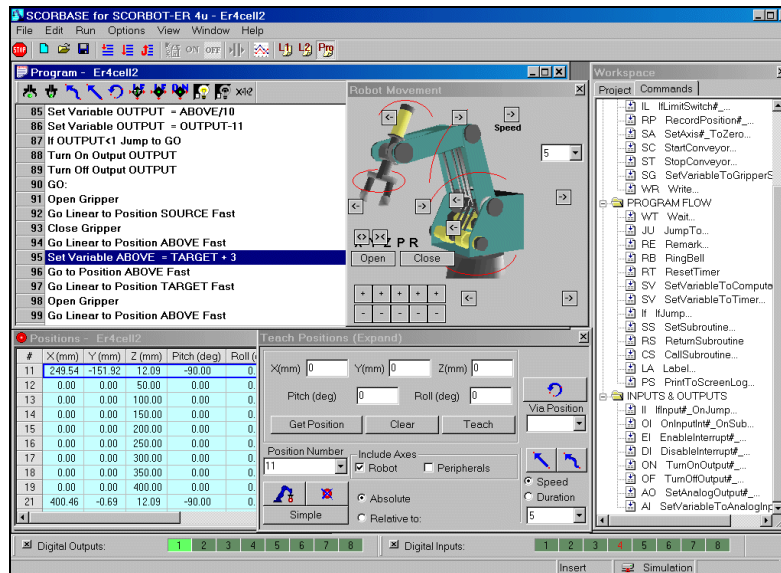


SCORBASE



Version 4.9 and higher

for

SCORBOT-ER 4u

SCORBOT-ER 2u

User Manual

Catalog #100342 Rev. E

intelitek

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INTELITEK INC.
444 East Industrial Park Drive
Manchester NH 03109-537
Tel: (603) 625-8600
Fax: (603) 625-2137
Web site www.intelitek.com

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1

Introducing SCORBASE

SCORBASE for SCORBOT-ER 2u/4u is a robotics control software package for robot programming and operation. SCORBASE for SCORBOT-ER 2u/4u provides numerous capabilities:

- Communication with the robot controller over USB channel.
- Control and real-time status display of five robot axes, gripper and two peripheral axes.
- Full support and real-time status display of eight digital inputs, eight digital outputs, two analog outputs and four analog inputs.
- Position definition and display as well as manual robot movement in joint coordinates (encoder units).
- Cartesian coordinates (X,Y,Z Pitch and Roll) are also available.
- Robot movement definition as Joint, Linear, or Circular, with ten active speed settings. (Availability depends on level.)
- Default setting of 1000 positions and 1000 active program lines.
- Interrupt programming for handling responses to changes in digital input status.
- Variable programming, in three levels of complexity, to moderate the learning curve. This makes it possible for beginners to start at a lower level, and advance through the levels, as they become more skilled in robotics programming.
- Saving and loading projects.
- SCORBASE can be installed as part of RoboCell, an interactive graphic software package, which provides simulation of the robot and other devices in the workcell.

This manual describes all the features and operations for all levels of SCORBASE. When necessary, illustrations show the differences in the levels, and descriptions note the availability of options and commands.

2

Starting SCORBASE

The instructions in this chapter are for SCORBASE only.

If you intend to install SCORBASE as part of the RoboCell software package, follow the instructions in Chapter 2, Starting RoboCell, in the RoboCell User Manual.

System Requirements


SCORBASE for ER 4u computer requirements are:

- Pentium III with 450 MHz processor, or higher, equipped with CD drive.
- At least 128 MB of RAM.
- A hard drive with at least 60 MB of free disk space.
- Windows 98/2000/me/xp.
- A Super VGA or better graphics display, minimum 256 colors.
- A Mouse or other pointing device.
- USB port.

Installing the Software

The SCORBASE software is supplied on a CD which also contains RoboCell. Close any open applications before proceeding with the installation procedures. If you are about to reinstall the software, or install a newer version to an existing SCORBASE directory, it is recommended that you back up any existing user-created files before you begin the installation. It is also recommended that you remove the previous SCORBASE version for Windows installation, using the software's Uninstall utility.

To install SCORBASE:

- Insert the CD into the CD-ROM drive to start the installation procedure.
- If the procedure does not start, either:
- From the Windows task bar, click Start | Run and type D:Setup (where D: is your CD drive),
or
- Using Windows Explorer, explore the CD drive and click  Setup.
- Wait until the Welcome window is displayed.

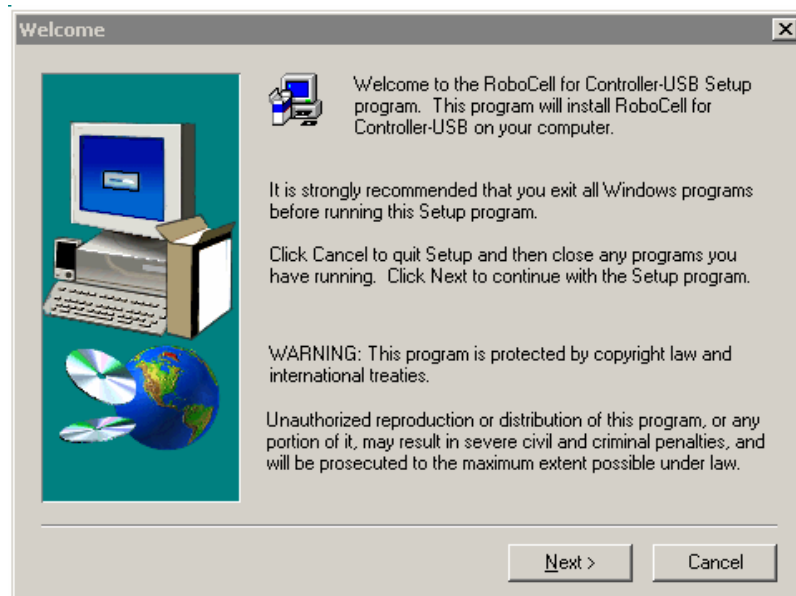


Figure 2-1: Welcome Window

- Click Next to open the Software Selection Window.

