2 Click in the order of [↑] → "2" → [ENTER].

3 Click in the order of [STOP] → "1" → [ENTER].

4 Click in the order of [↻] → "4" → [ENTER].

5 Click in the order of [STOP] → "1" → [ENTER].

6 Click in the order of [NEXT] → [ENTER].
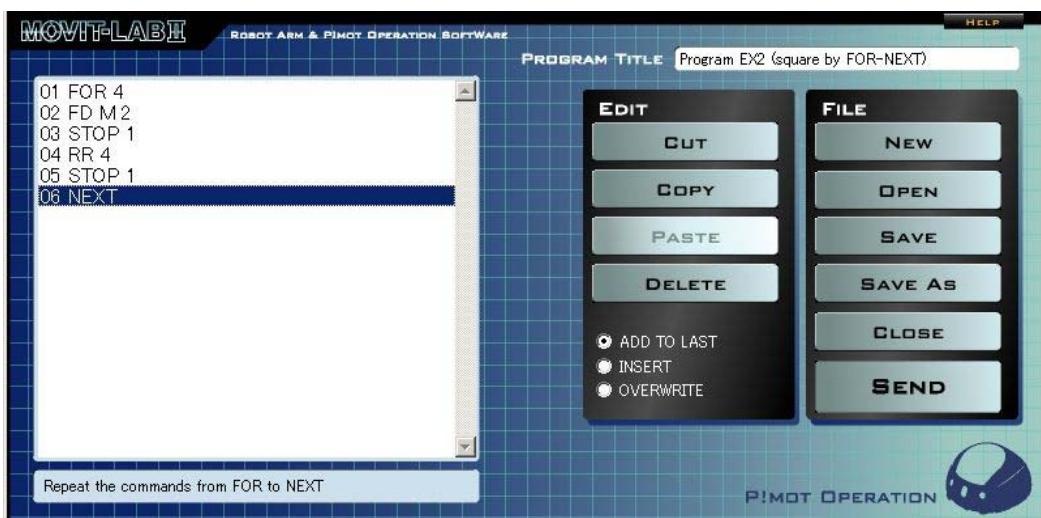
Now, the program EX2 is complete.

 When EX1 and EX2 are transmitted to P!MOT, it makes exactly the same movements. How could this happen even though the length of the 2 programs is different? The answer is the [FOR] and [NEXT] command used in the program EX2. As you see, [FOR] and [NEXT] are very useful command when you want a sequence of movement (a process of the program) to be repeated for a certain number of times.

   * As for the program transmission to P!MOT and the program execution, please refer to "Program transmission and execution" on Page 51.
   * To save the program, click [SAVE], select an appropriate folder, name the file, and save.
   * Click [SEND], and the error check is automatically executed on the program. Correct the program when there is an error.
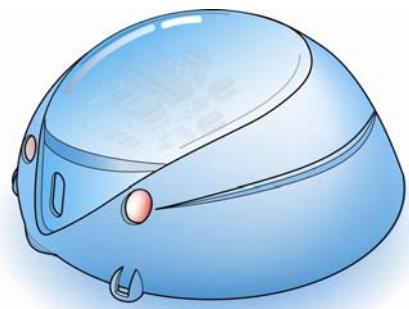
(Program EX3)

Let's create a program where P!MOT repeats a square movement of the program EX2, moving over little by little.

