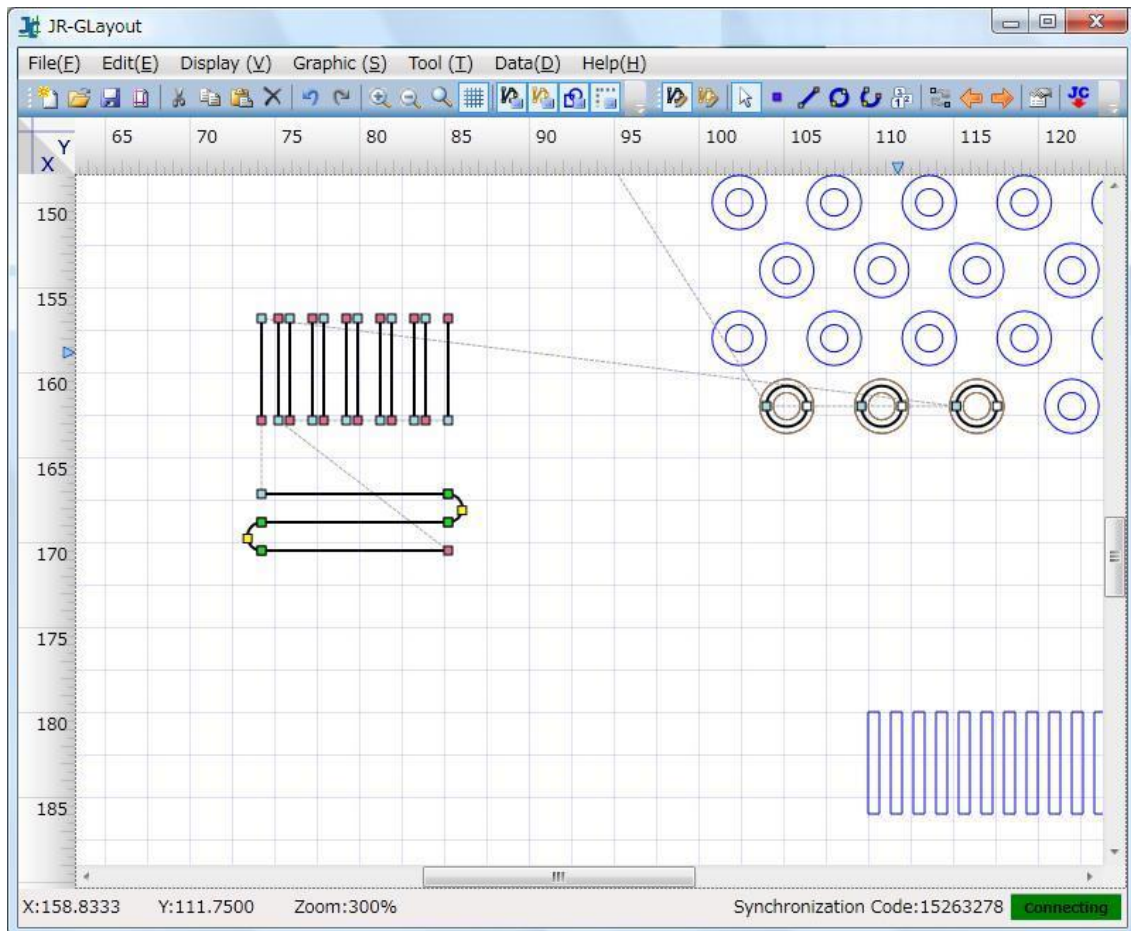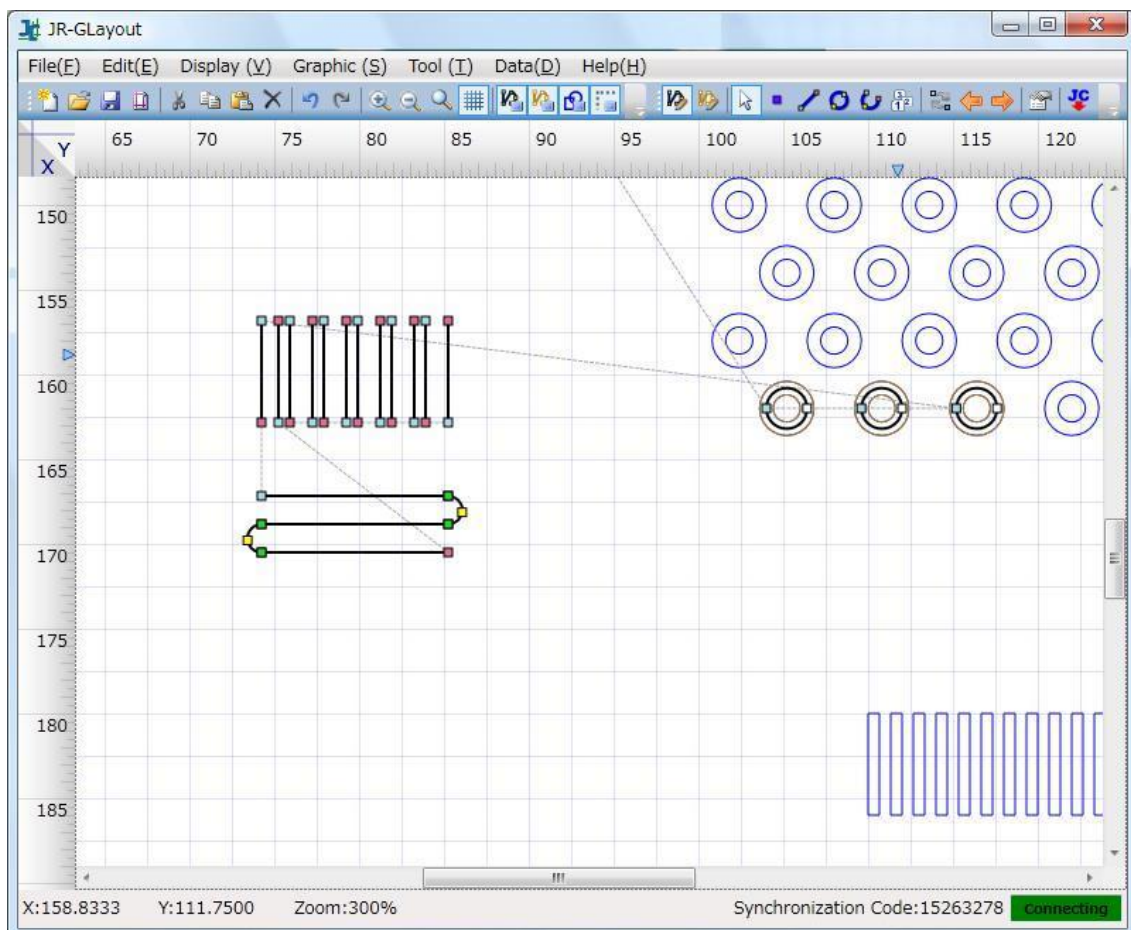# JR-GLayout

About JR-GLayout

JR-GLayout is a path generation application for desktop robots.　You can output created graphic data to jcs format files.

Use JR C-Points to transfer output jcs files to a robot, thus enabling the control of the robot along paths drawn by this application.

Importing DXF/Gerber files

Overview

Use JR-GLayout to convert AutoCAD format DXF files or plot data format Gerber files (RS-274D/RS-274-X) to jcs format files to be imported.

Not all of DXF/Gerber data can be imported. Conversion and importing are performed only when data are expressed in jcs format and use the coordinate values of DXF data as they are.

Only a single DXF or Gerber data can be imported at one time. If you are to execute importing a DXF or Gerber data with other graphic data already imported, previously imported data are discarded.

Support conditions

DXF data and Gerber data support the following group codes:

[DXF data]

    The following group codes are supported:

    POINT : points

    LINE : lines

    POLYLINE : combination of lines and arcs

    LWPOLYLINE : combination of lines and arcs

    CIRCLE : circles

    ARC : single arcs

    TRACE : bold lines (no filling)

    SOLID : filling (no filling)

[Gerber data]

    Lines, arcs, or circles

Operation procedure

    ＊Select Menu > File (_F) > Import (_I) > Import DXF File (_D) / Import Garber Data File (_G).

    ＊The Input Settings dialog box appears. Select a file to be imported and input import settings,

then click OK.

The Offset Settings dialog box is displayed.   Set offset values for importing data and click OK. Then, importing data is executed.   A value at which a graphic contacts the edge of a work area shall be considered to be the initial value of offset.

\# If you cannot find the number of digits within a Gerber file when importing it, analyze data with the three decimal places of LZ0 operation.
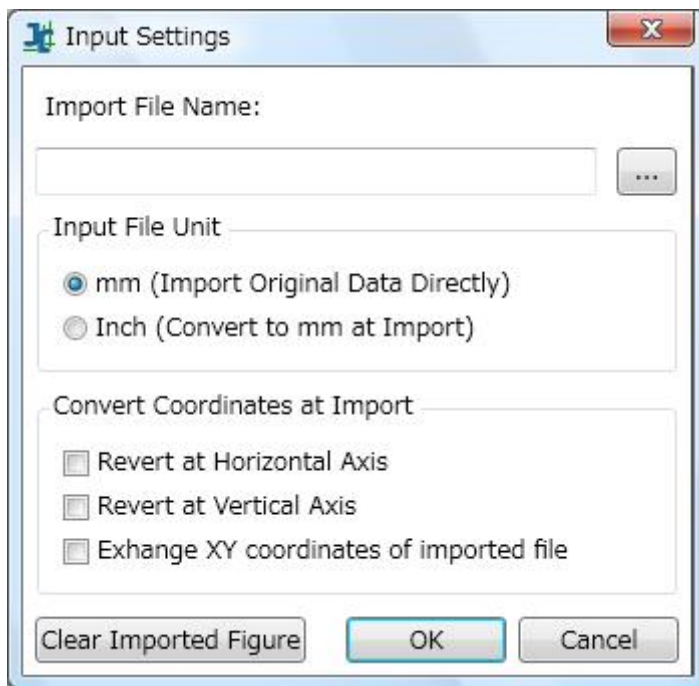
Setting items:

|		
Import File Name:	:	Set a file imported from the Import File Name dialog box.
Input File Unit	:	Select whether a file is imported in mm or inch.
		(This software uses mm.)
Revert at Horizontal Axis	:	Set whether to invert data imported along the horizontal axis.
Revert at Vertical Axis	:	Set whether to invert data imported along the vertical axis.
Exchange XY coordinates of imported file	:	Set whether to exchange the X-axis and Y-axis when importing data.
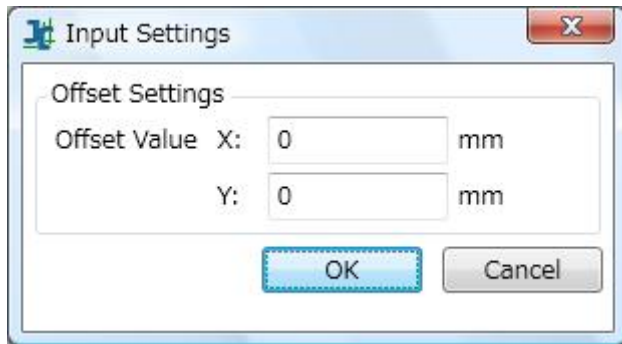
Offset Value   :

 X   : Set offset to the X coordinate.

 Y   : Set offset to the Y coordinate.

Importing jcs files

JR-GLayout allows you to import existing jcs files.　You can import any jcs files either converted by JR-G Layout or any other tools.　However, Z and R coordinates are not subject to importing.

Set the type of a graphic to be drawn from the Select Figure Type dialog box: trajectory line or auxiliary line.
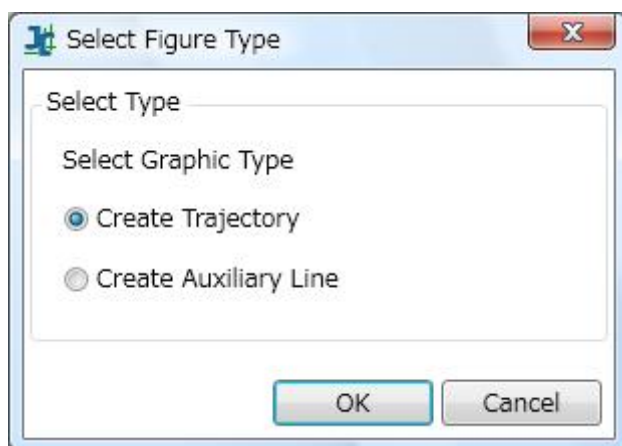
About UI

Read this chapter to learn about the main UI of JR-GLayout.
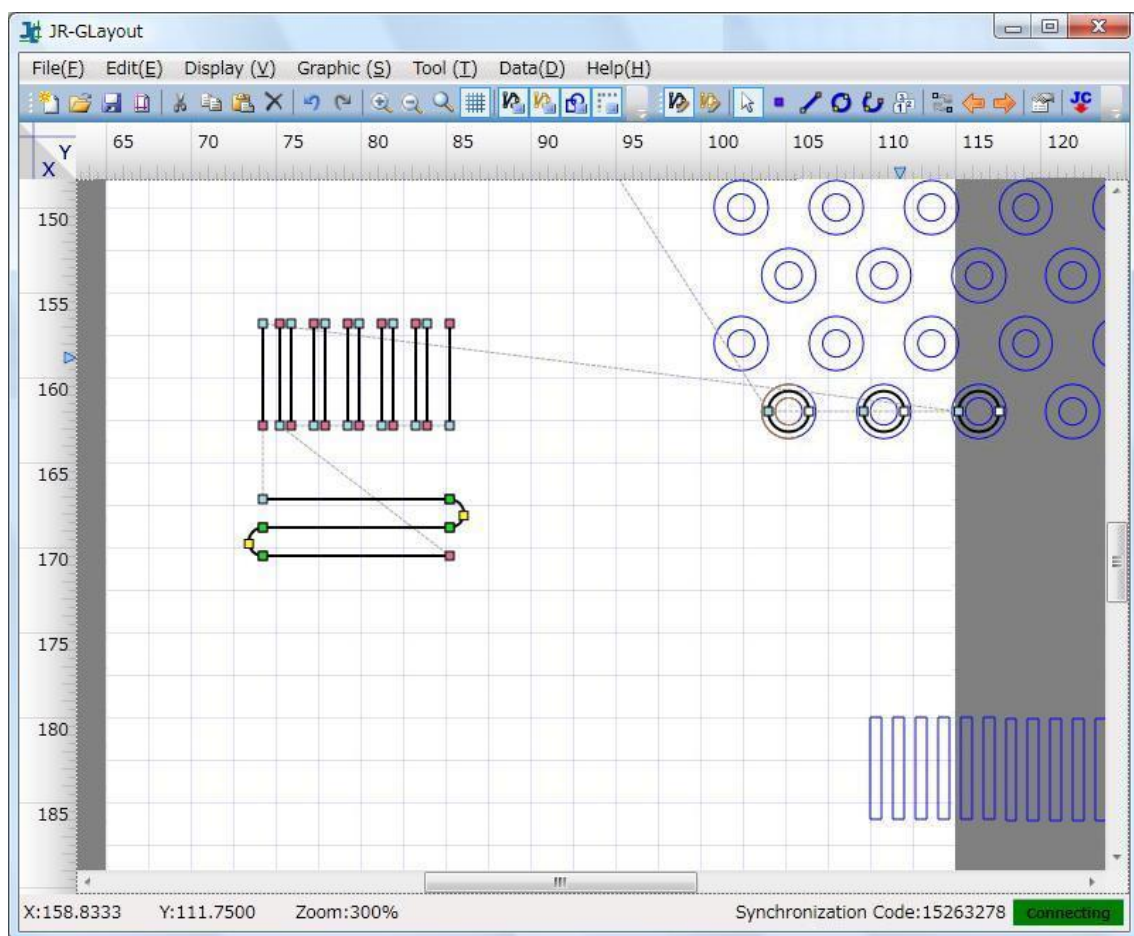
The UI generally consists of the following four parts:

＊ Menu bar

＊ Toolbar

＊ Edit View

＊ Status bar

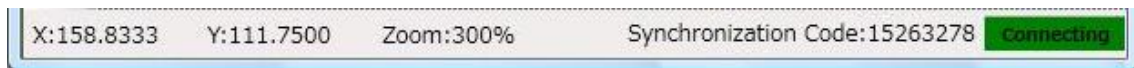Menu bar

For details, see "Menu bar."