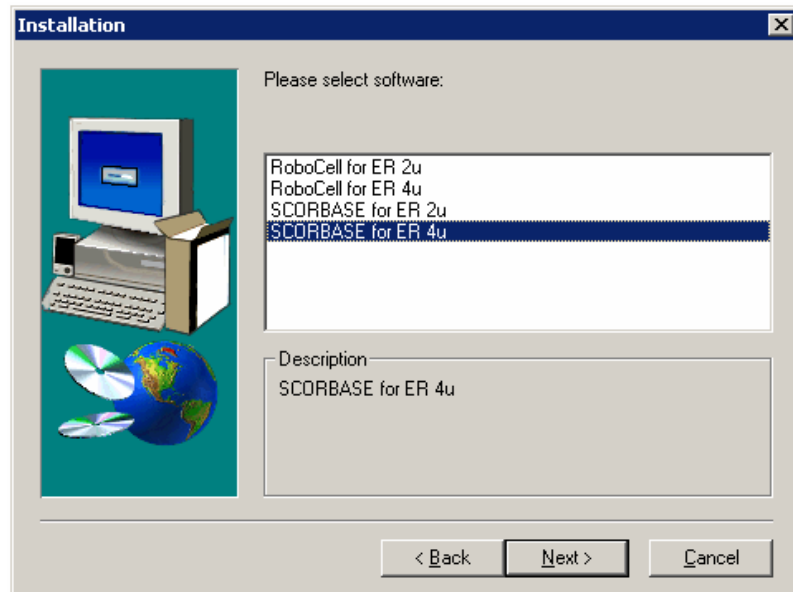


Figure 2-2: Software Selection Window

- Select RoboCell for ER 2u, RoboCell for ER 4u, SCORBASE for ER 2u or SCORBASE for ER 4u. The robot that you select becomes the default robot while you are working in SCORBASE, although you can choose to open a new project and work with the other robot. See the Hardware Setup option in the Options Menu.

- Click Next to open the License Agreement Window.

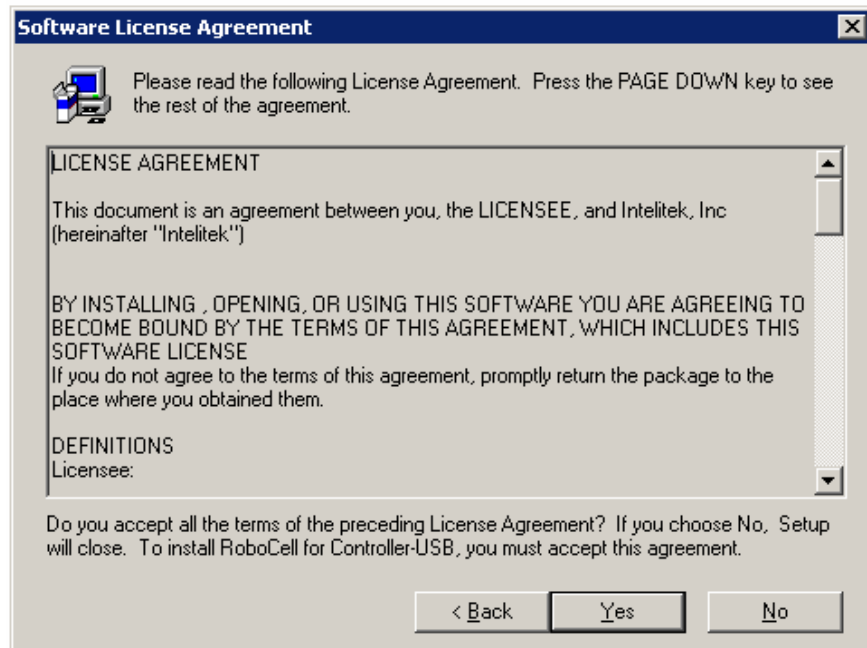


Figure 2-3: License Agreement Window

- Review the Intelitek software license agreement. You must accept the terms of this agreement in order to proceed with the installation. To accept, choose Yes. The Choose Destination window opens.

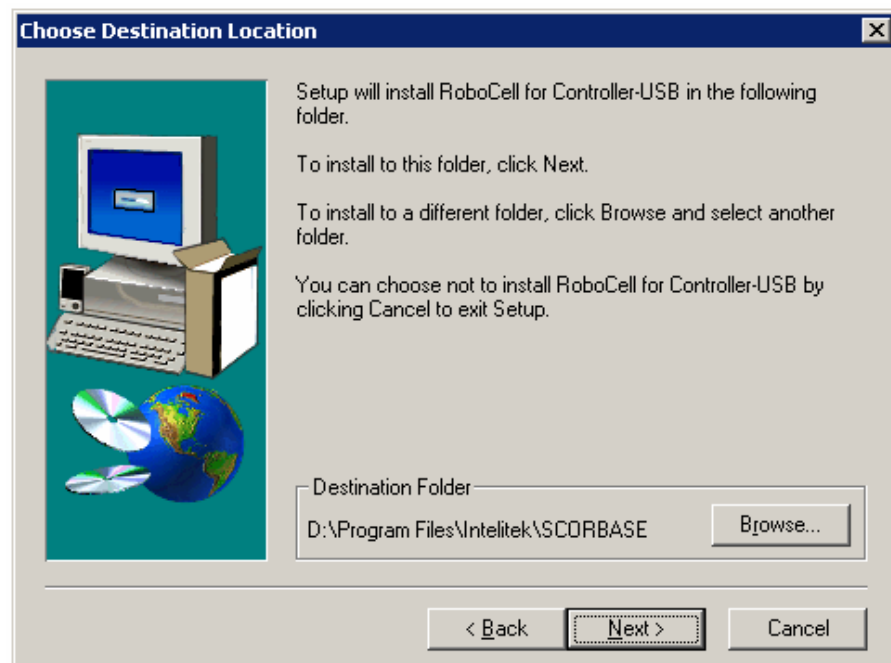


Figure 2-4: Choose Destination Window

- The default destination folder for the files is:
 \Program Files\Intelitek\SCORBASE
 Click Next to accept the default, or click Browse to select another folder and then click Next to open the Select Program Folder window.