1 Since the movement of the program EX2 is repeated endlessly, click the 01 line, and click [INSERT].

2 Click in the order of [FOR] → "0" → [ENTER].
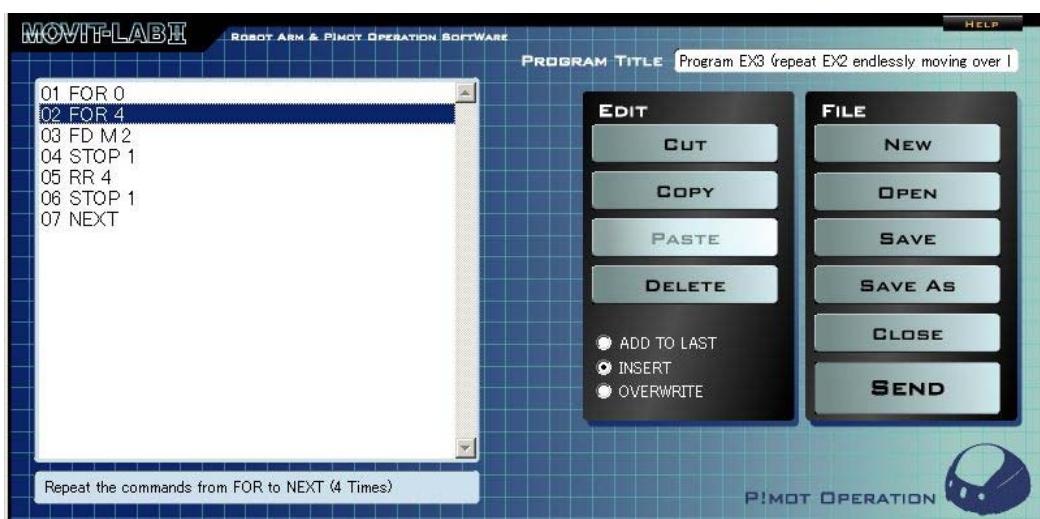
3 To have P!MOT move over a little every time the program EX2 ends, click "Add to last".
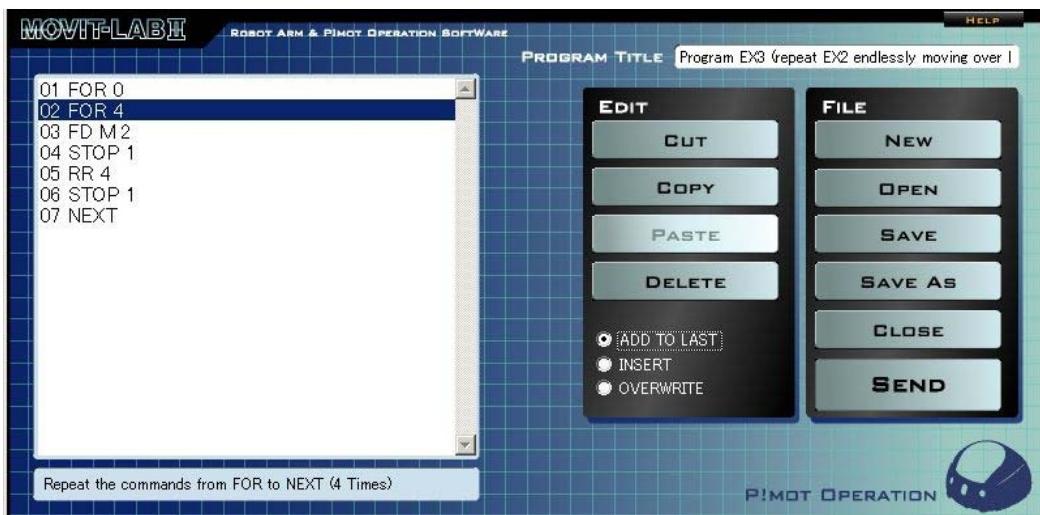
4 Click in the order of → "2" → .