Toolbar

For details, see "Toolbar."

Edit View

For details, see "Edit view."

Status bar

Status bar indicates the cursor position (X,Y) and Display Magnification (%), Synchronization Code and Connection Status.

＊Synchronization Code: A value to identify a destination that you are connecting where multiple JR C-Points are active.

＊Connection Status: A status of connection with JR C-Points.　When connection is established, the green lamp is lit and when disconnected, the red lamp is lit.

Import function

JR-GLayout allows you to import data in any of the following formats to be used for editing.

jcs format : Driving-point definition data for a robot are imported as trajectories or auxiliary lines.

DXF : Graphics are imported in AutoCAD format to be used as imported figures.

Gerber format : Graphics are imported in plot data format to be used as imported figures to support RS-274D/RS-274-X.

Exporting data

JR-GLayout allows you to export data edited by this application in jcs format.   Of edited data, only trajectories (solid black lines) are output.   (Auxiliary lines and lines of imported figures are not output.)

Toolbar

Read this chapter to learn about various functions available from Toolbar.

Toolbar (1)

(From the left)

Create New Project (Ctrl+N)	:	Create a new project.
Open Existing Project (Ctrl+O)	:	Open an existing project.
Save (Ctrl+S)	:	Save a project you are editing to overwrite an existing file.
Page Setting	:	Start up the Page Settings dialog box.
Cut (Ctrl+X)	:	Cut a selected graphic.
Copy (Ctrl+C)	:	Copy a selected graphic.
Paste (Ctrl+V)	:	Paste a cut and a copied graphic.
Delete (Del)	:	Delete a selected graphic.
Undo (Ctrl+Z)	:	Undo the operation. You can undo only the following operations: Create, Move, Delete, and Path Order Setting. Operation history is cleared by executing import.
Redo (Ctrl+Y)	:	Redo the operation. You can redo only the following operations: Create, Move, Delete, and Path Order Setting. Operation history is cleared by executing import.
Zoom In	:	Enlarge an edit view.
Zoom Out	:	Reduce/enlarge an edit view.
Zoom	:	Start up the Display Magnification Setting dialog box to set a scale(%).
Display Grid　(Ctrl+G)	:	Choose to disable or enable the showing of a grid line.
Display Trajectory (Ctrl+1)	:	Choose to disable or enable the showing of a trajectory.
Display Auxiliary Line (Ctrl+2)	:	Choose to disable or enable the showing of an extension line.
Display Import Figure	:	Choose to disable or enable the showing of an imported graphic.

(Ctrl+3)

Show Offline　　　　　　　:　Choose to disable or enable the showing of an offline.

Toolbar (2)

(From the left)

| Edit Trajectory (F3)	:	Set ON/OFF of a trajectory edit mode.
		When trajectory edit mode is set to ON, auxiliary line edit mode is set to OFF.
Edit Auxiliary Line (F4)	:	Set ON/OFF of an auxiliary line edit mode.
		When auxiliary line edit mode is set to ON, trajectory edit mode is set to OFF.
Select/Move (Ctrl+5)	:	Set edit mode to Select/Move mode.
Point (Ctrl+6)	:	Set edit mode to Draw a "point" mode.
Straight Line (Ctrl+7)	:	Set edit mode to Draw a "line" mode.
Circle (Ctrl+8)	:	Set edit mode to Draw a "circle" mode.
Arc (Ctrl+9)	:	Set edit mode to draw an "arc" mode.
Path Order Setting (Ctrl+0)	:	Set edit mode to "path order setting" mode.
Reverse Start/End Point (Ctrl+I)	:	Perform exchange between start and end points of a graphic you are choosing.
		This function is enabled only when you choose a graphic for which editing is enabled.
Previous Item (Shift+Tab)	:	Move from the current item to the previous one.
		This function is enabled only when editing trajectory is enabled.
Next Item (Tab)	:	Move from the current item to the next one.
		This function is enabled only when editing trajectory is enabled.
Graphic Properties	:	Start up the Graphic Properties dialog box.
Synchronize with JR-C-Points (Ctrl+Shift+J)	:	Obtain data from JR C-Points that you are connecting to import it as trajectory.

Page settings

Read this chapter to learn about page settings including setting a work area for editing graphics.
Settings are stored in a project file.
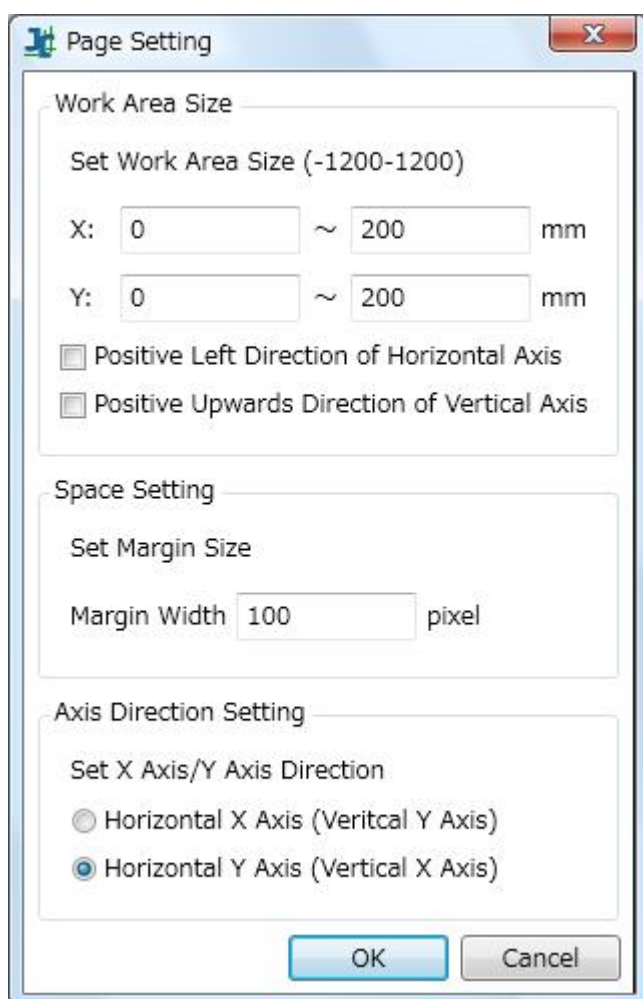
Work Area Size

X (min. – max.)	:	Input a value "X" to set the range of a work area.　A value in the right box must be greater than that in the left box.
Y (min. – max.)	:	Input a value "Y" to set the range of a work area.　A value in the

		right box must be greater than that in the left box.
Positive Left Direction of Horizontal Axis	:	Normally the right of a horizontal axis is set to a positive direction. Check the box to set the left to a positive direction.
Positive Upwards Direction of Vertical Axis	:	Normally, the downside of a vertical axis is set to a positive direction. Check the box to set the upward to a positive direction.

Space Setting

| Margin Width | : | Set a margin width outside the work area in units of pixel. |

Axis Direction Setting

| Horizontal X Axis (Vertical Y Axis) | : | Set a horizontal axis as X-axis and a vertical axis as Y-axis. |
| Horizontal Y Axis (Vertical X Axis) | : | Set a horizontal axis as Y-axis and a vertical axis as X-axis. |

In this application, Y-axis is set to a horizontal direction by default. Set the directions of axes when creating a new project. If the axis direction settings are changed during the project creation, conversion (exchange between X and Y coordinates) is performed in order to maintain the current display of UI.

Menu bar

Read this chapter to learn about JR-GLayout functions available from Menu.

File(F)   Edit(E)   Display (V)   Graphic (S)   Tool (T)   Data(D)   Help(H)

File menu

Create New Project (_N)	:	Create a new project.
Open Existing Project (_O)	:	Open an existing project.
Save As (_A)	:	Save a project you are editing as a new file.
Save (_S)	:	Save a project you are editing by overwriting an existing file.
Import jcs Fie (_J)	:	Import a jcs fie.
Import DXF File (_D)	:	Convert a DXF file to a jcs format file to import it.
Import Garber Data File (_G)	:	Convert a Gerber file to jcs format file to import it.
Export jcs File (J)	:	Export a jcs file
Background Image Setting (_B)	:	Import a jpg file as a background image.
Page Setting (_F)	:	Start up the Page settings dialog box.
End Application (_X)	:	Exit the JR-GLayout..

Edit menu

Cut (_T)	:	Cut a selected graphic.
Copy (C)	:	Copy a selected graphic.
Paste (_P)	:	Paste a cut and copied graphic.
Delete (Del)	:	Delete a selected graphic.
Undo (_U)	:	Undo the operation. You can undo only the following operations: Create, Move, Delete, and Path Order Setting. Operation history is cleared by executing import.

Redo (_R)	:	Redo the operation. You can redo only the following operations: Create, Move, Delete, and Path Order Setting. Operation history is cleared by executing import.
Select All (_A)	:	Choose all the graphics.

Display menu

Zoom In (_W)	:	Enlarge an edit view display.
Zoom In (_S)	:	Reduce or enlarge an edit view.
Zoom (_Z) (50% to 400%)	:	Rescale an edit view to a selected scaling factor (50% to 400%).
Display Entire Window (_F)	:	Rescale an edit view so that it is displayed on the entire work area.
Arbitrary Zoom (_Z)	:	Start the Designate scaling dialog box to set a new scaling.
Display Grid (_G)	:	Choose to disable or enable the showing of a grid line.
Display Trajectory (_A)	:	Choose to disable or enable the showing of a trajectory line.
Display Auxiliary Line (_B)	:	Choose to disable or enable the showing of an extension line.
Display Import Graphic (_C)	:	Choose to disable or enable the showing of an imported graphic.
Show Offline (_O)	:	Choose to disable or enable the showing of an offline.
Language	:	Set the language in which the application is displayed.

Graphic menu

Edit Trajectory (_M)	:	Set ON/OFF of Trajectory edit mode. When Trajectory edit mode is set to ON, Auxiliary line edit mode is set to OFF.
Edit Auxiliary Line (S)	:	Set ON/OFF of Auxiliary line edit mode. When Auxiliary line edit mode is set to ON, Trajectory edit mode is set to OFF.
Select/Move (_S)	:	Set edit mode to Select/Move mode.
Point (_P)	:	Set edit mode to Draw point mode.
Straight Line (_L)	:	Set edit mode to Draw line mode.

Circle (_E)	:	Set edit mode to Draw circle mode.
Arc (_A)	:	Set edit mode to Draw arc mode.
Path Order Setting (_O)	:	Set edit mode to Path order setting mode.
Start Point/End Point Reverse	:	Perform exchange between start and end points of a graphic you are choosing.
		This function is enabled only when you choose a graphic for which editing is enabled.
Previous Item (_B)	:	Move from the current item to the previous one.
		This function is enabled only when trajectory editing is enabled.
Next Item (_N)	:	Move from the current item to the next one.
		This function is enabled only when trajectory editing is enabled.
Graphic Properties (_I)	:	Start up the Graphic properties dialog box.

Tool menu

Create Graphic (_C)	:	Start up the Create graphic dialog box to create a graphic by entering numeric values.
Edit Graphic (_E)	:	Start up the Edit graphic dialog box to edit data of a selected graphic.
Move Graphic (_M)	:	Start up the Move graphic dialog box to relocate the relative position of a graphic.
Coordinate Conversion (_D)	:	Start up the Coordinate conversion dialog box to transform the coordinate of any line type.
Create circle by designated radius (_N)	:	Start up the Create circle by setting a radius dialog box to create a circle around a point graphic of selected graphics.
Create circle by intermediate radius (_O)	:	Choose two circles to create another circle around the midpoint of those two circles by averaging the radiuses of those two circles.
Create circle/arc center point (_P)	:	Position a point graphic at the center of a circle or arc of selected graphics.
Create line in rectangle center (_Q)	:	Position a straight line between the two longest straight lines of selected graphics.

Data menu

Sychronize with JR C-Points (Ctrl+Shift+J)	:	Obtain data from JR C-Points you are connecting and import it as trajectory.

Help menu

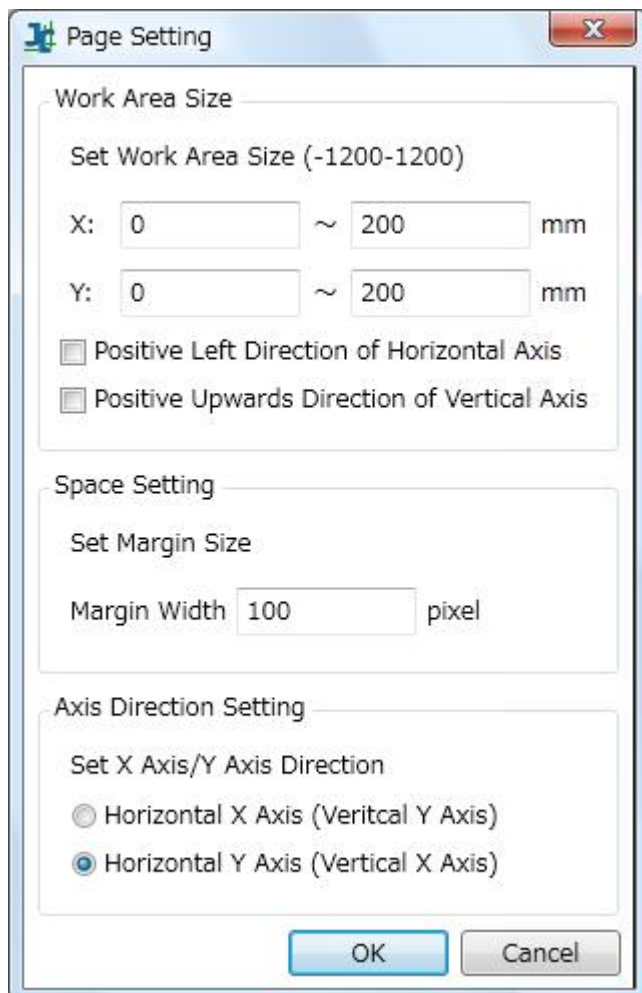|		
Help (_H)	:	Start up Help.
About JR-GLayout (_I)	:	Start up the version information dialog box.

Basic operations

Read this chapter to learn how to operate JR-GLayout.

Setting a work area

After starting up the application, you need to set a work area first.

Start up the Page Settings dialog box from Menu > File (_F) > Page Setting (_F).

Perform setting for a work area.

Work area size:

Input minimum and maximum values to boxes for the X and Y coordinates to determine the range of a work area.　The value in the left box must be smaller than the value in the right box.

In the following example, a 300mm long 300mm wide work area is set around the original point.
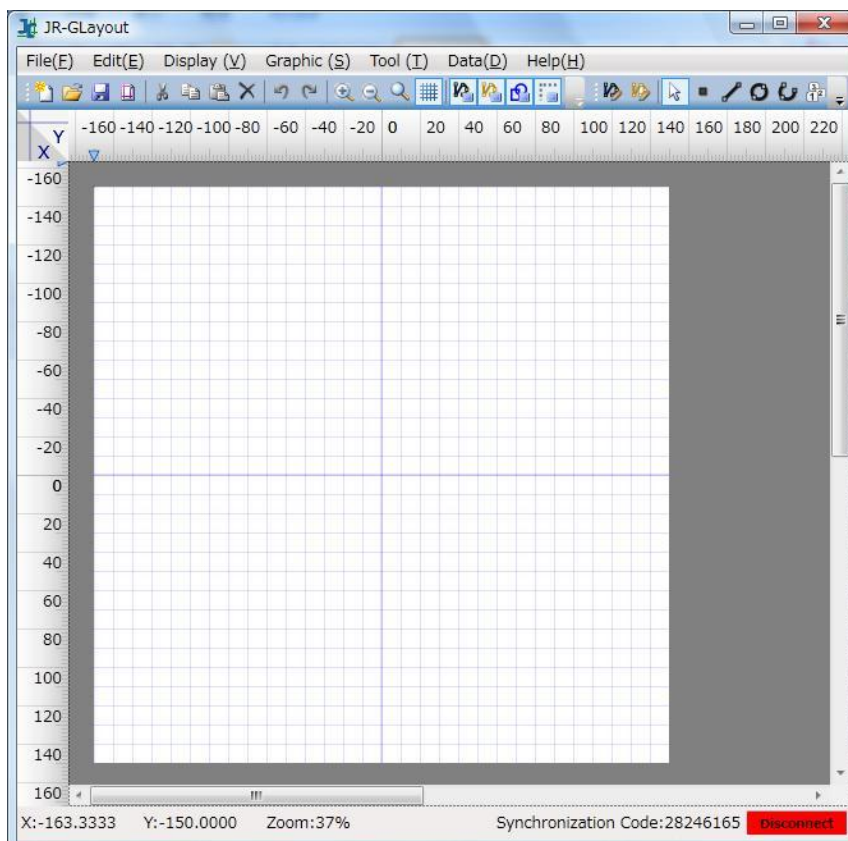
Gray areas are set by pixel value as margins outside the work area.