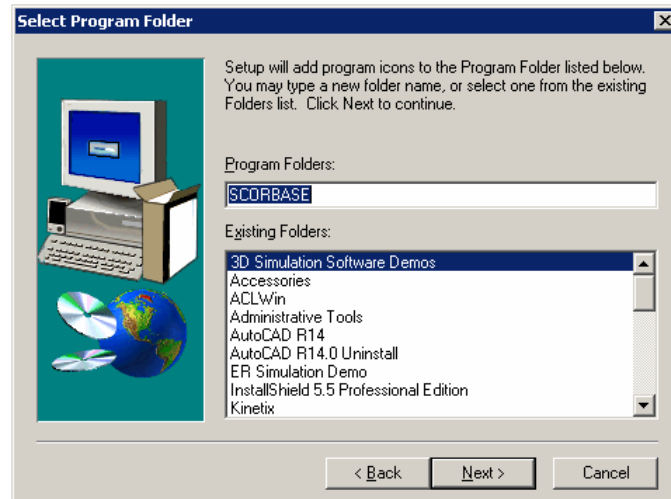


Figure 2-5: Select Program Folder Window

- In the Select Program Folder window you are requested to select the folder to which the program icons will be added.
- Click Next to complete the installation procedure.

Uninstalling the Software

To uninstall SCORBASE:

1. From the RoboCell program group, select Uninstall.
2. Follow the instructions which appear on the screen.

Starting SCORBASE

The following procedure describes how to access the SCORBASE for ER 4u application. However, the same procedure applies to SCORBASE for ER 2u.

To start SCORBASE:

1. Make sure that all the components to be used are installed and connected according to the installation procedures detailed in the User Manuals supplied with the robot and controller.
2. Turn on the computer and the controller.
3. Select Start | Programs | SCORBASE for ER 4u.
4. Select the SCORBASE for ER 4u command. After initialization, the following screen appears:

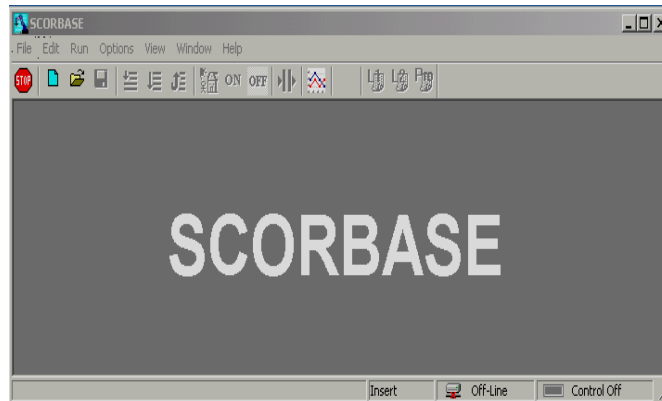
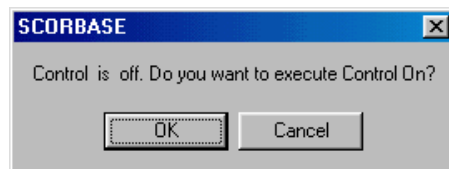


Figure 2-6: SCORBASE Opening Screen

If SCORBASE opens in On-line mode, the controller is detected and this message appears:



Select OK to select Control On (CON) state. Select Cancel to remain in Control Off state.

If SCORBASE opens in Off-line mode or the controller is not detected, the program will load and operate in Off-line mode.

Only one application of SCORBASE can be active at a time.

Quitting the Software

Stop the SCORBASE program (if running). If you have unsaved changes in the project, SCORBASE prompts you to save the changes before closing.

To close SCORBASE (or its components), do any of the following:

- From the Menu Bar, select File | Exit.
- Click the Close box in the SCORBASE Title Bar.
- Press [Alt]+F4.

3

Menus Overview

The SCORBASE Window

Figure 3-1 shows the SCORBASE opening screen which comprises:

- A Title Bar containing the screen name and the usual Windows controls for sizing and closing the application screen.
- A Menu Bar containing all SCORBASE command menus and options.
- A Toolbar containing icons for the most commonly used options.
- A Status Bar displaying information regarding the SCORBASE software, modes of operation, current activity, etc. When you position the mouse over an icon, a description of the icon appears in the status bar.

Note: In version 4.9.1 the System menu (displayed by right clicking the Title Bar) contains the **Always on Top** menu item, enabling you to display the application on top at all times.