5 Click in the order of → "1" → .
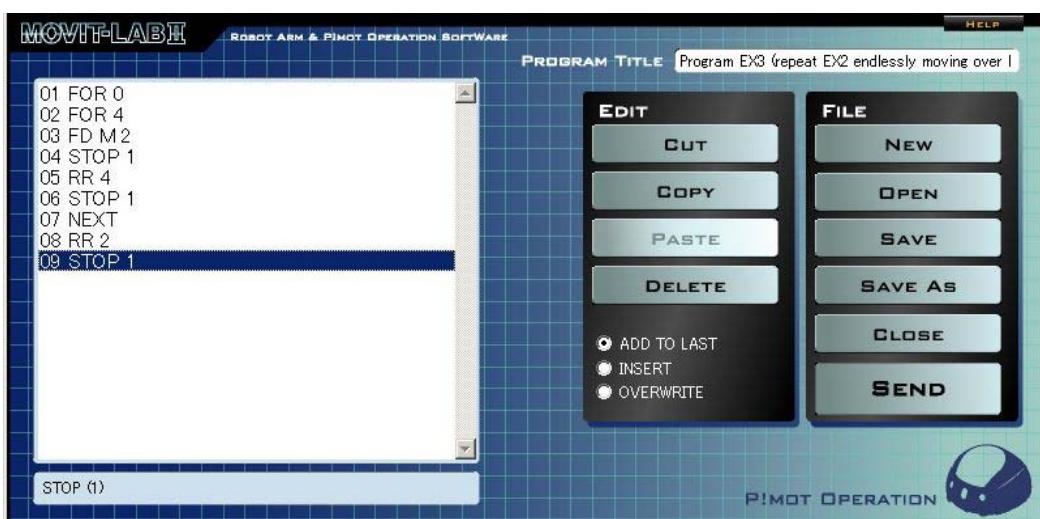
6 Lastly, to repeat the whole movements endlessly, add [NEXT] so that the program goes back to 01 line.

Click in the order of [NEXT] → [ENTER] .
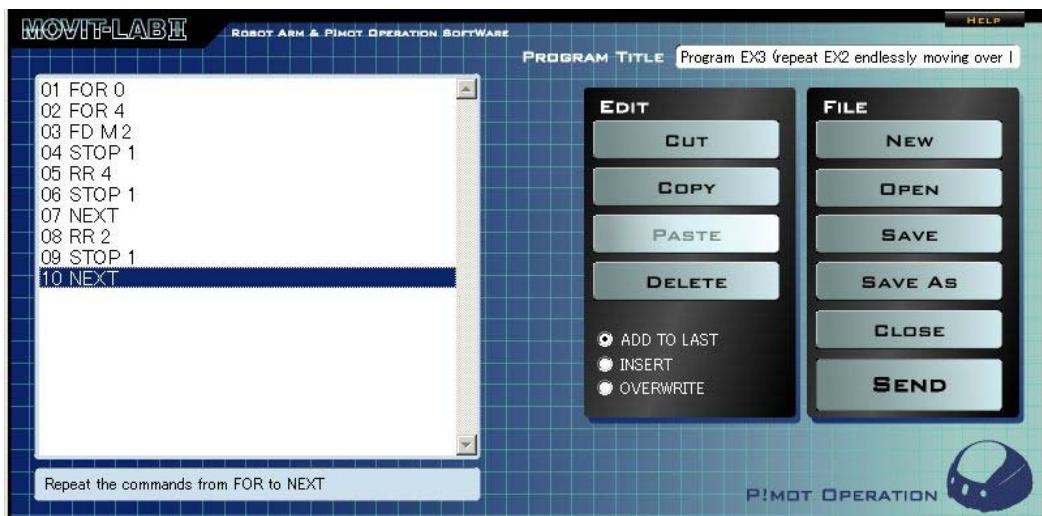
Now, the program EX3 is complete.

As you see, you can make a [FOR] and [NEXT] program in between another [FOR] and [NEXT] command. This is called "Multiple loops". "Multiple loops" is used in the program EX3 and the program goes on, repeating a square movement, moving over little by little, endlessly.

* As for the program transmission to P!MOT and the program execution, please refer to "Program transmission and execution" on Page 51.
* To save the program, click [SAVE], select an appropriate folder, name the file, and save.
* Click [SEND], and the error check is automatically executed on the program. Correct the program when there is an error.

How to make a program with [IF], [THEN], and [ELSE]

(Program EX4)

Let's make a program where P!MOT makes a Pipo (Pe-Po) sound for once when the right infrared sensor is ON.

1 Click in the order of [IF] → [IRR] → [ON] → [THEN] → "1" → [ELSE] → "2" → [ENTER].

This program refers to; when the right infrared sensor is ON, execute the program after Label 1, and when OFF, then execute the program after Label 2.