Normally, the right and down directions of horizontal and vertical axes are set to positive directions.　You can change the positive direction of each axis by checking the boxes, "Set Left

to Positive" and "Set Upward to Positive."

Set X-axis or Y-axis to a horizontal direction.

You can change settings of individual items after starting the operation with the Page Setting function. (However, take care of changing between axes. For details, see below.)

[Important]
For JR-GLayout, Y-axis is set to a horizontal direction by default. Although it is possible to exchange the direction between X-axis and Y-axis, you need to perform setting for axes when creating a project. When the directions of axes are changed, conversion (exchange between X-axis and Y-axis) is performed in order to maintain the display on the UI.

Selecting edit mode

Select Edit Trajectory mode from Menu or Toolbar.

(Details of Edit Trajectory mode are described later.)

Positioning and moving graphics

JR-GLayout allows the following four types of graphics to be positioned: Point, straight line, circle, and arc.

You can connect straight lines and arcs to other graphics. Points and circles are located alone.

Choose a graphic to be located from the Menu or Toolbar. In order to move a graphic you have already positioned or change the size of it, click on the Select/Move button on the Menu or Toolbar to set Select/Move mode.

(From the left, Edit, Point, Line, Circle, Arc, and Path Order Setting buttons.)

To begin with, position all types of graphics.

Positioning a point

Click on the Point button to start point mode.

Click on any point in the coordinate where you want to position a point.
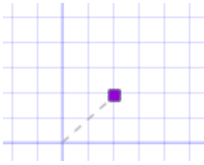
Positioning a line

Next, click on the Line button to start line mode.

Click on any two points in the coordinate in the order of a start point and end point to position a line.
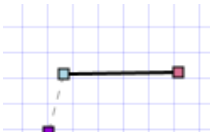

Positioning a circle

Click on the Circle button to start circle mode.   Click on any two points to provide a start point and an auxiliary point, which will make the ends of a diameter of a circle.   A circle is positioned by connecting the start point to the auxiliary point.
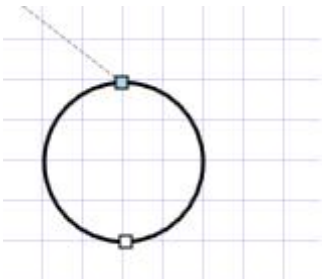
Positioning an arc

Click on the Arc button to start arc mode.   Click on any three points to provide a start point, an end point, and an auxiliary point.   An arc is positioned by connecting those points in order of the start point, auxiliary point and end point.
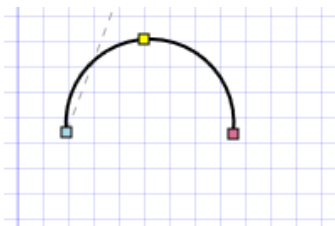
Color of a point

Different colors indicate various points of robot trajectories such as start and end points. (Codes in jcs format are written in the parentheses below.)

Purple : A single point (PTP driving point : PTP)

Pale blue : A start point (CP start point : CP_S)

Pale red : An end point (CP end point : CP_E)

Green : A series of passing points (CP continuous passing points : CP_P)

Yellow : An arc auxiliary point (CP arc auxiliary point : ARC)

White : A circle auxiliary point (no corresponding code in jcs format.)

If a circle is converted or output in jcs format, points are converted as follows:

CP_CS (a start point of the circumference of a circle: displayed as the start point of a graphic)

CP_SS (the center of a circle : not displayed on a graphic)

Snap function and concatenation

The snap function allows you to draw continuous trajectories for a robot easily.　Move a point to be positioned to another point that has already been positioned by dragging the mouse.　And, the former point is automatically snapped to the latter point.　Then, finalize concatenation so that the snapped point is located with the same coordinates as those of the point that has already been located.

The snap function is enabled for every existing point.　However, concatenation is basically enabled only when **a point that has already been positioned is an end point and a point to be positioned is a start point.**
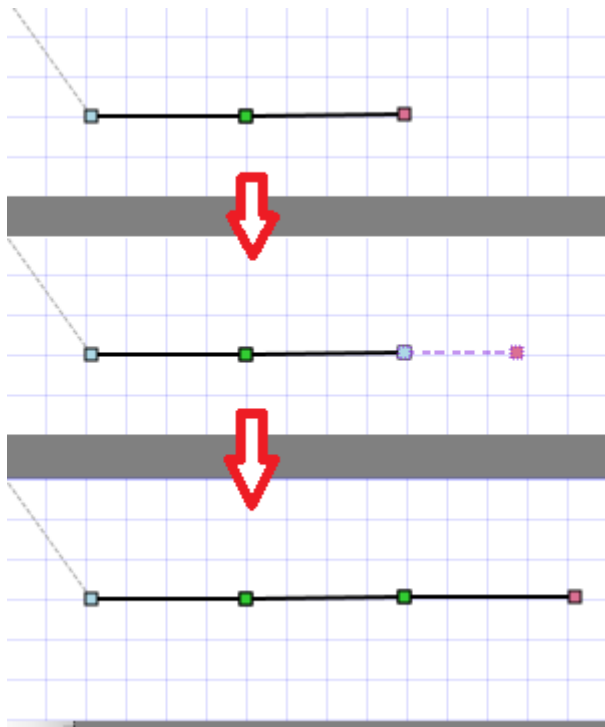
If you are to concatenate a new point to a start point that has already been positioned, perform the following steps assuming that an item to be newly positioned is (a) and an item that you have already positioned is (b):

1. Snap the end point of item (a) to the start point of item (b) (concatenation is not yet established).

2. Select item (b), move the start point once to any place where snapping is not performed, and then snap it to the end point of the item (a).　This completes concatenation of two items (a) and (b).
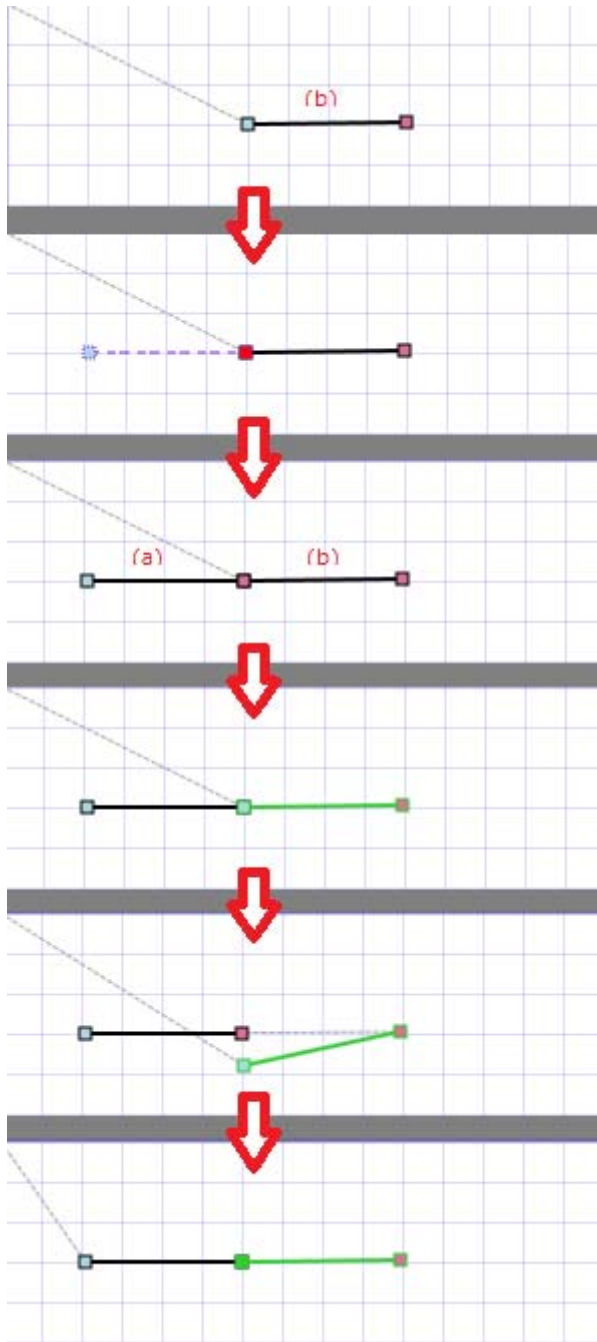
To cancel concatenation of two items, perform the following steps assuming that an item positioned in an earlier trajectory sequence is called (a) and that in a later sequence is called (b).

1. Click on a point at which you want to cancel concatenation while selecting item (a), move that point to any place where snapping is not performed.

2. Snap the above moved point again to the point where items (a) and (b) has been concatenated.
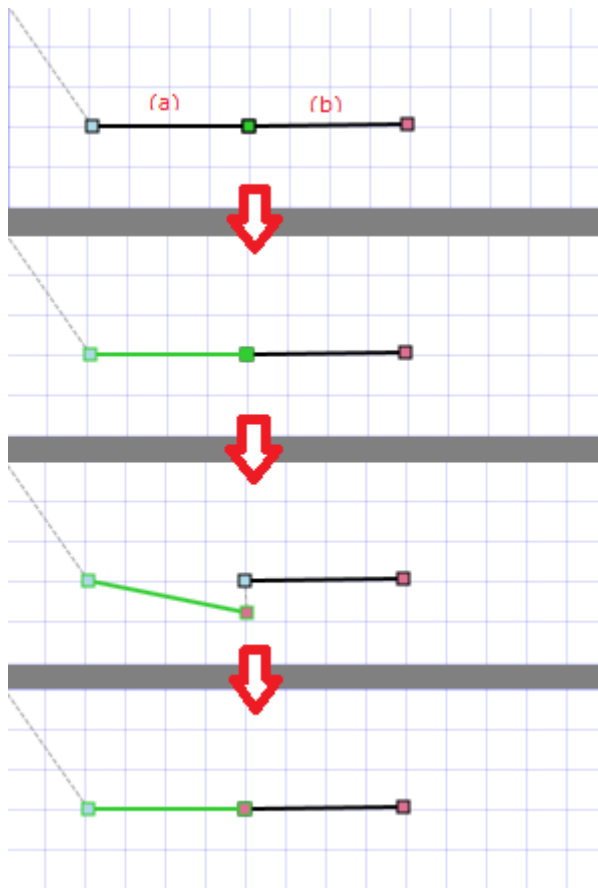
If you do not want to snap a point to another point, drag the mouse with Ctrl and Shift pressed simultaneously.

Positioning a circle to make it connect to other graphics

As mentioned above, a circle cannot be connected to other graphics.　Use arcs to draw a circle as if it were connected to another graphic.　Position two arcs each of which center angle is 180 degree as if to draw one regular circle.

Position an arc point (the third point) while pressing the Ctrl button.　Move the mouse while pressing the Ctrl button and the center angle will be fixed to 180 degrees.
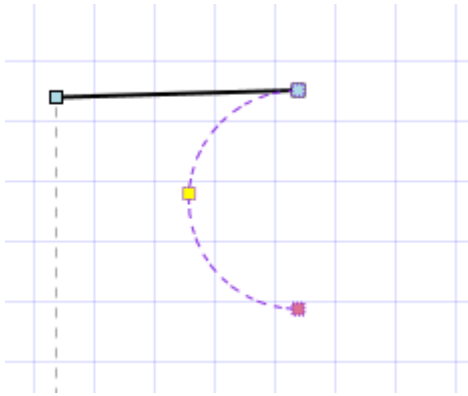
Move

You can move any graphic that you have already positioned.　Put the cursor on a target item and move it with 'Drag & Drop'. Click on a line to move the entire item or click on a point to drag it to move that point alone.　When a target point is moved, other points concatenated to that point stay on the same positions.
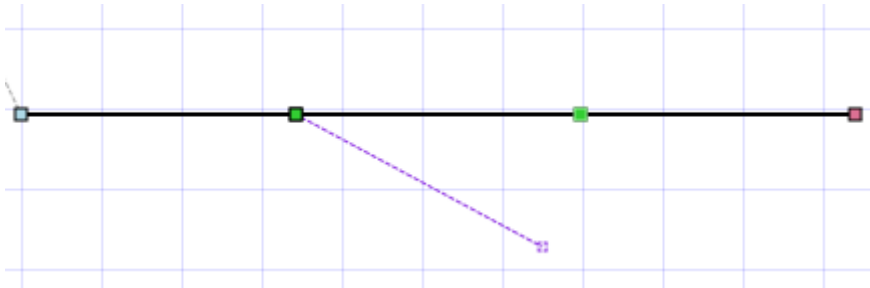
Selecting and moving multiple items

Click on the Edit button to start Edit mode and select items by clicking on them or dragging the mouse to select the range of items.

In addition, you can select a group of items concatenated to a target item in bulk by double-clicking on it.

(Selection is valid if all the points that compose graphics are included within the range. For circles and arcs, the entire graphic needs not be included.)

You can move all items together by Dragging & Dropping a line or pressing the arrow key of the keyboard with multiple items selected.

For selecting the range, an item to which Edit mode is not ON can also be selected.　(When Edit Trajectory mode is ON, selecting auxiliary lines or imported graphics is also enabled.)