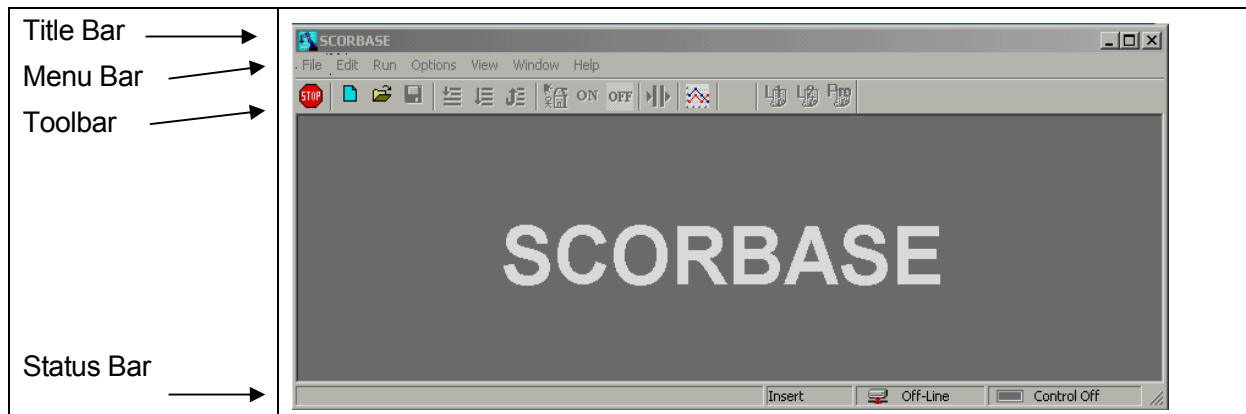
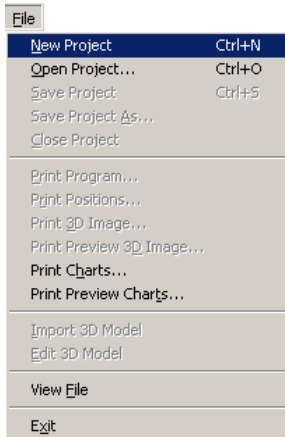


Figure 3-1: SCORBASE Window

File Menu

A SCORBASE project contains a program (SBP file), user-defined positions (PNT file), and a project data file (WS file). If RoboCell is also being used, the project includes the cell image (3DC file). Throughout this manual, the term “project” refers to the program positions (and image) files saved by the user as one entity.



The File menu contains the usual Windows functions that allow you to open new or previously saved projects, save and close projects. You can print files containing robot programs and positions, and exit the software.

The File menu options are:



New Project (Ctrl+N) Opens a new, untitled, project.



Open Project (Ctrl+O) Opens the Load Project window which lists SCORBASE files (without a virtual cell).



Save Project (Ctrl+S) Saves the currently active project (program, positions and graphics).

Save Project As... Saves the currently active project under a new project name.

Close Project Closes the currently open project.

Print Program Prints the program. (Program window must be active).

Print Positions Prints the user-defined positions. (Positions window must be active)

Print 3D Image Reserved for RoboCell program option.

Print Preview 3D Image Reserved for RoboCell program option.

Print Charts	Opens a dialog box to select the specific axis chart for display or printout. Only one axis can be selected at a time.
Print Preview Charts	Displays the selected axis chart before printout.
Import 3D Model	Reserved for RoboCell program option.
Edit 3D Model	Reserved for RoboCell program option.
View File	<p>Enables you to view a file from those listed:</p> <ul style="list-style-type: none"> • Graphic module files (*.3DC) • SCORBASE programs (*.sbp) • Position data (*.pnt) <p>When you select a file, a window opens displaying that file.</p>
Exit	Closes SCORBASE. If changes to a program or position file have been made but not yet saved, a message appears giving you the opportunity to save the file before you exit SCORBASE.

For more information on SCORBASE File Management, see Chapter 9.

Edit Menu

Edit	
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Find...	Ctrl+F
Find Next	F3
Command/Remark (* ...)	Ctrl+R
Go to Line...	
Edit Line	

The Edit menu contains the usual Windows functions that allow you to edit program files.

Cut (Ctrl+X)	Deletes selected text or lines from the program lines, and places it on the Windows and SCORBASE clipboards.
Copy (Ctrl+C)	Places a copy of selected text or lines from the program lines on the Windows and SCORBASE clipboards.
Paste (Ctrl+V)	Inserts the contents of the SCORBASE clipboard into the program lines.
Find (Ctrl+F)	Opens a dialog box that allows you to search for a particular text string, SCORBASE command, or command argument.
Find Next	Repeats the last Find operation for the next occurrence.

Command/Remark (*...) (Ctrl+R)	Inserts/deletes asterisk at beginning of a SCORBASE program command line. This action toggles the command line between a remark and an executable command.
Go to Line	Opens a dialog box that displays the total number of lines in the program, and prompts you for a line number. The program editor jumps to the line you specify.
Edit Line	Edit a selected line. Useful for long programs.

For more information on these and additional SCORBASE editing functions, see Chapter 6.

Run Menu

Run	
Search home - all axes	
Search home - robot	
Search home - peripherals	
Run single line	F6
Run single cycle	F7
Run continuously	F8
Go home - all axes	
Go home - robot	
Go home - peripherals	
Pause	F10
Stop	F9

The Run menu contains SCORBASE commands for homing the robot and peripheral axes (see Chapter 4, Homing and Control), and executing programs.

Note: If the software is operating Off-line, only the Run program options are available in this menu.



Search home - all axes Homes both the robot and any configured peripheral axes.

Search home – robot Homes the robot.
This command is available only if the system has been homed once, after opening SCORBASE.

Search home – peripheral Homes the peripheral.
This command is available only if the system has been homed once, after opening SCORBASE.



Run single line (F6) Executes the *selected (highlighted)* program line.



Run single cycle (F7)

Executes the program from the *selected (highlighted) program line to the end of the program.*



Run continuously (F8)

Executes the program from the *selected (highlighted) program line.* When the last program line is reached, the program *starts again from the first line.*

Go home – all axes

Sends the robot and peripherals to their home positions.

This command does not home the system.

Go home - robot

Sends the robot to its home position.

This command does not home the robot.

Go home – peripheral

Sends the peripherals to their home position.