2 Click in the order of [LABEL] → "1" → [ENTER].

3 Click in the order of [BUZZER] → "2" → "1" → [ENTER].

4 Click in the order of [LABEL] → "2" → [ENTER].
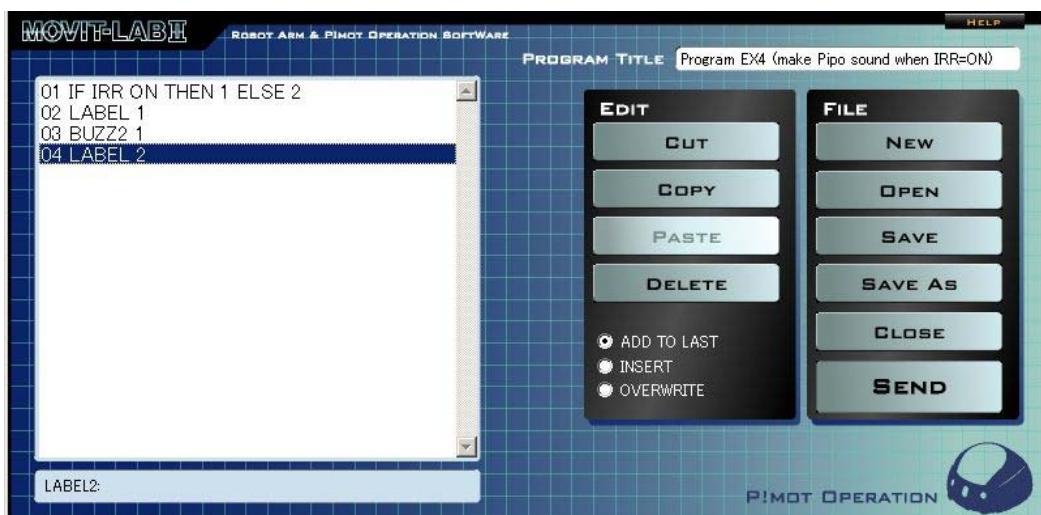
Now, the program EX4 is complete.

   * As for the program transmission to P!MOT and the program execution, please refer to "Program transmission and execution" on Page 51.
    * To save the program, click [SAVE], select an appropriate folder, name the file, and save.
    * Click [SEND], and the error check is automatically executed on the program. Correct the program when there is an error.

Now, let's transmit the program EX4 to P!MOT. In this program, P!MOT makes a Pipo sound when the right infrared sensor is ON. So, click [MODE/RUN] button of P!MOT and put your hand approx. 10cm ahead of the right infrared sensor. Did P!MOT make a Pipo sound? It might not have made the sound, but that does not mean there is a mistake in the program. The P!MOT did not make a Pipo sound because the program processing speed was too fast and the program had already been executed when you put your hand 10cm ahead of it.

(Program EX5)

Let's make a program, using [FOR] and [NEXT], where the program EX4 is repeated endlessly.