If you are to select only trajectories (only items to which Edit mode is ON), perform selecting the range with the Shift key pressed.
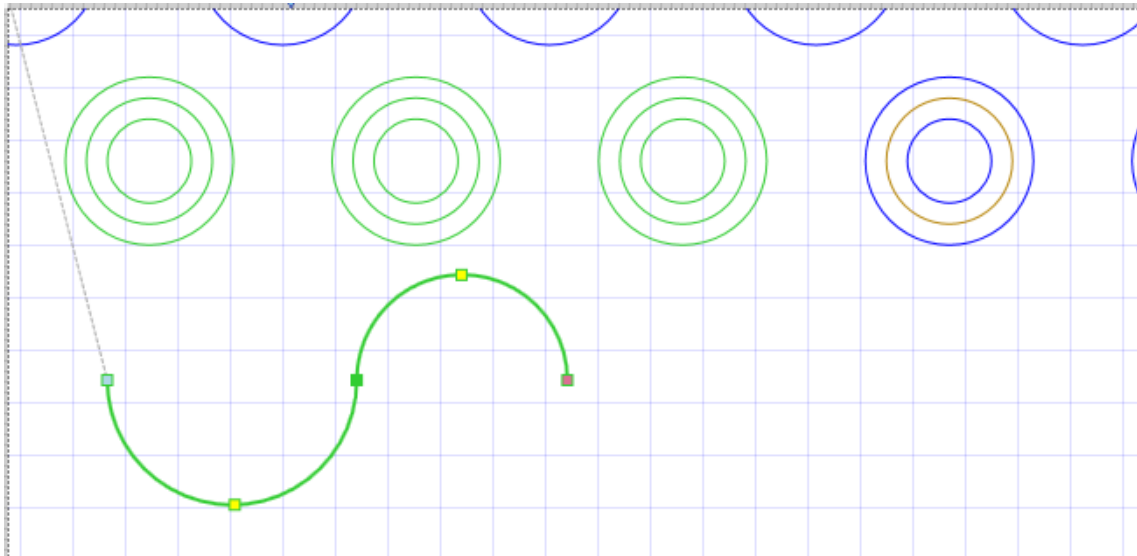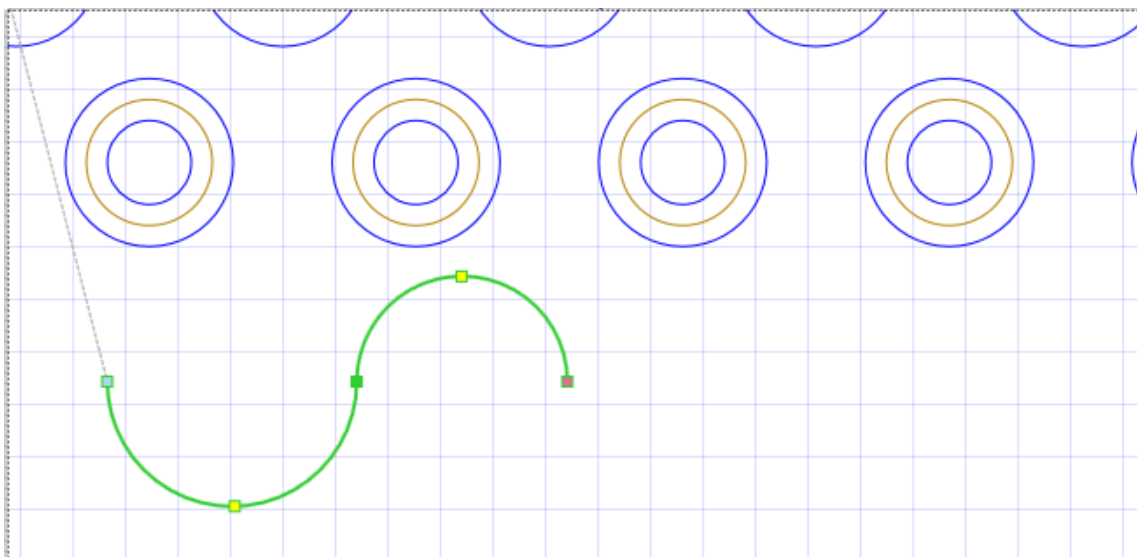
Before selecting
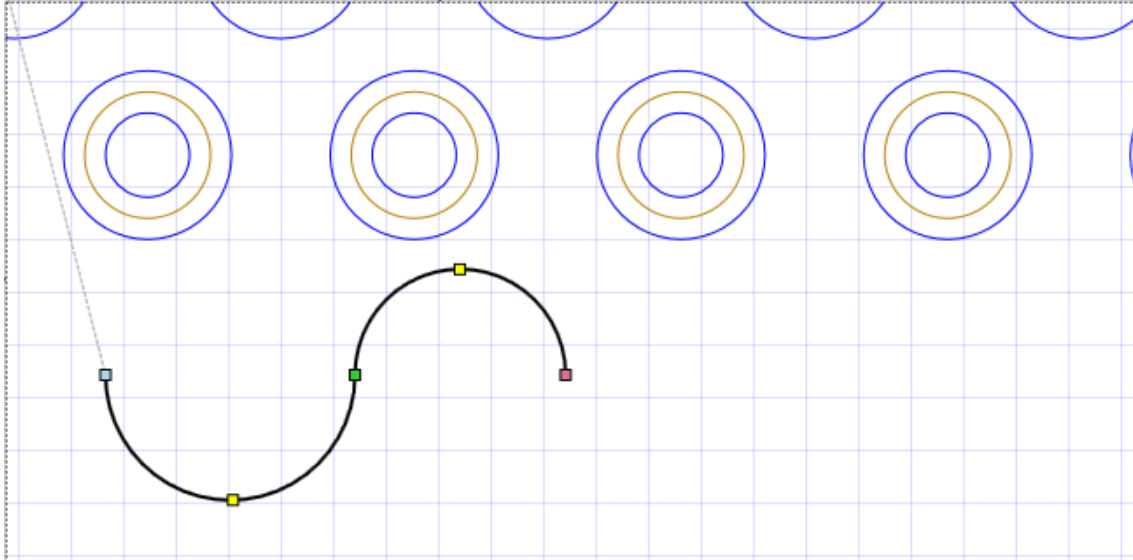
Selecting the range
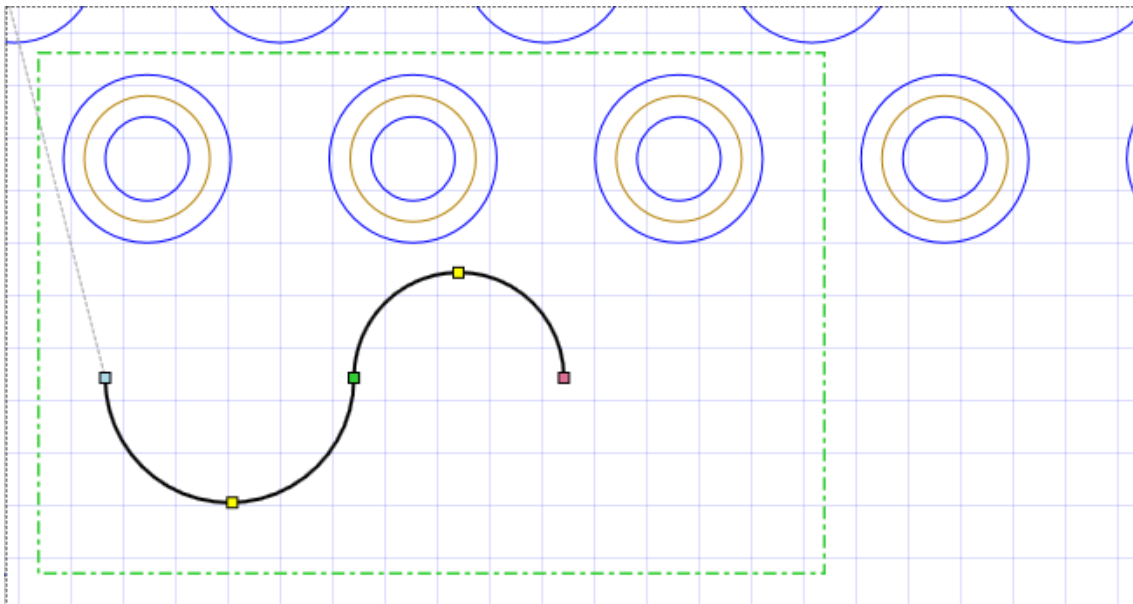
Selecting only by dragging the mouse enables all the items included in the selected range to be selected.

Selecting items while pressing the Shift key enables only items to which edit mode is ON to be selected.
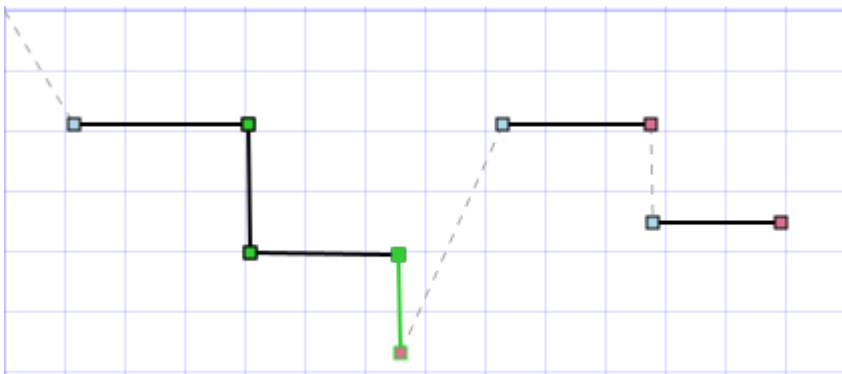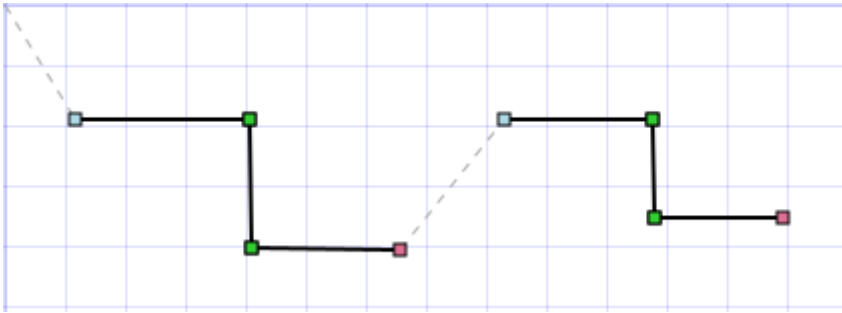
Changing the sequence of graphics by inserting an item

JR-GLayout allows graphics to be positioned beginning from the origin point with a continuous line.

A newly created graphic is basically positioned last.

The sequence is changed when a new item is created or an existing item is moved and concatenated to another item with the snap function.

Exchanging between start and end points

You can exchange the start and end points of an item by pressing the Reverse Start/End Point button of the Toolbar with an item selected.　For points and circles, exchange does not occur because start and end points are not distinguished for these items.

You can exchange all the start and end points for concatenated items while keeping the concatenation by executing Reverse Start/End Point with all the concatenated items selected.
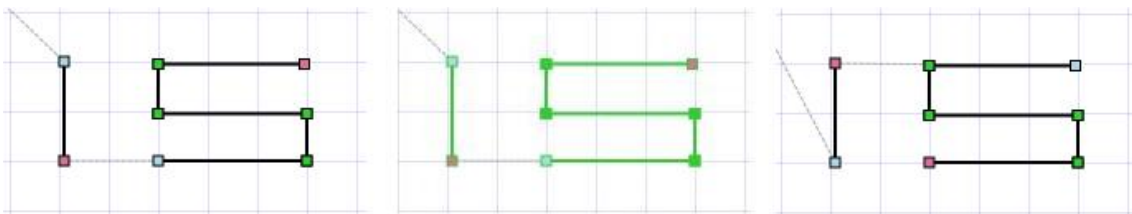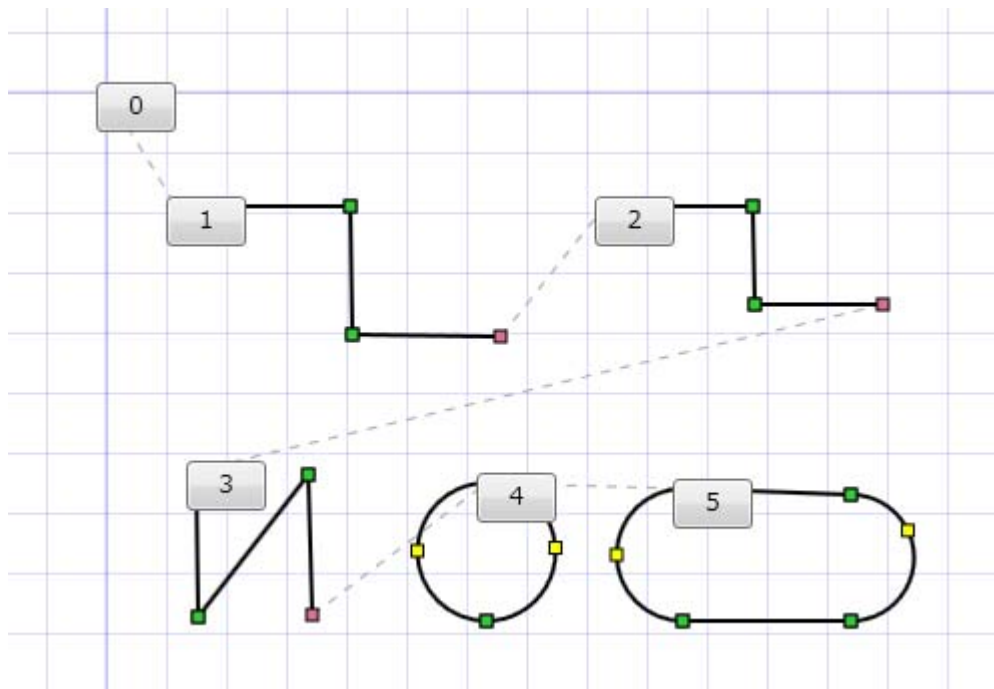

Path Order Setting function

A Path Order Setting function is provided to change the sequence of paths.　Each path is a group of items.

Press the Path Order Settings (Ctrl+0) of the Toolbar to start the Path Order Setting function.

Path Order buttons are displayed on the screen at the start points of individual paths to indicate

the current sequence.

You can change the sequence of paths in the order of pressing buttons.　However, a path of the first pressed button and any paths before that path cannot be changed.

For instance, if you are to change the sequence from the top, click on "0" first and any numbers to be changed.　Once you finalize the change, further selection is disabled for that button.

If you are to perform exchange between "3" and "4", click on "2", which is a number immediately before what you initially want to change.　This disables further selection for "0", "1", and "2". Then, click on buttons in the order of "4" and "3" on the current display.　This function is useful for changing the sequence of paths partially, especially when a large number of paths are provided.

After completing the change of the sequence, turn the current mode to Edit mode or any other mode to exit the. Path Order Setting function,

Edit Trajectory mode and Auxiliary Line Edit mode
JR-GLayout allows you to edit trajectory and extension lines.　Edited trajectory lines are finally output to jcs format files and used to draw the path of a robot.　Extension or Auxiliary lines serve

as complement for drawing trajectory lines.　Auxiliary lines are not output to a jcs file.

You can switch between Edit Trajectory Line mode and Edit Auxiliary Line mode from the Toolbar or Menu.

(Edit Trajectory Line button is on the left and Edit Auxiliary Line button is on the right.)

You can choose to enable or disable the showing of a trajectory line and auxiliary line.　You can also choose to enable or disable the showing of a move line (offline) and grid line.

(From the left, the following buttons are available.)
Display Grid (_G)
Display Trajectory (_A)
Display Auxiliary Line (_B)
Display Import Graphic (_C)
Show Offline (_O)

<u>Exporting a jcs file</u>
After completing editing, select File (_F) > Export (_E) > Export jcs File (J) from the Menu to output a file in jcs format.

# Creating new graphics using existing graphics

JR-GLayout allows you to create and position new graphics from existing graphics. Execute individual functions from the following menu items:

    ＊Tool (_T) > Create circle by designated radius (_N) (Ctrl+H)

    ＊Tool (_T) > Create circle by intermediate radius (_O) (Ctrl+J)

    ＊Tool (_T) > Create circle/arc center point (_P) (Ctrl+K)

   ＊Tool (_T) > Create line in rectangle center (_Q) (Ctrl+L)

Creating a circle by designating a radius

Create a circle with a designated size of radius around a selected center point (single point).　If multiple points are provided in selected graphics, multiple circles are created.　If selected graphics do not include any points, graphics are not created.
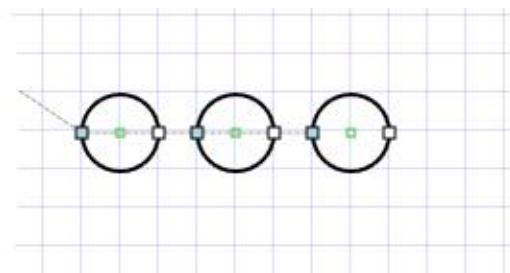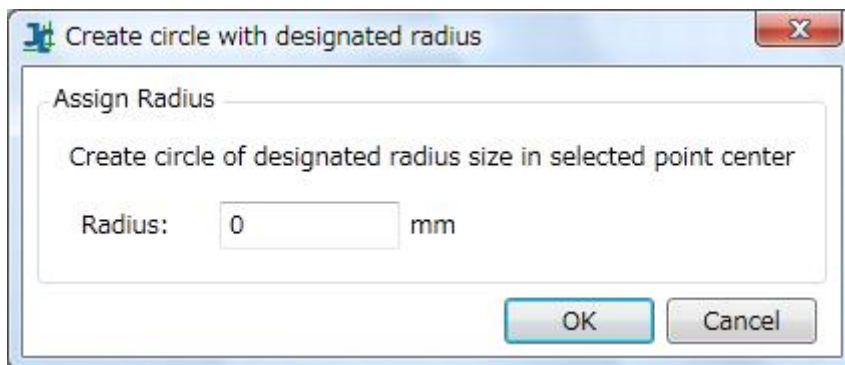
## Creating a circle by designating an intermediate radius

A new circle is created around the midpoint position from two existing circles of selected graphics by averaging the locations and radiuses of those two circles. Two circles with the lowest and the second lowest numbers of trajectories in the path order are selected from three or more circles. If selected graphics include only one circle, a new graphic is not created. This function is useful to draw a circle concentrically between two circles with different sizes.