This command does not home the peripherals.



Pause (F10)

Stops program execution after the current line is executed.



Stop (F9)

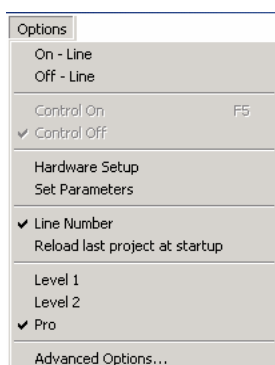
Immediately stops program execution and movement of all axes.

Note: Pause and Stop are software methods for halting program execution. In an actual emergency situation, you should use the EMERGENCY button on the controller or the ABORT key on the Teach Pendant.

For more information on SCORBASE Setup Options, see Chapter 10.

For more information on Program Execution, see Chapter 8.

Options Menu



The Options menu allows you to define your preferences for operating the software.

On-Line

Establishes communication with the controller.

Off-line

SCORBASE does not communicate with the controller, even though it may be connected.

Off-line mode is useful for checking and debugging programs.



Control On (F5)

Enables servo control of the axes and I/O device.

Control Off

Disables servo control of the axes and communication with I/O device.

Hardware Setup

Opens the Hardware Setup dialog box where you can define the peripheral devices which are connected and operated by the controller as axes 7 and 8. Full details are provided in *Hardware Setup* in *Chapter 10, System Setup*.

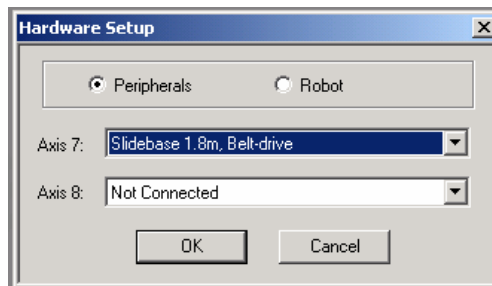
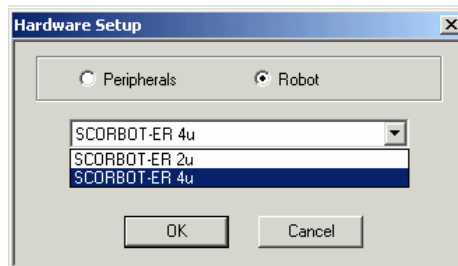


Figure 3-2: Hardware Setup Dialog Box showing default settings

The Hardware Setup option also enables you to work with a robot different from the one you selected during installation (see *Installing the Software* above). To do so, click **Robot**.



Select the desired robot and click **OK**.

Set Parameters

Opens the Parameter Set window (see Figures 3-3 and 3-4). You have to activate the Advanced Commands before can you utilize Set Parameters (see the Advanced Options option below).

Parameters can be set for the robot and for each one of the eight axes. Select the appropriate tab and set the desired parameters.

Line Number

Shows/hides program line numbers in the program window.



Reload last project at startup

When checked, opens the last project saved when SCORBASE is started.

Level 1

Displays list of commands and options at introductory level. Commands related to Levels 2 and 3 are disabled.

Level 2

Displays list of commands and options at advanced level. Commands related to Pro are disabled.

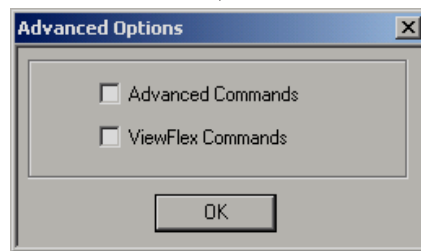
Pro

Displays list of all commands and options.

Advanced Options

Opens a dialog box in which these options are available:

- *Advanced Commands (see Chapter 6, Program Editing).*
- *ViewFlex Commands (see the ViewFlex User Manual).*



When one or both options are checked, the corresponding commands (Advanced Commands and Vision Commands) are listed under the Command tab of the Workspace window.

Parameter Set Windows

Section	Key	Description	Value
Limits	BaseAngle1	t of axis motion, in angles (degrees), from horizontal reference position	174.0
	BaseAngle2	t of axis motion, in angles (degrees), from horizontal reference position	-132.0
	ShoulderAngle1	t of axis motion, in angles (degrees), from horizontal reference position	31.0
	ShoulderAngle2	t of axis motion, in angles (degrees), from horizontal reference position	-124.0
	ElbowAngle1	t of axis motion, in angles (degrees), from horizontal reference position	160.0
	ElbowAngle2	t of axis motion, in angles (degrees), from horizontal reference position	-115.0
	PitchAngle1	t of axis motion, in angles (degrees), from horizontal reference position	115.0
	PitchAngle2	t of axis motion, in angles (degrees), from horizontal reference position	-113.0
	RollAngle1	t of axis motion, in angles (degrees), from horizontal reference position	570
	RollAngle2	t of axis motion, in angles (degrees), from horizontal reference position	-570
	RMin	Lower limit of working envelope radius, in meters	0.05
	RMax	Upper limit of working envelope radius, in meters	0.940
	ZMin	Lower limit of Z coordinate, in meters	-0.109
ZMax	Upper limit of Z coordinate, in meters	0.940	
Singularity	Minimum elbow angle, in degrees	5	
Geometry	BaseHeight	inate of the rotation axis of arm link 2 when robot at home position, in	0.349
	Joint1Offset	ate of the rotation axis of arm link 2 when the robot at home position,	0.016
	ShoulderLength	Length of arm link 2 from the first articulated joint, in meters	0.221
	Joint2Offset	ffset from center along the Y-axis of the TCP when robot at home pos	0
	ElbowLength	Length of arm link 3 from the second articulated joint, in meters	0.221
	GripperLength	Distance from pitch axis to tip of gripper, in meters	0.145
HomingSeq	HomingAxis_1	First robot axis for homing	2
	HomingAxis_2	Second robot axis for homing	3
	HomingAxis_3	Third robot axis for homing	5