1 Click 01 line, and click "INSERT".

2 Click in the order of [FOR] → "0" → [ENTER].

3 Check "Add to last".

4 Click in the order of [NEXT] → [ENTER].
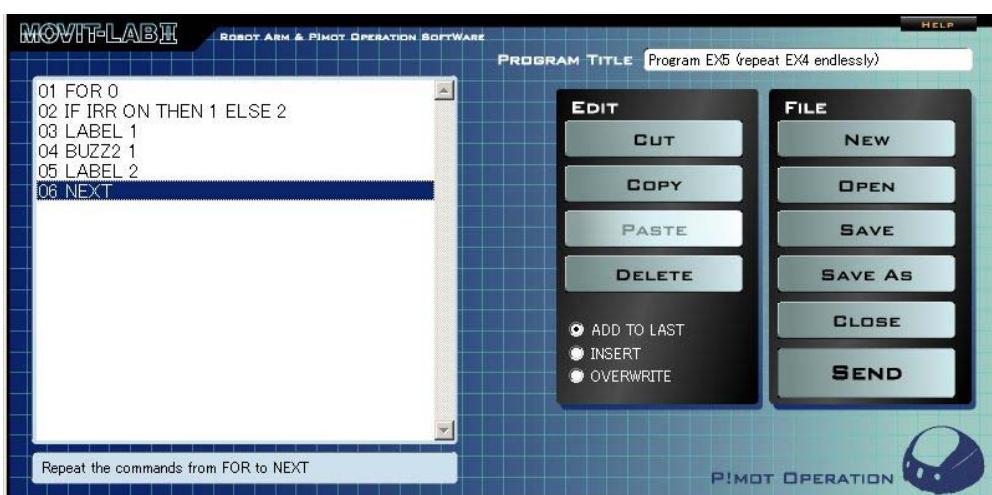
Now, the program EX5 is complete.

> *As for the program transmission to P!MOT and the program execution, please refer to "Program transmission and execution" on Page 51.
> * To save the program, click [SAVE], select an appropriate folder, name the file, and save.
> * Click [SEND], and the error check is automatically executed on the program. Correct the program when there is an error.

Now, let's transmit the program EX5 to P!MOT.

P!MOT must have made a Pipo sound when you put your hand toward the right infrared sensor, and it must not have made a Pipo sound when there is nothing in its front. This indicates that P!MOT makes a judgment according to the information from the sensor.

 As mentioned above, in a [IF], [THEN] and [ELSE] program, execution of a movement depends on the condition; whether the condition is satisfied or not decides which command is executed.

* Program transmission and execution

Follow the below instructions to transmit a program to P!MOT.

1. Connect the enclosed cable for robot to the connector, indicated as P!MOT on Interface Board.
2. Have P!MOT in SLEEP mode by turning ON the power of P!MOT and pressing "RESET" -> "RUN/MODE" -> "RUN/MODE" in order., and connect the cable for robot to P!MOT.
3. After creating and saving a program in PC, click "SEND" in Program Mode. Then, the message as shown below appears.
4. After pressing "RESET" button of P!MOT, press "RUN/MODE" -> "0" to have P!MOT in Program Receive mode. The LED of P!MOT starts blinking.
5. Click "OK" in the message displayed on PC, and the program transmission starts.
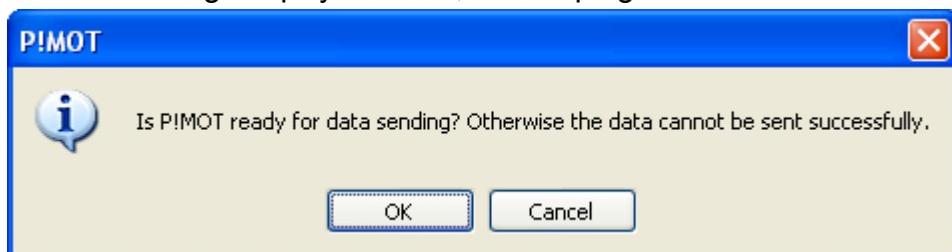
6. When the program transmission is complete properly, P!MOT becomes in SLEEP mode again.
7. Remove the cable for robot from P!MOT, and press "RUN/MODE" of P!MOT. Then the transmitted program is executed.

* P!MOT does not operate properly when there is an error in the program.

* P!MOT does not operate properly when a program transmission is cancelled in mid-course. In such case, press "RESET" button and start transmission from the beginning.

* When unplugging the cable for robot from P!MOT, make sure **not** to press "RESET" button of P!MOT by mistake. The transmitted program is cleared when "RESET" button is pressed before "RUN/MODE" button is pressed after the program transmission.