\# Which circle is selected first basically cannot be identified from the appearance although it depends on the order of trajectories or positioning.
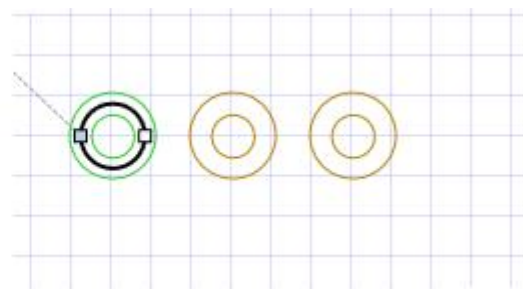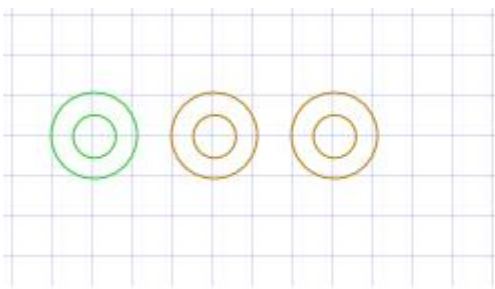
Creating the center point of a circle/arc

The center point of a selected circle or arc is created. If multiple circles or arcs are contained in selected graphics, multiple center points are created. If there is no circle or arc, a graphic is not created.
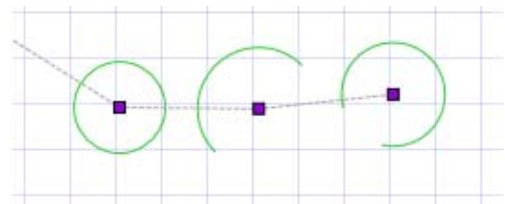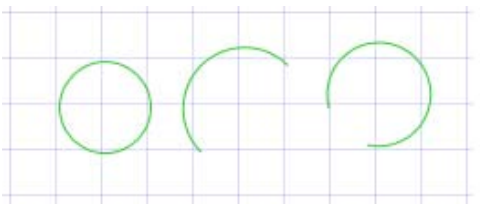

Drawing a line in the middle of a rectangle

JR-GLayout allows you to create a graphic that appears as a rectangle by combining straight lines instead of drawing a rectangle itself. You can position a straight line in the middle of such graphic that looks like a rectangle. A straight line is created between the two longest lines when multiple straight lines are included in the selected graphics. A graphic is not created if there is not more than one straight line. The function is useful for drawing a line in the middle of a rectangle.

\# When there are multiple lines with the same length, a line that is first found is selected. Which line is first found basically cannot be identified from the appearance although it depends on the

order of trajectories or positioning.
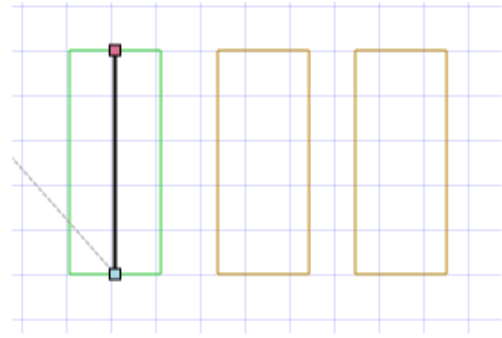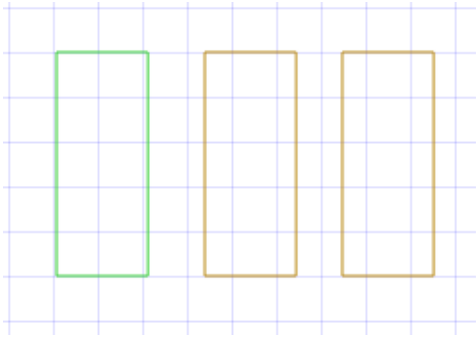
Converting coordinates

JR-GLayout provides a coordinate conversion function to convert the coordinates of graphics that have already been inserted.

<u>Operation procedure</u>

＊Select Menu > Tool (_T) > Coordinate Conversion (_D).

＊ The Coordinate Conversion dialog box is displayed. Check any of the boxes below Coordinate Conversion Target to select the type of a graphic to be converted and input setting values. Press OK to execute coordinate conversion. Press the Convert by setting coordinates... button to display the Coordinate assignment before and after conversion dialog box. Then, input setting values for the robot coordinate system and the corresponding edit view coordinates to calculate conversion data. (Details are described later.)
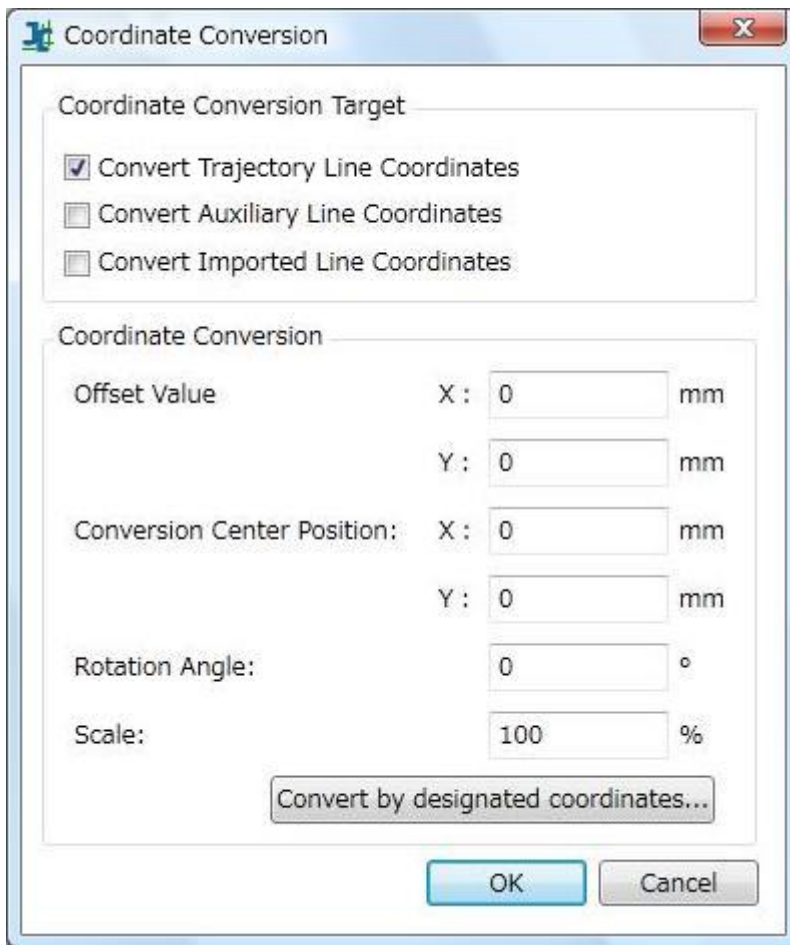
Setting items

Coordinate Conversion Target:

Convert Trajectory Line Coordinates	:	Set trajectory line as a conversion target.
Convert Auxiliary Line Coordinates	:	Set auxiliary line as a conversion target.
Convert Imported Line Coordinates	:	Set imported line as a conversion target.

Coordinate Conversion:

|		
Offset Value	:	Set offset to be added by conversion.
Conversion Center Position	:	Set a reference point for the center of rotation and scaling.
Rotation Angle	:	Set a rotation angle for conversion.
Scale	:	Set a scale (%) for conversion.

When trajectory or auxiliary line is selected as a conversion target, conversion is performed for the entire trajectory line or the entire auxiliary line; you cannot perform partial conversion for a trajectory or auxiliary line.

Conversion by designating coordinates

The coordinates of a graphic imported to the edit view from the outside may not match those of an actual graphic used on a robot.   The coordinates are matched by the conversion function that uses the coordinates that have been designated.
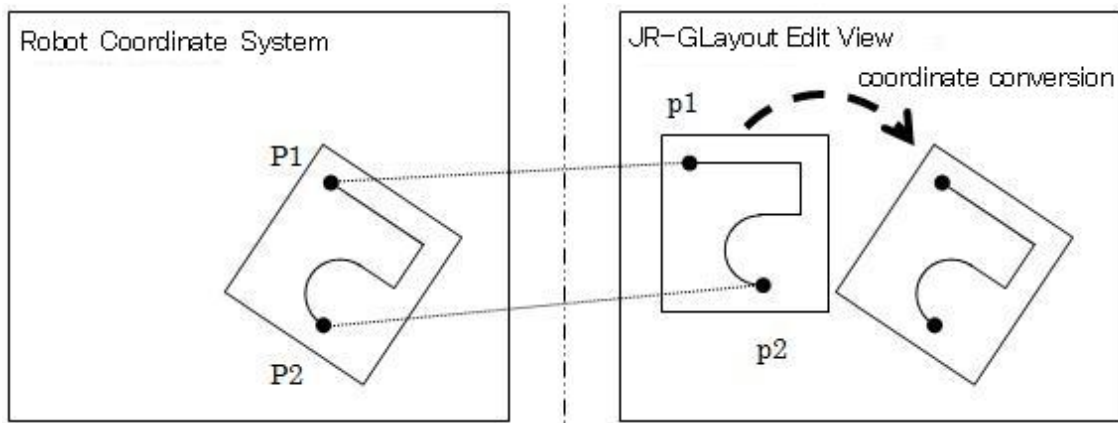
Set reference points P1 and P2 on a robot and p1 and p2 in the edit view corresponding to P1 and P2.   Then, calculation is performed automatically for making P1(X1, Y1) and P2(X2, Y2) match p1(x1, y1) and p2(x2, y2).

Setting items

Robot coordinate system	:	Set two reference points to designate the position of a graphic after coordinate conversion is performed.
Edit view coordinates	:	Set two reference points to designate the position of a graphic before coordinate conversion is performed.

While the Coordinate assignment before and after conversion dialog box is displayed, a red line and a blue line are displayed on the edit view. A red line connects two reference points on the robot coordinate system and a blue line connects two reference points on the edit view coordinate system.

With the Coordinate assignment before and after conversion dialog box displayed, you can set the coordinates of a graphic for which a radio button is checked by clicking on the corresponding point on the edit view.
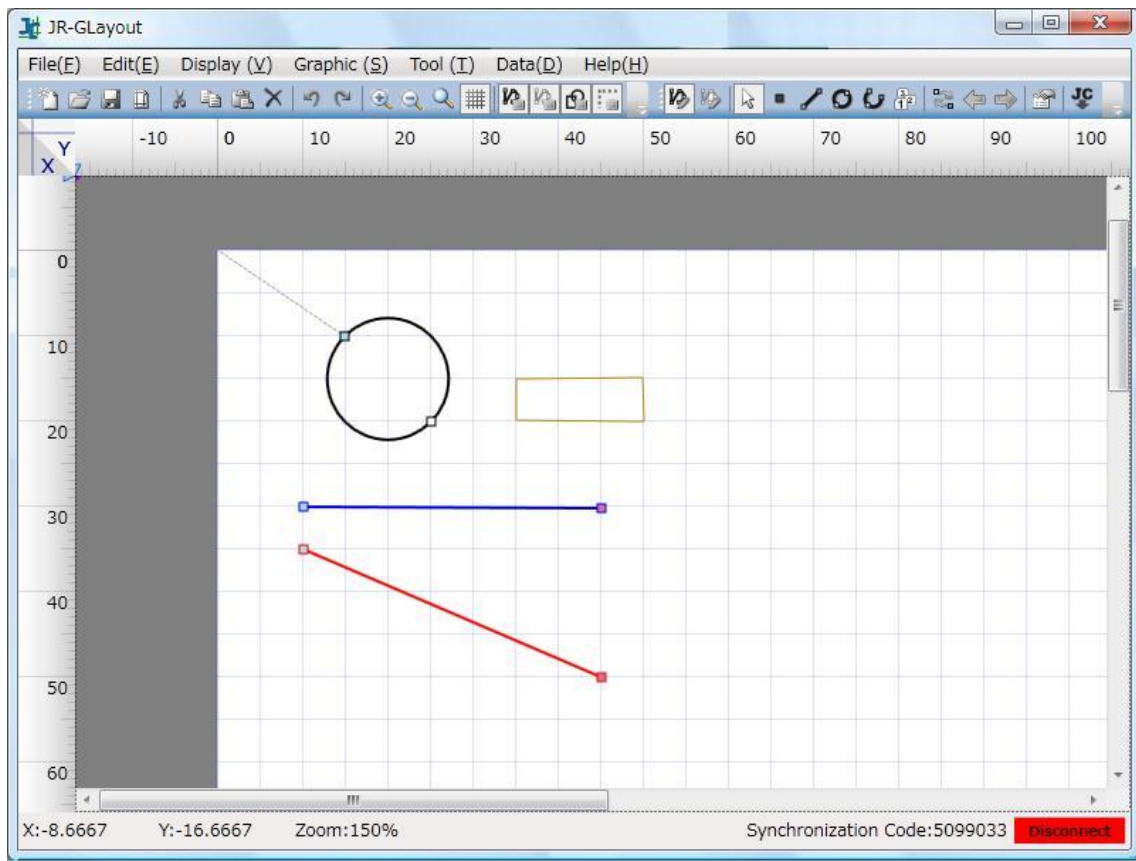
After setting the coordinates, press OK. And, Offset Value, Conversion Center Positions, Rotation Angle, and Scale are automatically set.

Coordinate Conversion

Coordinate Conversion Target

☑ Convert Trajectory Line Coordinates

☐ Convert Auxiliary Line Coordinates

☐ Convert Imported Line Coordinates

Coordinate Conversion

Offset Value	X :	5	mm
	Y :	0	mm
Conversion Center Position:	X :	30.1667	mm
	Y :	10.1667	mm
Rotation Angle:		22.9259	°
Scale:		108.8	%

Convert by designated coordinates...

OK   Cancel

Moving graphics

You can move graphics from the Graphic Displacement dialog box.

Select a graphic to move and select Menu >Tool (_T) > Move Graphic (_M). And, the Graphic Displacement dialog box starts up.
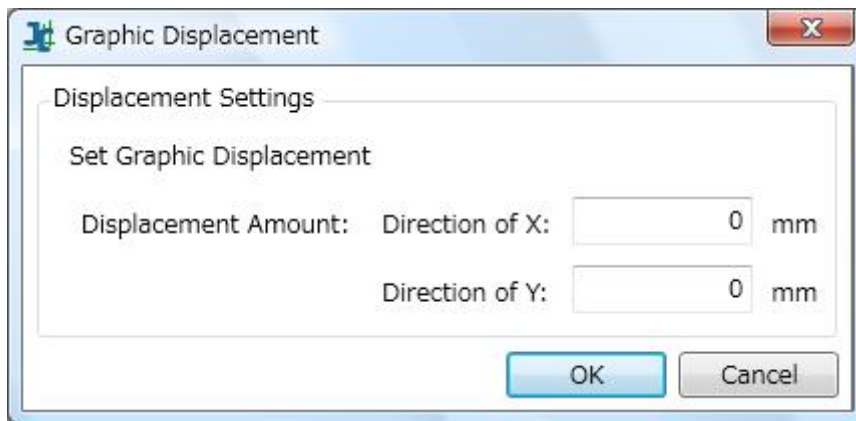
Set the amounts of displacement from the current position to press OK. And a graphic is moved from the current position by designated displacement amounts.

Creating and editing graphics

You can create or edit graphics from the Graphic Assignment dialog box.

The Graphic Assignment dialog box is displayed by selecting Create Graphic (_C) or Edit Graphic (_E).
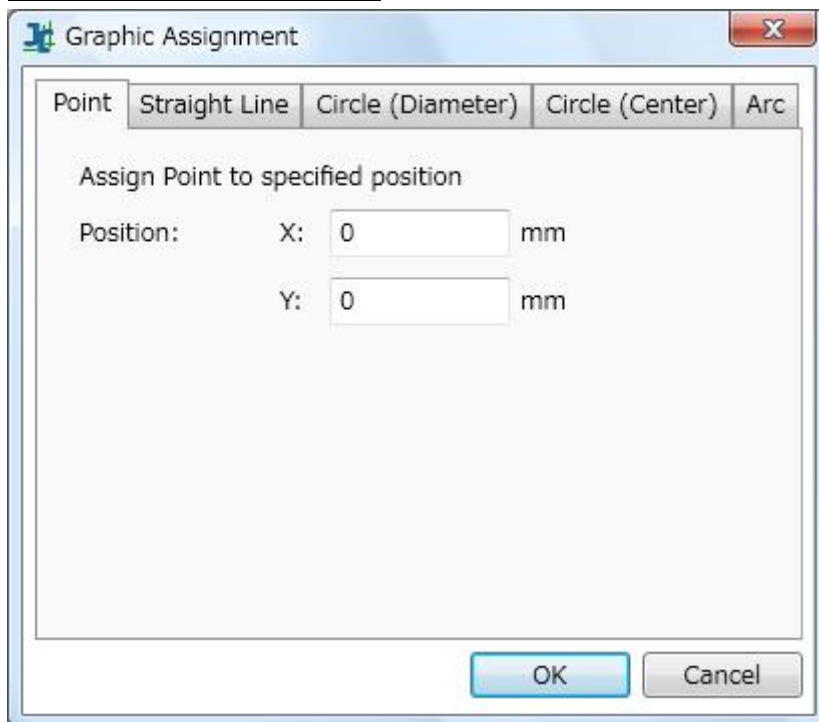
For creating, input values to a tab for any item you are creating.