Figure 3-3: Parameter Set Window - for Robot

Section	Key	Description	Value
General	AxisType	Axis type bitmap; bit mask: 0=rotational, 1=linear, 2=gripper, 4=unlimited axis	0
	ImpactDetect	Maximum position error for impact detection, in encoder counts	70
	EncLimit_1	Lower limit of axis motion, in encoder counts	-18000
	EncLimit_2	Upper limit of axis motion, in encoder counts	1500
	MaxSpeed	Maximum speed setting, in units of encoder counts/(second)	6500
Speed	MaxAccel	um acceleration/deceleration allowed for each axis during movement; in units of encoder counts/(sec	11000
	Manual_1	Speed setting for manual movement in one direction.	145
	Manual_2	Speed setting for manual movement in opposite direction.	-145
Cartesian	NoEnc90	mber of encoder counts for 90 degrees; when axis is linear, value is number of encoder counts for 90 r	-10216
	HorizPos	Encoder count at horizontal reference position	-13653
Servo	PropGain	Proportional feedback constant	120000
	DifferGain	Differential feedback constant	1200000
	IntegralGain	Integral feedback constant	12000
	FeedForward	Velocity feed forward constant	0
	Bias	Zero offset bias	0
Homing	Velocity	Homing Velocity	100
	ImpactCondEnc	Maximum encoder counts for impact detection during homing	2
	ImpactCondTicks	Number of ticks (24 ms) for impact detection during homing	10
	MaxTime	Maximum time for homing, in milliseconds	30000
	MaxDistance	Maximum movement during homing, in encoder counts	30000
	Offset	Offset after home switch found, in encoder counts	-190

Figure 3-4: Parameter Set Window - for Axes

SCORBASE contains the following parameter sets:

Parameter Set	Description
\$2KG	Moves objects that weigh about 2 kg.
\$3KG	Moves objects that weigh about 3 kg.
\$Current	Current parameter set loaded to the controller.
\$Default	Default set when parameters are optimized.
Maxspeed	Activates the robot at maximum speed.

To modify any of the parameters of the above vendor supplied sets you must save the set under a different name. Click the Save As icon to open the dialog box. Enter the name of the new Parameter Set and click OK to save it.

Use the Parameter Set window tool bar to select one of the following options:



Open Displays the Open Parameter Set window. Select the desired Parameter Set from the list.



Save Saves the Parameter Set after changes have been affected.
A Parameter Set marked with the \$ symbol cannot be changed and saved. The set must first be saved under a new name using the Save As icon.



Save As Opens the Save Parameters Set As dialog box. Enter the name of the new Parameter Set and click OK to save it.



Default Displays the \$Default Parameter Set.



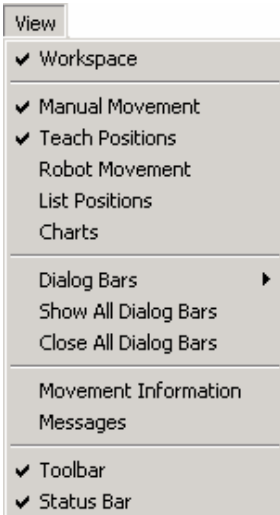
Apply Loads the selected Parameter Set to the controller.



View Opens the selected Parameter Set Window which lists all the parameter keys, with description and value, included in the Parameter Set. The keys are listed by sections (see Figures 3-2 and 3-3).

For more information on SCORBASE Setup Options, see Chapter 10.

View Menu

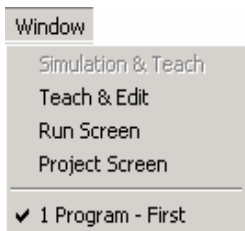


The options in the View menu allow you to show/hide SCORBASE dialog bars and windows.

Workspace	Shows/hides the Workspace window. Through this window, the user can access the project files and the SCORBASE commands tree (see Chapter 6, Program Editing).
Manual Movement	Shows/hides the Manual Movement dialog box. This box enables manual control over the movements of the robot, the gripper and peripheral axes.
Teach Positions	Shows/hides the Teach Position dialog box. This box enables recording, teaching and deleting positions. It also enables the user to send the robot and/or peripherals to a previously defined position.
Robot Movements	Opens a dialog box that displays the robot axes. Pressing on a selected axis moves it in the selected direction.
List Position	The List Positions window displays the positions of the currently open project. The list is presented in tabular format.
Charts	Opens Charts window. See Charts later in this chapter.

Dialog Bars	<p>Toggles the display of seven dialog bars that enable the following:</p> <ul style="list-style-type: none"> • <i>Joints</i> – Displays the robot’s joints angle (five joints). • <i>XYZ</i> - Displays the robot tool center point (TCP) position and orientation. The coordinate system origin is at the center of the robot base at table level. • <i>Digital outputs</i> - Displays the status of digital outputs 1-8 (dark green - off; light green - on). Click on an output to show/hide its status. • <i>Digital inputs</i> - Displays the status of digital inputs 1-8 (dark green - off; light green - on). In <i>Off-line</i> clicking on input toggles its status. • <i>Analog outputs</i> - Displays the value of analog output 1&2 (0-255)-(0-10 volt). • <i>Analog inputs</i> - Displays the value of analog input 1-4 (0-255). In <i>Off-line</i> you may set the analog input value. • <i>Encoders</i> – Displays the encoder counts of axes 1-8. (Encoders are zeroed after homing the system.)
Show All Dialog Bars	Displays all seven dialog bars.
Close All Dialog Bars	Closes all seven dialog bars
Movement Information	<p>Displays the following data:</p> <ul style="list-style-type: none"> • Position error of eight axes in encoder counts • Home switch status of all eight axes • PWM for one selected axis. The PWM (Pulse Width Modulation) is the controller output for the selected axis motor.
Messages	<p>Opens the Messages window.</p> <p>The data printed in the Messages window is printed using the PS (<i>Print to Screen & Log</i>) command.</p>
Toolbar	Shows/hides the programming toolbar (default on).
Status Bar	Shows/hides the lower status bar (default on).