< Simulation Mode >

In Simulation Mode, you can have P!MOT simulate the program created in Program More on the screen.
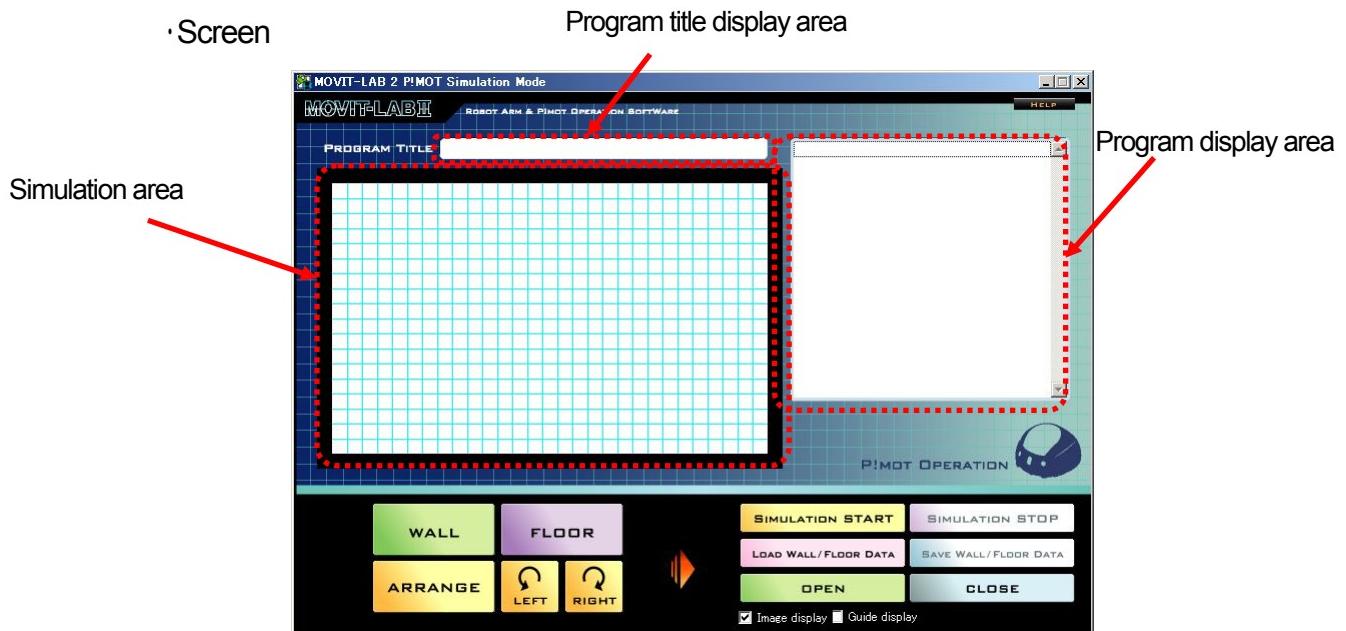
Program title display area	The title of the program is displayed.
Simulation area	Walls and black floors can be created in this area in which P!MOT is arranged and a program can be simulated.
Program display area	A program to be simulated is displayed. Click [OPEN] and read the program you want to simulate. During the simulation, the program being simulated is highlighted.

WALL	Click this button once, and click anywhere in the simulation area and drag to create a wall. Right click (and drag if necessary) to delete the wall.
FLOOR	Click this button once, and click anywhere in the simulation area and drag to create a floor. Right click (and drag if necessary) to delete the floor.
ARRANGE	Click this button once, and click anywhere in the simulation area to arrange P!MOT.
LEFT	P!MOT rotates left in the simulation area.
RIGHT	P!MOT rotates right in the simulation area.