For editing, a tab for any item you are editing is enabled.

Tab settings

＊Point

＊Line

＊Circle (diameter)
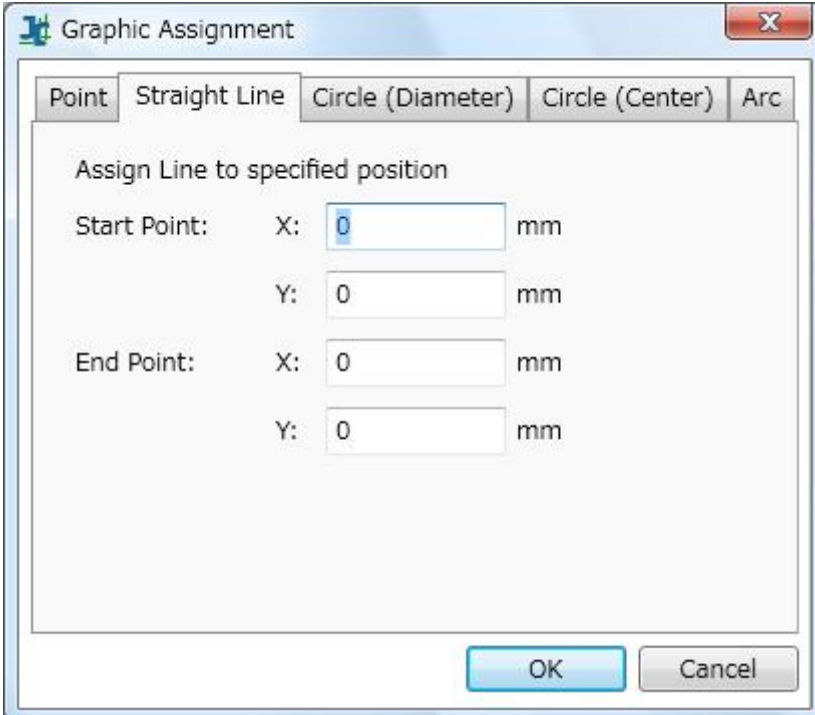
＊Circle (center)

＊Arc

Creating and positioning a point

Setting items

   ＊Position (X,Y)

Create or edit a single point on position (X,Y).

Creating and positioning a line

Setting items

   ＊Start point (X,Y)

   ＊End point (X,Y)

Create and edit a straight line (line) that connects a start point to an end point.

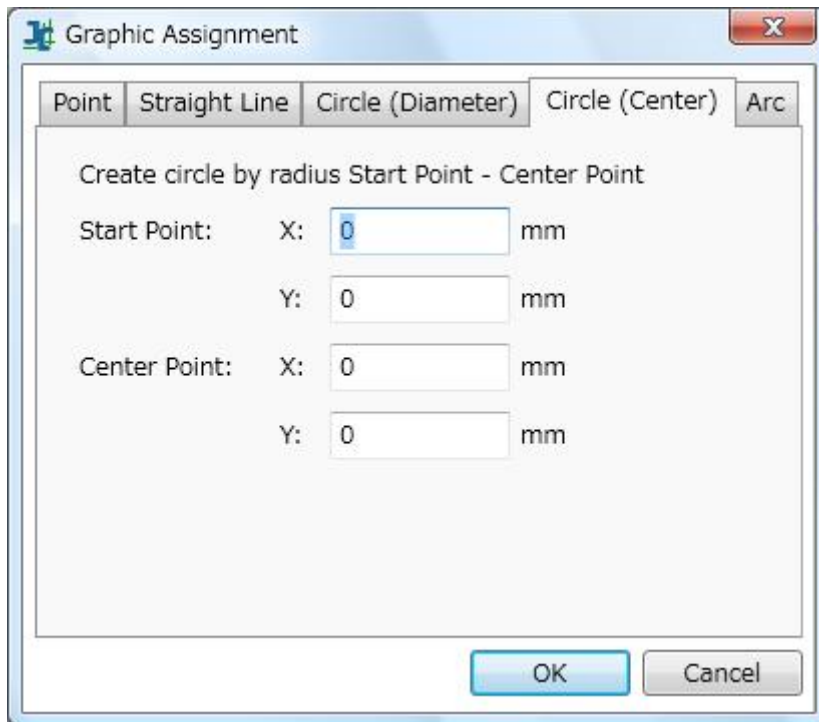## Creating and positioning a circle (diameter)
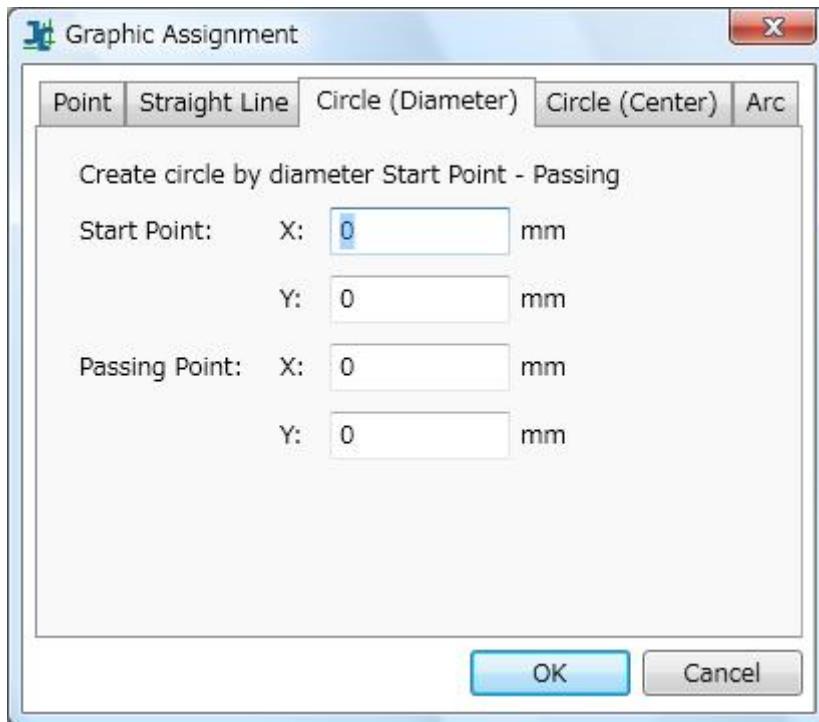
Setting items

  ＊Start point (X,Y)

  ＊Passing point (X,Y)

Create and edit a circle by setting a start point and an end point to determine a diameter.

Creating and positioning a circle (setting a center point)

Setting items

    ＊ Start point (X,Y)

    ＊ Center point (X,Y)

Create or edit a circle by designating a radius by setting a start point and the center point.

Creating and positioning an arc

Setting items

 ∗ Start point (X,Y)

 ∗ End point (X,Y)

 ∗ Arc point (X,Y)

Create or edit an arc that connects a start point to an arc point to an end point.

Editing graphics

Overview

JR-GLayout allows you to position any of the following graphics: points, lines (continuous straight lines), circles, and arcs.

Each graphic consists of a start point, an end point, and an auxiliary point or the combination of these points.　A start point, an end point, and an auxiliary point are elements that compose a graphic, each of which functions in a different way from a graphic consisting of a single point.

Graphics are displayed when selected or not selected as shown below.

	Not selected	Selected
Point	■	■
Line	□—■	□—■

Rules of positioning graphics

Choose a graphic to be positioned from the Menu or Toolbar.　Position a graphic in order of a start point, end point, and auxiliary point.

(Not all of these elements are required according to the type of a graphic.　For details, see a table below.)

	Start point	End point	Auxiliary point	Remarks
Point	Provided	Not provided	Not provided	A start point is positioned as an assigned point.
Straight line	Provided	Provided	Not provided	A line is drawn to connect a start point to an end point.
Circle	Provided	Not provided	Provided	A circle is drawn with a straight line from a start point to an auxiliary point as a diameter.
Arc	Provided	Provided	Provided	An arc is drawn to connect a start point to an auxiliary point to an end point.

Combination with key operations for positioning graphics

The following operations are enabled by operating a mouse while pressing the Ctrl key.

	Ctrl	Shift	Ctrl+Shift
Point	None	None	Not snapped
Straight line	End point is positioned so that a straight line from a start point to that end point is positioned in 45 degree.	None	Not snapped
Circle	Auxiliary point is positioned so that a straight line from a start point to that auxiliary point is positioned in 45 degree.	None	Not snapped
Arc	End point is positioned so that a straight line from a start point to that end point is positioned in 45 degree. When an arc point is positioned, the center angle is 180 degree.	None	Not snapped

Rules of moving graphics/vertexes

Move a graphic by left-dragging. The move of a graphic depends on what portion you click on a graphic for dragging.

Dragging a point within a graphic (for example, a start point or end point) moves only that point, which results in the changed shape (size) of that graphic.

Dragging a line of a graphic (line to connect each point) enables you to move the entire graphic. If multiple graphics are selected, all of the selected graphics are moved.

Combination with key operations for moving

A combination of using the keys and the mouse means the following operations can be performed.

|	Ctrl	Shift	Ctrl+Shift
Point	None	None	Not snapped
Straight line	An angle made with a point staying on the same position is	A point is moved with a distance from another point	Not snapped

	fixed.	fixed.	
Circle	An angle made with a point staying on the same position is fixed.	A point is moved with the center point fixed.	Not snapped
Arc	When a start (end) point is moved, an angle made with an end (start) point is fixed When an arc point is positioned, the center angle is 180 degree.	An arc point is moved with the center point fixed.	Not snapped

Delete

Select a graphic to be deleted and select Menu > Edit Graphic (_E) > Delete (Del) or press the Delete key,

Examples of moving graphics

Examples of moving graphics actually are shown below.
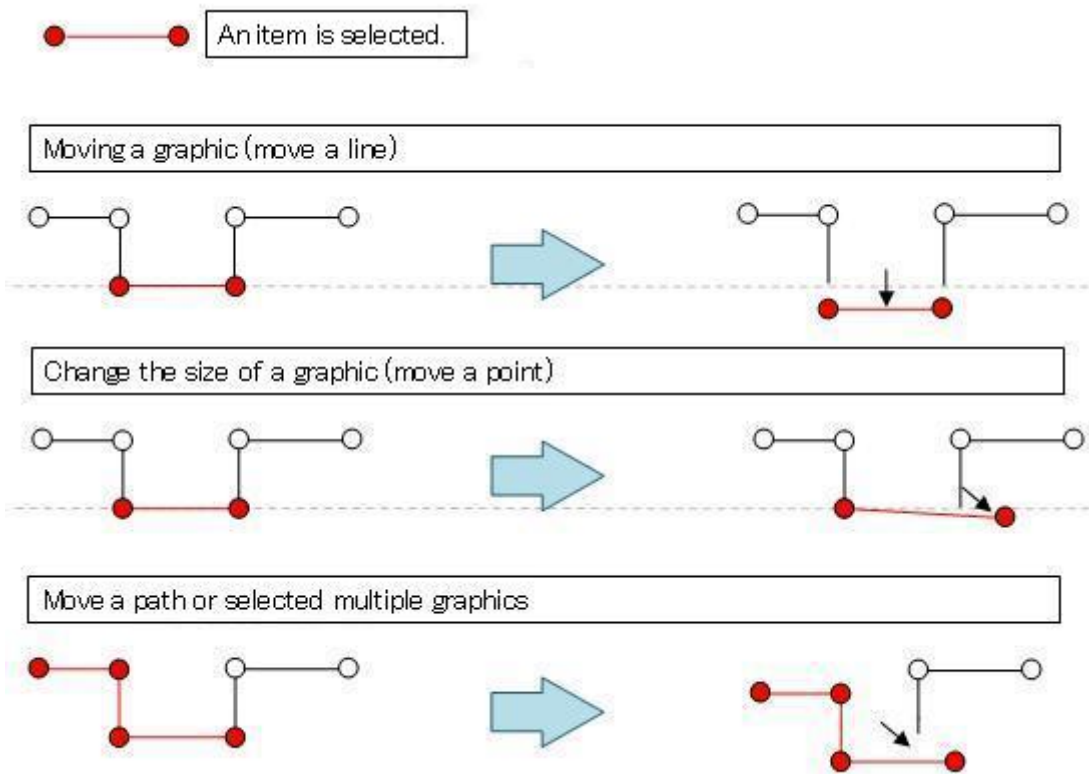
Snap function and concatenation (generating a path)

The Snap function allows you to connect the start point of a graphic to the end point of another graphic. (However, it is only enabled when a connectable end point has not yet been connected.) Two graphics are concatenated at the connected points, thus being included in the same path. A path cannot be branched and concatenation is performed between two graphics. (It is possible that multiple passing points, start points, and end points exist in the same coordinate.)

Point to snap	Point to be snapped	Condition after snapping
Start point	End point	Concatenated
End point	Start point	Not concatenated
Start point	Start point	Not concatenated
End point	End point	Not concatenated

Rules of concatenation/cancel concatenation

Basically concatenation is established by moving a start point to an end point to execute the snap function there. On the other hand, to cancel concatenation, select a graphic whose end point is concatenated and move that end point to any place where snapping is not performed and snap it again to the same point. In other words, the end point is snapped to the start point. This means that concatenation is not established (the operation to cancel concatenation).

By way of exception, you can connect adjacent two graphics with a newly assigned graphic either by snapping an end point to a start point or a start point to an end point.

## Rules of changing the sequence of graphics

Where concatenation is established, the order of graphics can be changed in a series of trajectories. You can change the order only for graphics you have moved. In order to change the order of graphics in units of path, use the Path Order function that will be described later.
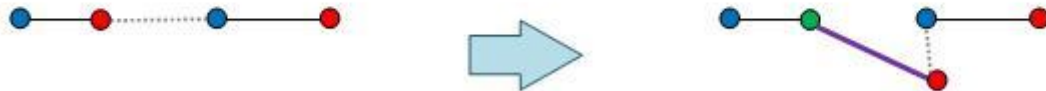
Typical operations
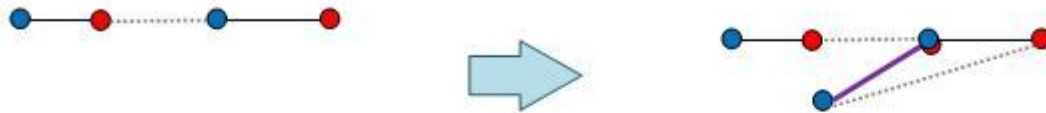

Positioning a new graphic

Position a new graphic without snapping it anywhere -> Positioned last.
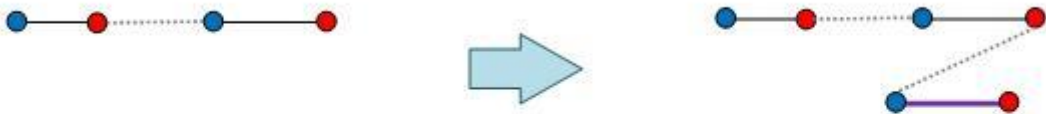
Snap the start point to the end point -> Concatenated to the end of the snapped graphic.

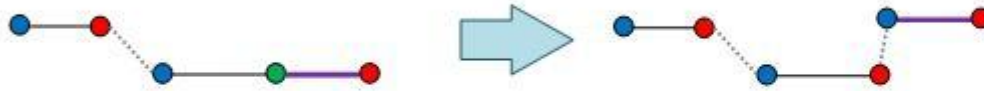Snap the end point to the start point -> Positioned last (the order is not changed).

Position a new graphic and snap it to connect adjacent two graphics
-> Positioned and concatenated at the end and start points of each of the two graphics.

Editing or moving graphics

Move a graphic without snapping it anywhere -> The order is not changed.

Snap a start point to an end point
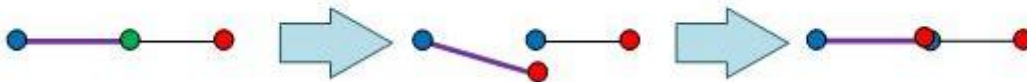-> Positioned at the end of the snapped graphic and concatenated.

Snap an end point to a start point
-> Concatenation is not established and the order is changed.

Concatenate/Cancel concatenation

Cancel concatenation -> Graphic in an earlier sequence is once moved to any other place and snapped to the same point again.