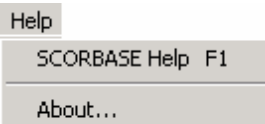
Window Menu



The Window menu enables you to select the desired window display.

Simulation & Teach	Sets the screen to display the RoboCell window and dialog bars required to define positions.
Teach & Edit	Opens Teach position, Manual movement, Program and Workspace windows.
Run Screen	Displays the dialog boxes and menus used for program execution.
Project Screen	Displays the Program and Positions of the Project.
[Project Name]	Displays the Project name of a program which is running.

Help Menu



The Help menu options:

SCORBASE Help (F1)	Opens SCORBASE on-line help.
About	Shows the SCORBASE software version.

Charts

SCORBASE charts can be configured to display the following data (Y-axis) vs. time (X-axis).

- Encoder counts (axis position), represent the actual axis position. The encoder counts are shown in a blue line.
- Position error is the difference between the required axis position and the actual axis position. The error is expressed in encoder counts and shown in a red line.
- The PWM value represents the controller output. The error and the axis control parameters determine the PWM value shown in a green line.

Each axis data (1-8) is shown in a different chart. Sample charts for axes 1 and 2 are shown in Figure 3-5.

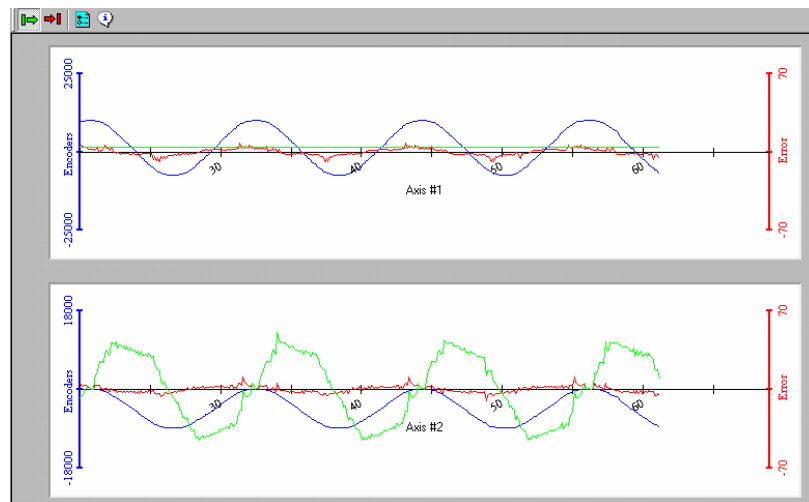



Figure 3-5: Chart for Two Axes

To open the Charts window, do one of the following:

- Click the Charts icon in the toolbar .
- Select View | Charts.

The following options are available in the Charts window toolbar:



Start chart Starts drawing the chart.



Stop chart Stops drawing the chart.



Options Opens the Chart Options dialog box where you can select the data to be displayed in the chart(s).

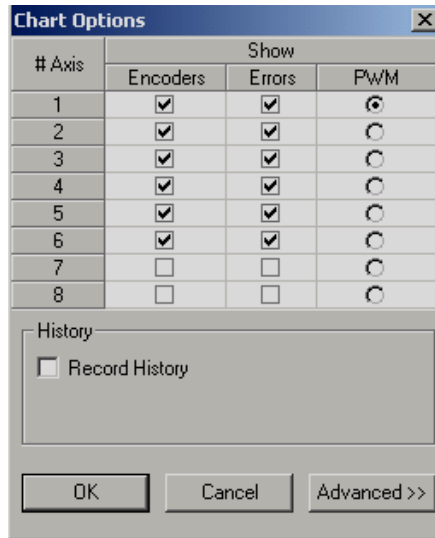


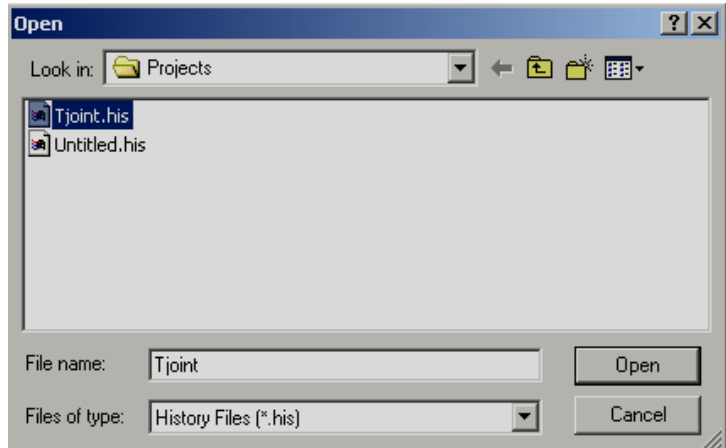
Figure 3-7: Chart Options Dialog Box

Click the data that you want displayed in the charts.

The example shown in Figure 3-4 results in the display of the Encoder, Error and PWM of axis 1, as well as the display of the Encoder and Error for axes 2 through 6. Since each axis is shown in a different chart, six charts will be displayed.