SIMULATION START	Starts simulation.
SIMULATION STOP	Stops simulation.
READ PROGRAM	Read a program created in PROGRAM MODE.
CLOSE	Goes back to P!MOT Mode Select screen.
IMAGE DISPLAY	P!MOT image is displayed.
GUIDE DISPLAY	P!MOT sensor area is displayed.
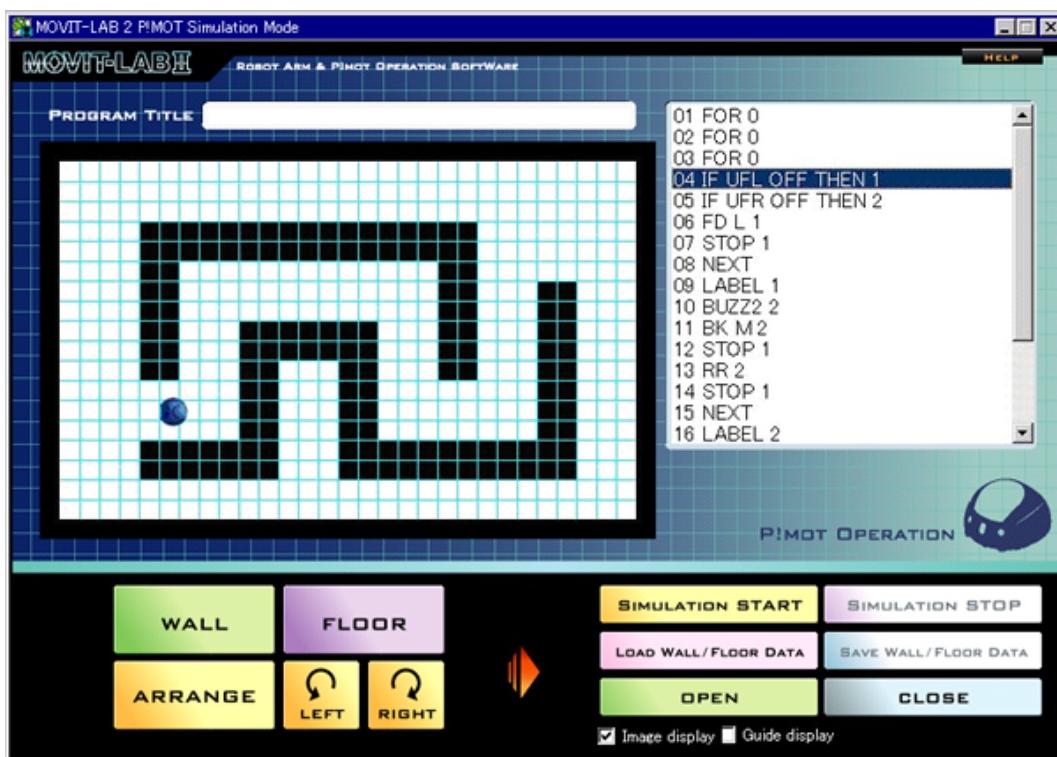
4. Troubleshooting

Select the current symptom from the below I, II, and III, and refer to the following pages for troubleshooting.

I. The software cannot be installed in PC
II. ROBOT ARM does not operate.
III. Data cannot be transmitted to P!MOT.

I. The software cannot be installed in PC.

Q.   The operation system of my PC is Windows XP. The installer is started up and the installation is executed, but the software is not properly installed.

A.   Make sure the operating system of your PC is "Windows XP Service Pack 2".

(How to check)
(1)   Click "Start" of Windows XP, move the cursor to "Control Panel" and click.
(2)   Double-click "System" in Control Panel.

(3) System property is displayed. Check the version of Windows XP of your PC.

The descriptions varies depending on Windows XP version of your PC.
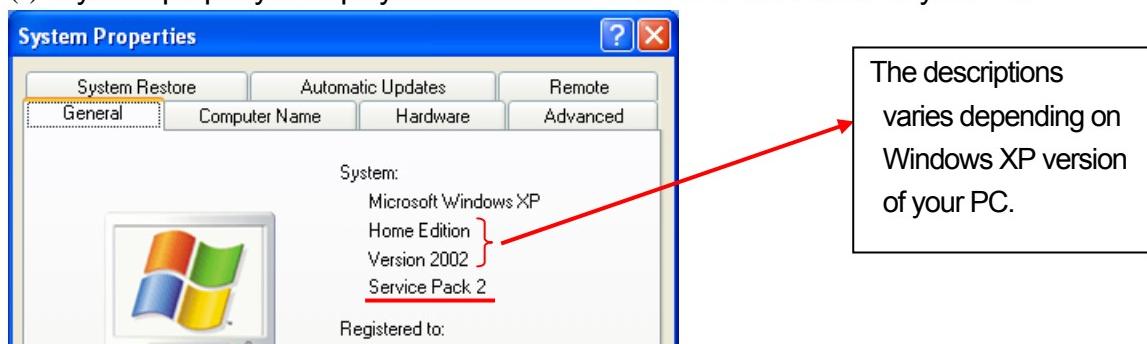
When the version of Windows XP Service Pack of your PC is not "2", then installation might not be executed properly. Please access to Microsoft URL and update the version.