Concatenate separate two graphics -> Graphic in a later sequence is once moved to any other place and snapped to the same point again.

Path order setting function

The Path Order Setting function allows you to change the order of paths. (The order within a path cannot be changed.)

Select Path Order Setting (_O) from Menu or Path Order Settings (Ctrl+0) from Toolbar. And,

buttons with numbers indicating the order of positioned paths appear at the start points of those paths (A start point of CP in jcs format). You can set the order of paths in order of setting these buttons. For a path of the first pressed button and paths with smaller numbers, the order cannot be changed. For a path of the secondly pressed button and paths with larger numbers, the order can be changed. The path order setting function is canceled by selecting any other edit mode.

Typical operation procedure

Example 1: Changing the sequence in order of 4 -> 3 -> 2 -> 1

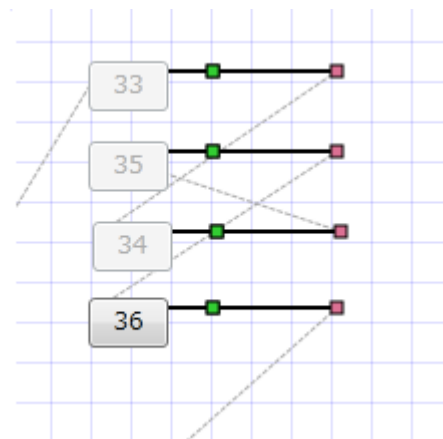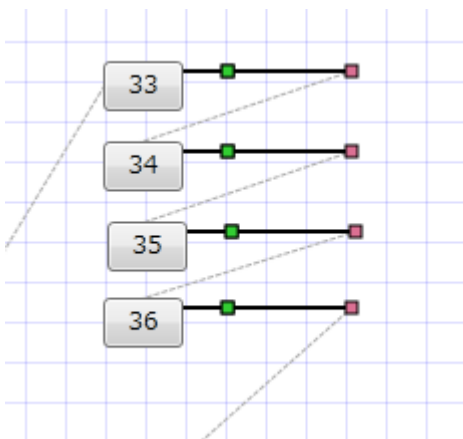Press buttons in order of 0 -> 4 -> 3 -> 2 -> 1.

Actually, every time you press a button, a displayed number is changed.
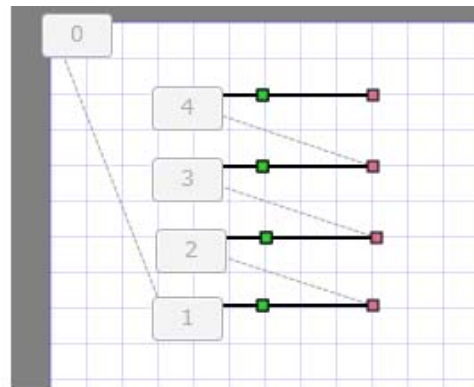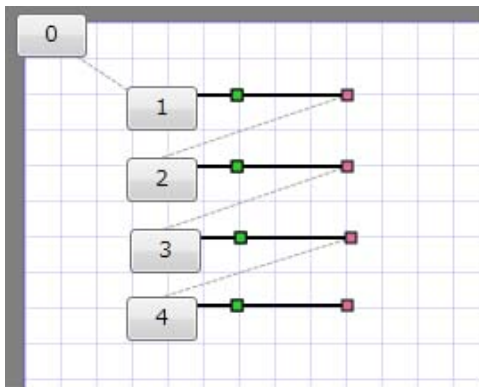
Example 2: Changing the order for only numbers 34 and 35

Press buttons in order of 33 -> 35 -> 34.

Actually, every time you press a button, a displayed number is changed.

Operation to select graphics and target graphics

JR-GLayout mainly provides the following two operations to select graphics:

＊ Click the mouse on a graphic to be selected.

＊ Select the range of graphics by dragging the mouse.

Select a graphic by clicking the mouse

This operation is enabled only for editable graphics.　Combined operation with Shift/Ctrl enables multiple graphics to be selected.

When you select graphics by double-clicking on them, all other graphics concatenated to double-clicked graphics are also selected.

Target	Key	Operation
On an editable graphic	None	Clicked graphics are selectable (other graphics are not selectable).
On an editable graphic	+Ctrl	Whether a clicked graphic is selectable or not is switched.
On an editable graphic	+Shift	Whether a clicked graphic is selectable or not is switched.
Other areas	None	Every graphic is not selectable.

Select the range of selection by dragging a mouse

Dragging the mouse means that you can select items other than those that can be edited.　In addition, combination with Shift allows you to select only graphics editable.

Target	Key	Operation
All displayed graphics	None	Graphics within a mouse-dragged range are selected.
Editable graphics	+Shift	Only editable graphics within a mouse-dragged range are selected.

Exchange between start and end points

This function allows you to exchange between start and end points of a graphic.

Select a graphic to set the Start Point/End Point Reverse function from Menu or Toolbar.　And
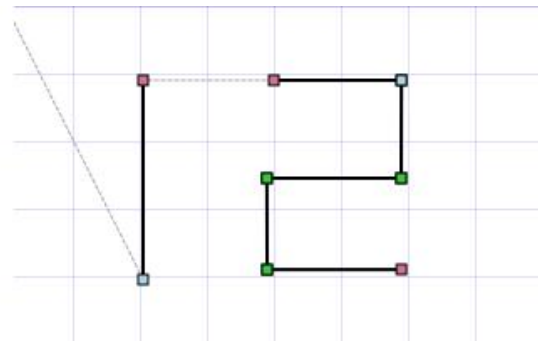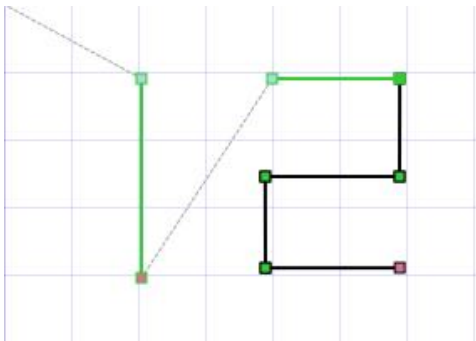
the start and end points of a graphic you are selecting is changed.

Exchange is enabled between the start and end points of a path by selecting the entire path to execute Start Point/End Point Reverse.

Example 1:Exchange between the start and end points of a single graphic

Select a single graphic or part of a path to execute the Start Point/End Point Reverse function.
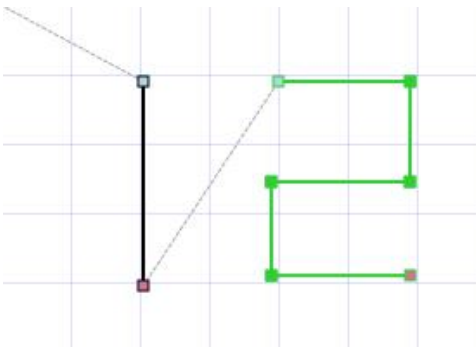
Exchange of the start and end points of a graphic you are selecting is performed.　Concatenation, if any, is canceled.

Example 2: Replacing between the start and end points of the entire path

Select all graphics included in a path to execute Start Point/End Point Reverse.

Start and end points are exchanged with the path concatenation maintained.
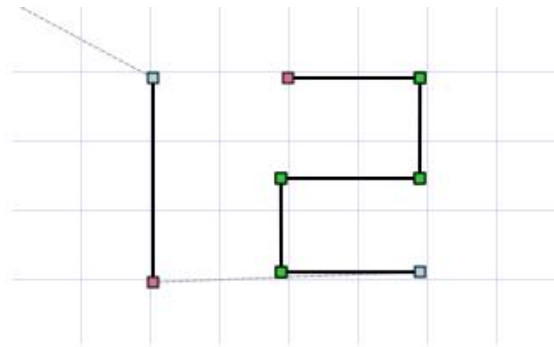
Synchronizing with JR C-Points

JR-GLayout allows you to obtain data edited by JR C-Points directly without converting edited data to jcs format files by using a synchronization function with JR C-Points.
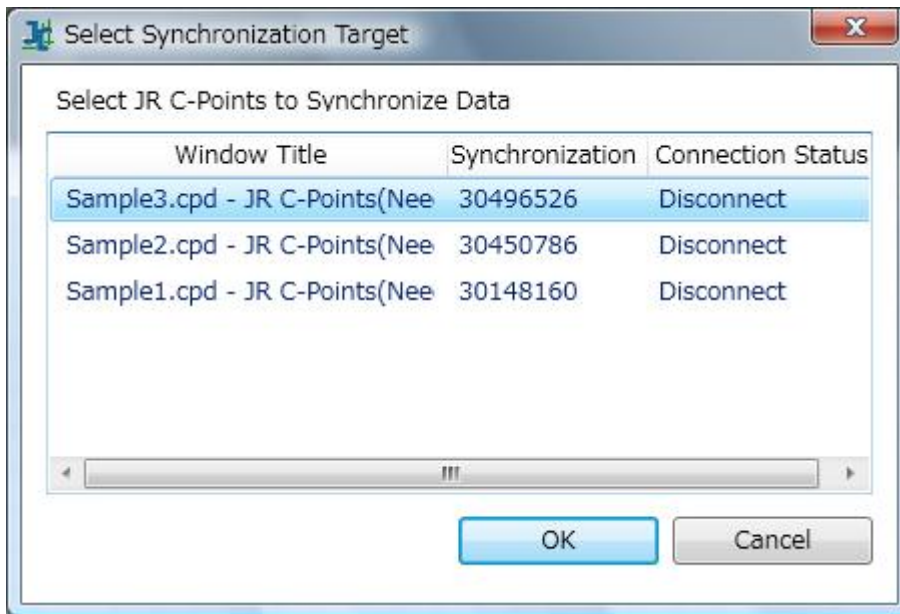
Connecting to JR C-Points

Start up JR-GLayout while JR C-Points is active or start up JR C-Points while JR-GLayout is active.　 This enables two applications to be connected automatically.

When the connection is completed, a Connection Status icon on the status bar turns from "Disconnected" to "Connected".

A one-to-one connection is established between JR-GLayout and JR C-Points.　 You can start up a multiple number of JR C-Points simultaneously.　 Accordingly, it is necessary to designate which JR C-Points is to be connected to JR-GLayout from the Select JR C-Points to Synchronize Data dialog box.

Window Title	:	A target window title is displayed.
Synchronization Code	:	A target synchronization code is displayed.
Connection Status	:	The current connection status is displayed.

Synchronization with JR C-Points

The synchronization function is enabled by connecting JR-GLayout to JR C-Points. Select Menu > Data(_D) > Synchronize with JR C-Points or press the Synchronize with JR C-Points button on the Toolbar. And the synchronization start confirmation dialog box is displayed.

Press OK to receive data from the currently connected JR C-Points to display it in the edit view. Executing synchronization deletes all trajectories inserted before synchronization is executed.
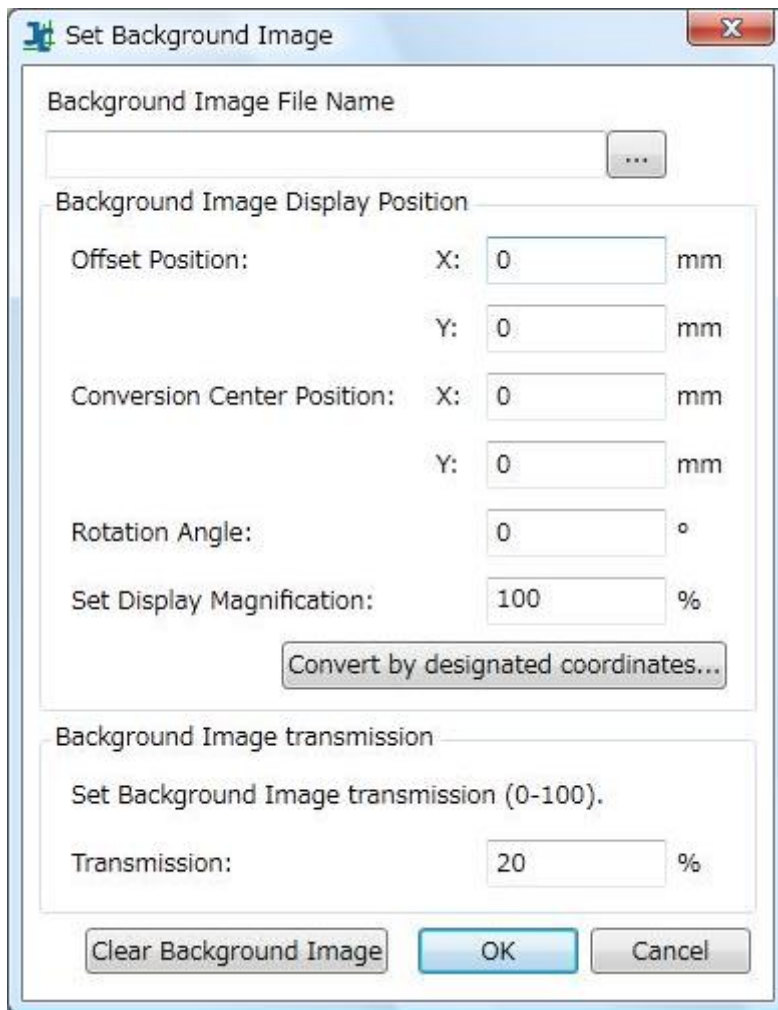
Importing background images

JR-GLayout allows you to import jpg images to be displayed as background images.

<u>Operation procedure</u>

＊ Select Menu > File (_F) > Background Image Setting (_B).

＊ The Set Background Image dialog box is displayed.　Choose a jpg file to be imported and a position to display an imported image and press OK to execute importing.　Select "Convert by designated coordinates" and input the robot coordinate system and the corresponding coordinate of the edit view to calculate conversion settings.　(Details are described later.)

By default, data is imported with the windows coordinate system (horizontal and vertical axes are set to X-axis and Y-axis and the right and down sides are set to positive directions) with (0,0) as a base point regardless of the settings of the coordinate system.

Setting items:

|		
Background Image File Name	:	Specify an image file displayed in the background from the file selection dialog box.
Offset Value	:	Set an offset position to import an image.
Conversion Center Position:	:	Set reference points for the center of rotation and scale.
Rotation Angle:	:	Set a rotation angle to import an image.
Scale	:	Set a scaling factor to import an image.
Transmission	:	Set the transmission of a background image.