- 54 -

II. ROBOT ARM does not operate.

Q. ROBOT ARM cannot operate by MOVIT-LAB 2.

A. Check the following points.

Are the USB cable and the cable for robot connected properly?
Make sure if the USB cable is connected to PC and Interface Board properly, or if the cable is not disconnected. When the USB cable is connected properly when PC power is ON, the LED1 (green) of Interface Board turns ON.
In addition, make sure the cable for robot is also connected to "R.A." of Interface Board and ROBOT ARM, or if the cable is not disconnected.

Is SW2 of Interface Board set to "->R.A."?
If not, ROBOT ARM does not operate. Set SW2 to "->R.A", and then the LED2 (red) turns ON.

Are not the batteries of ROBOT ARM exhausted?
If so, remove the old batteries and set new ones.

Are you sure you did not connect Interface Board after either Key Direct Mode or Program Mode screen appeared? If you did, PC might not recognize Interface Board correctly. Click "CLOSE" to go back to Mode Select screen, and select a mode you want to use.

III. Data cannot be transmitted to P!MOT.

Q. The program is not transmitted to P!MOT after "SEND" button in Program Mode is clicked.

A. Check the folowing points.

Are not the USB cable and the cable for robot unplugged?
Make sure if the USB cable is connected to PC and Interface Board properly, or if the cable is not disconnected. When the USB cable is connected properly when PC power is ON, the LED1 (green) of Interface Board turns ON. In addition, make sure the cable for robot is also connected to "P!MOT" of Interface Board and P!MOT, or if the cable is not disconnected.

Is P!MOT in Program Receive mode?
If not, P!MOT cannot receive the program transmitted from PC. After connecting the cable for robot to P!MOT, make sure to press the button "RESET" -> "RUN/MODE" -> "0" of P!MOT in order to have P!MOT in Program Receive mode.

When P!MOT mode changes to Program Receive mode, the red and green LEDs of P!MOT start blinking.

In addition, when "SEND" button is clicked, the following message appears. This pop-up is a proper message for confirmation and it is not an error. Click "OK" after making sure P!MOT is in Program Receive mode.

P!MOT

ⓘ Is P!MOT ready for data sending? Otherwise the data cannot be sent successfully.

[OK] [Cancel]
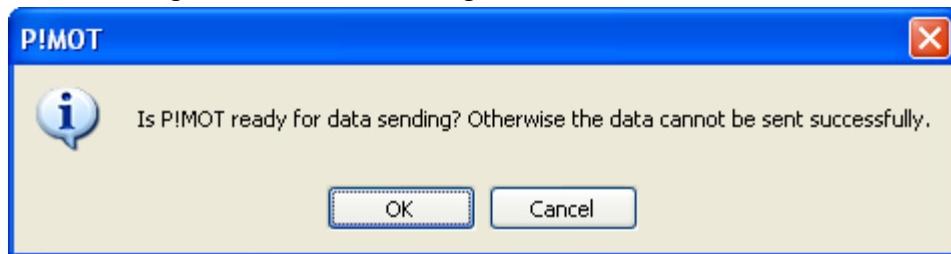
Are not the batteries of P!MOT exhausted?
If so, remove the old batteries and set new ones.

Are you sure you did not connect Interface Board after Program Mode screen appeared? If you did, PC might not recognize Interface Board correctly. Then, click "CLOSE" to go back to Mode Select screen, and select Program Mode.