Conversion by designated coordinates

The coordinate of an external image imported to the edit view may not match that of an actual image on the robot.   The coordinates are matched by the conversion function that uses the

coordinates that have been designated.
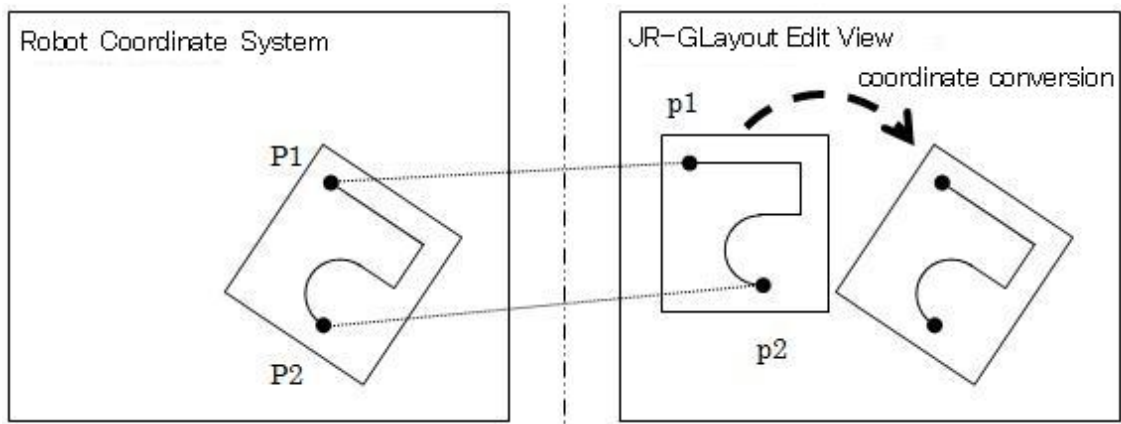
Set P1 and P2 on a robot as reference points and p1 and p2 corresponding to P1 and P2 in the edit view to calculate conversion settings for making the reference points on the robot P1(X1, Y1) and P2(X2, Y2) match those in the edit view p1(x1, y1) and p2(x2, y2).
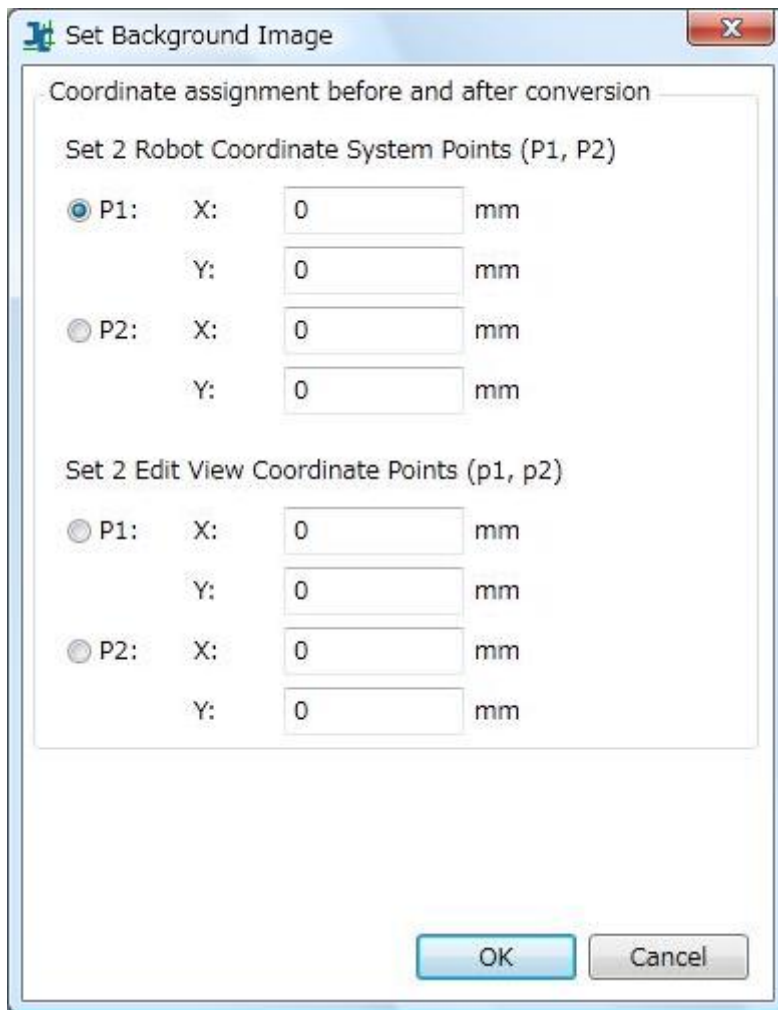
Setting items:

Set 2 Robot Coordinate System Points (P1, P2)	:	Two reference points for positioning after coordinate conversion is performed
Set 2 Edit View Coordinate Points (p1, p2)	:	Two reference points for positioning before coordinate conversion is performed

Open the Coordinate assignment dialog box.　And a red line and a blue line are displayed on the screen.　A red line connects two points on the robot coordinate system and a blue line connects two points on the edit view coordinate system.

You can set a coordinate for an item to which the radio button is checked by clicking on the corresponding coordinate in the edit view while the Coordinate assignment dialog box is displayed.
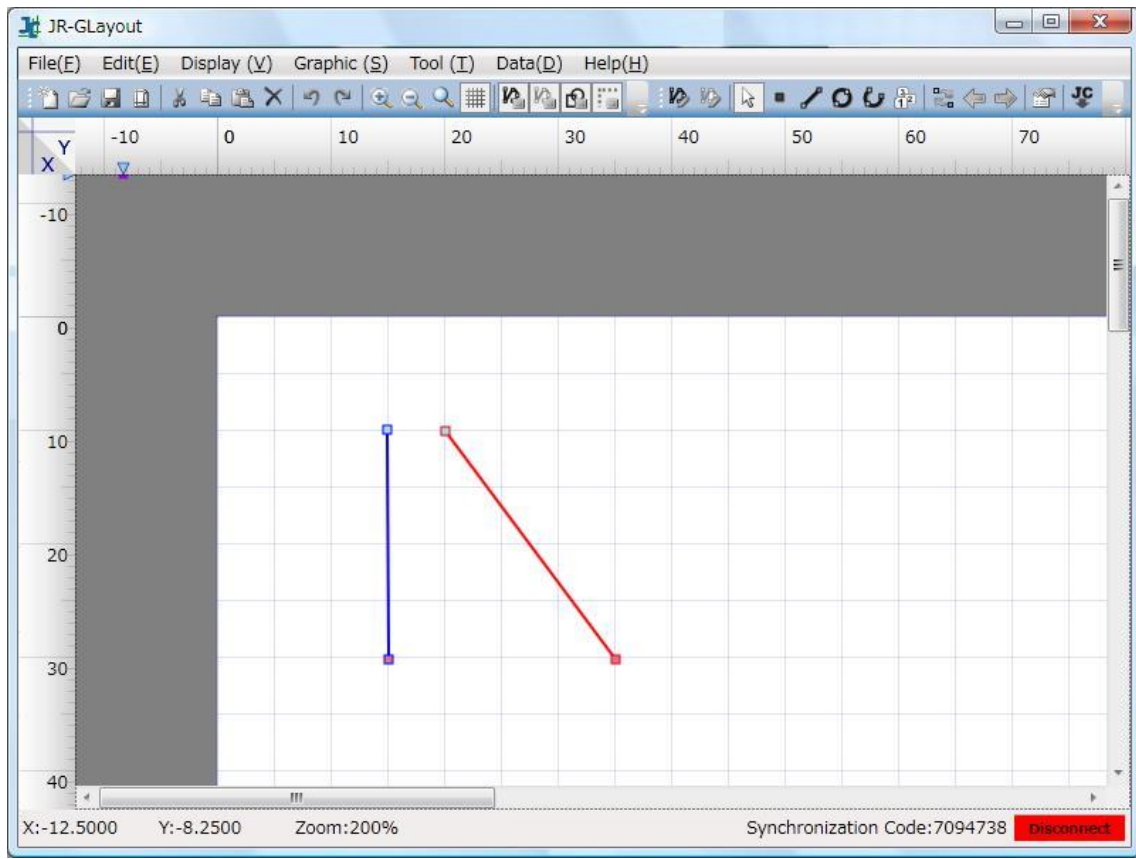
After setting the coordinate, press OK.   And, offset values, the center of conversion, a rotation angle, and a scale are automatically set

Set Background Image

Coordinate assignment before and after conversion

Set 2 Robot Coordinate System Points (P1, P2)

- P1:   X: `10.1250`   mm
  -       Y: `20.1250`   mm
- P2:   X: `30.2500`   mm
  -       Y: `35.1250`   mm

Set 2 Edit View Coordinate Points (p1, p2)

- P1:   X: `10.0000`   mm
  -       Y: `15.0000`   mm
- P2:   X: `30.2500`   mm
  -       Y: `15.1250`   mm

OK   Cancel

Set Background Image

Background Image File Name

[   ] [...]

Background Image Display Position

Offset Position:	X:	0.125	mm
	Y:	5.125	mm
Conversion Center Position:	X:	10	mm
	Y:	15	mm
Rotation Angle:		323.655	°
Set Display Magnification:		123.95	%

[Convert by designated coordinates...]

Background Image transmission

Set Background Image transmission (0-100).

Transmission:	20	%

[Clear Background Image]   [OK]   [Cancel]

Edit view

Read this chapter to learn about various types of items displayed in the edit view.
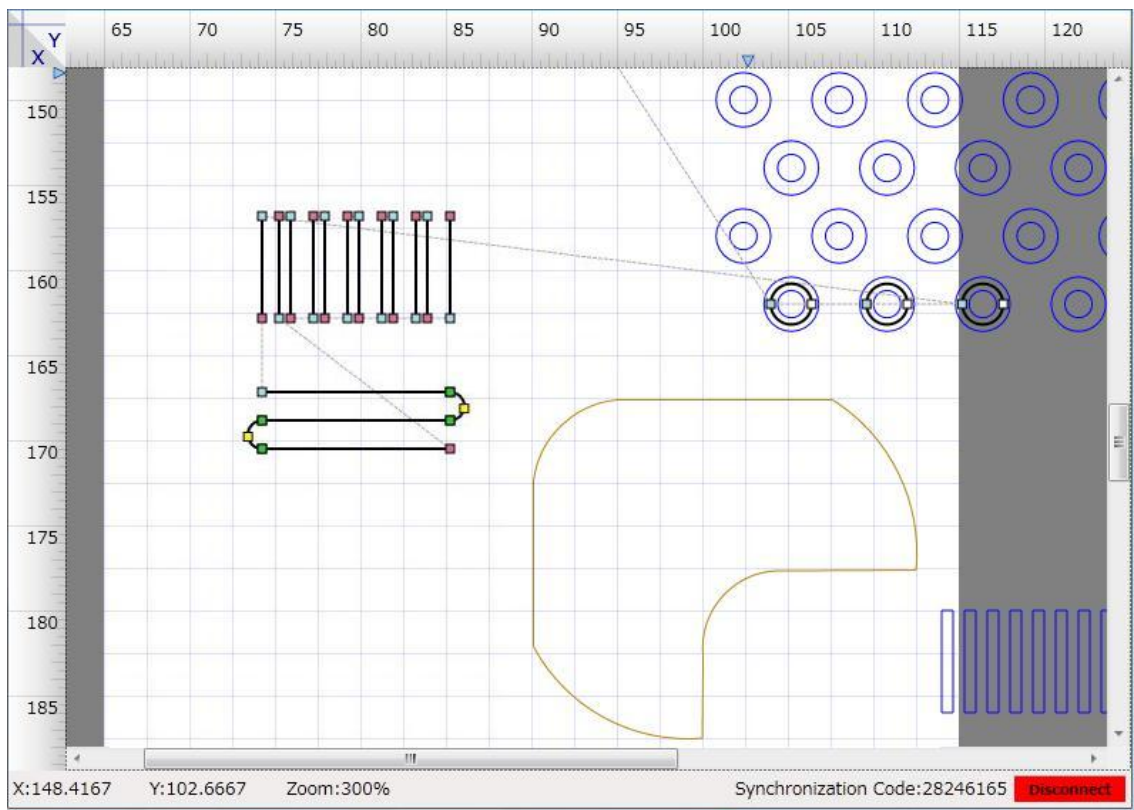
Ruler

The top and the leftmost of the edit view are provided with rulers. The rulers assist editing in units of mm.

By default, a horizontal axis is set to Y-axis and a vertical axis to X-axis. You can change settings from the Page Settings dialog box.

(Whether to set a horizontal axis to X-axis or Y-axis should be performed at the time of creating a project.)

Work area

A white area indicates a work area. You can change the size of a work area from the Page

Settings dialog box.

Grid line

A grid line is displayed in a work area to assist editing.　You can choose to enable or disable the showing of a grid line from the Toolbar or Menu.

Trajectory, Auxiliary line, Imported graphic, and Offline (Moving line)

A graphic to be edited (displayed) on the edit view looks like this.

(Solid black line)

A solid black line indicates a trajectory on which a robot is moving.　Data of this line is <u>output</u> with Export jcs File (J).

A line is displayed in the above thickness when Edit Trajectory mode is ON and thinly when OFF.

The Display Trajectory function allows you to choose to disable or enable the showing of trajectory.

(Solid ochre line)

A solid ochre line indicates an extension or auxiliary line to assist editing.　Data of this line is <u>not output</u> with Export jcs File (J).

A line is displayed in the above thickness when Edit Auxiliary Line mode is set to ON and thinly when OFF.

The Display Auxiliary Line function allows you to choose to disable or enable the showing of an auxiliary line.

.

(Gray dashed line)

A gray dashed line indicates a trajectory on which a robot is moving with the tip lifted.　Data of this line is output with Export jcs File(J), but this line cannot be edited directly.　You can make any change to this line by editing a trajectory line.

The Display Offline function allows you to choose to disable or enable the showing of this line.

(Solid blue line)

A solid blue line indicates a graphic imported from the external data. You cannot edit this line. However, you can snap this line to an imported graphic for creating a trajectory or auxiliary line. You can also copy and paste this line as a trajectory or auxiliary line.

The Display Import Graphic function allows you to choose to disable or enable the showing of this line

Color of a point on a trajectory

On a trajectory, the color of a point depends on the type of a point

Purple: PTP driving point

Pale blue: CP start point

Red: CP end point

Yellow: Auxiliary point of an arc

Green: CP continuous passing point

White: Auxiliary point of a circle. This point is not output to a jcs file. This is only displayed during editing with JR-GLayout.

Areas for coating

For JR-GLayout, you cannot newly position an item provided with coating information.　However, you can display or edit such an item.　It is possible to edit items provided with coating information in the same way as that for PTP driving points.

Typical indications for coating are shown below.
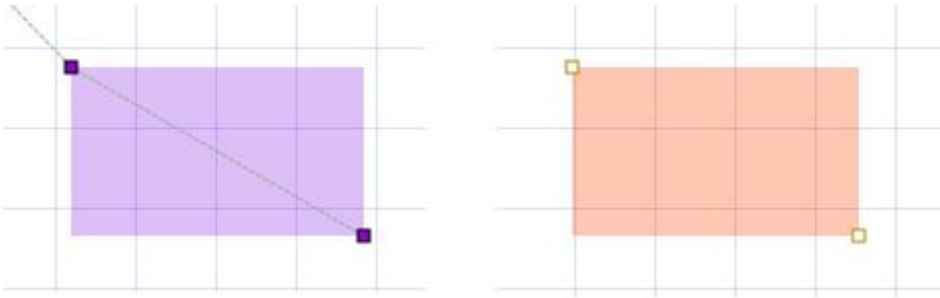
Red-purple rectangle: Indicates an area where a trajectory line is drawn in a zigzag from the start point to the end point of a rectangle.

Orange rectangular: Indicates an area where an auxiliary line is drawn in a zigzag from the start point to the end point of a rectangle.
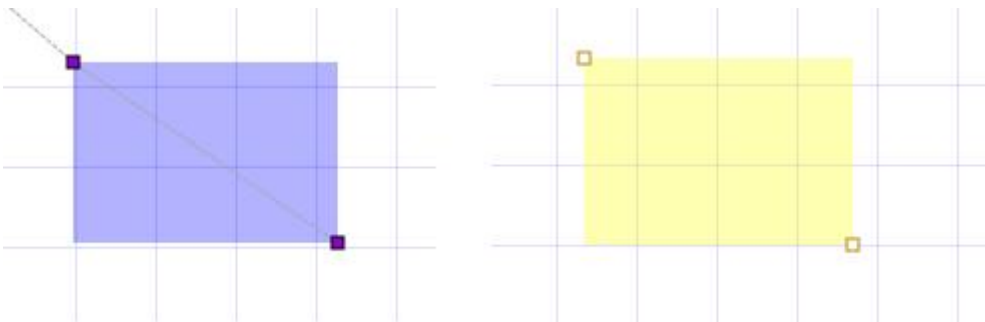
Blue-purple rectangle: Indicates an area where a trajectory line is drawn in a spiral from the start point to the end point of a rectangle.

Yellow rectangle: Indicates an area where an auxiliary line is drawn in a spiral from the start point to the end point of a rectangle.
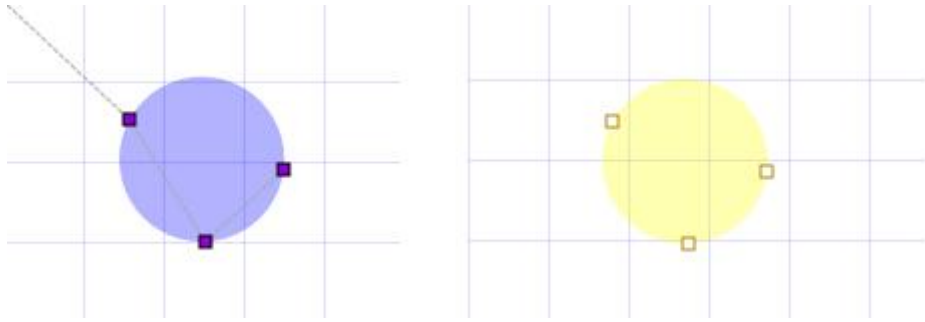
Blue-purple circle: Indicates an area surrounded with three points: the start point from which a trajectory line is drawn in a spiral, and the outer edge point 1 and point 2.

Yellow circle: Indicates an area surrounded with three points: the start point from which an auxiliary line is drawn in a spiral, and the outer edge point 1 and point 2.