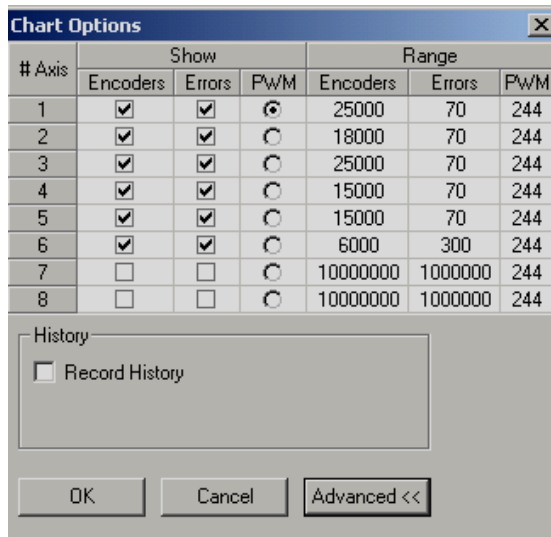
Any chart can be saved to a history (*.his) file. To do so:

- Check the Record History box.
- Click the Browse button (which becomes available) to open the window.
- Select the folder and enter the name of the file to be saved.



To set the resolution of the chart for the Encoder, Errors and PWM:

- Click the Advanced button in the Chart Options dialog box. The Range column opens.



History

Opens the History Files Window (see Figure 3-5). Select the desired history (*.his) file from the list or browse to locate it.

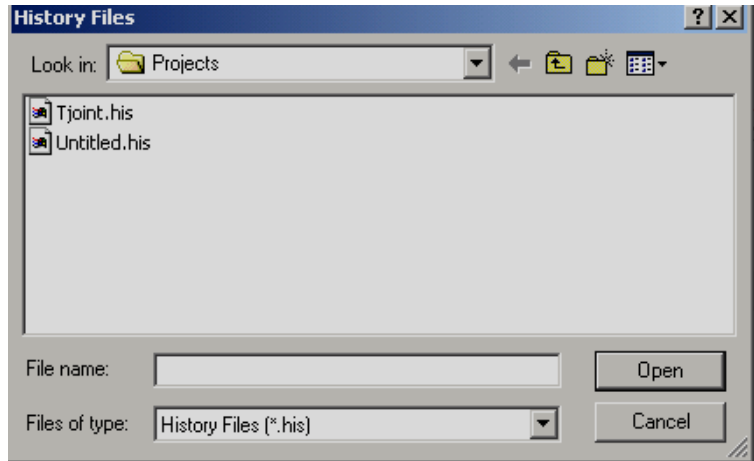


Figure 3-8: History Files Window

Note: To open a history file you must first stop drawing the chart.



Legend

Displays the colors used in the charts for Encoder, Error and PWM.

Encoders – Blue

Error – Red

PWM – Green

4

Homing and Control

General

The robot and peripheral axes location is monitored and controlled using encoders. To initialize the encoders and to obtain repeatable performance the axes must first reach a predefined position known as *hard home*. All recorded positions and movements refer to the hard home position. The homing procedure finds the hard home for the selected axes.

SCORBASE offers two commands relating to the home position.

- Search Home starts the homing procedure. During Search Home each axis is homed separately. The controller activates the currently homed motor axis, until its micro-switch is pressed. Then the controller initializes the axis encoder counter and turns to home the next axis. After all configured axes are homed, the homing procedure ends.
- Go Home sends the selected axes to a position where the encoders' value is zero. **Note:** *This command does not home the axes.*


The two commands are available in three levels:

- Search / Go home all (applies for all active axes)
- Search / Go home robot (applies for the robot)
- Search / Go home peripherals (applies for axes 7 & 8).

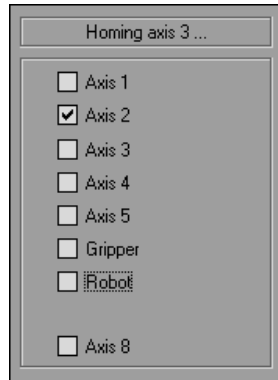
Search Home Command

All Axes

To start the homing procedure, do one of the following:

- Select Run | Search home - all axes.
- Click the Search Home  icon.

A window opens displaying the number of the axis currently being homed. Each time an axis is successfully homed, a checkmark appears next to the axis number. After the five axes and the gripper have been homed, a checkmark appears next to Robot.



To abort homing while the procedure is still in progress, do one of the following:

- Press F9 (Stop command)
- Press the red EMERGENCY button on the controller.
- Press the EMERGENCY key on the Teach Pendant.

If the homing procedure fails, a message appears.

The Search Home - All Axes command executes the robot's homing procedure as well as that of any peripheral devices that have been configured in the Options | Peripherals Setup menu. The command is available only when SCORBASE is On-line for the first time.

If the system has already been homed and you change SCORBASE to Off-line mode, there is no need to home the system again when you return to On-line mode.

When SCORBASE is Off-line, or when RoboCell is installed, the homing procedure is not required, although it can be executed. The homing procedure initializes Joint and XYZ values according to a software definition. All encoders are set to 0, while the robot Cartesian coordinates are set according to a software model.

Search Home - Robot

This command runs the homing procedure for the robot.

Homing of the peripherals is enabled only after the system has been homed once.

Search Home - Peripherals

This command runs the homing procedure for the configured peripherals.

Homing of the robot is enabled only after the system has been homed once.

Go Home Command

All Axes – Robot – Peripherals

After the axes have been homed, select Run | Go Home - All Axes to send the axes back to their home position at any time. This command sends the robot and peripherals to a position where the axes encoders value equals zero. The Go Home command does not run the homing procedure.

Selecting the Go Home - Robot or Go Home - Peripherals command sends the selected axis to its home position.

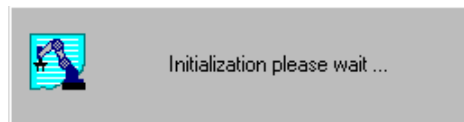
On-line / Off-line Modes

SCORBASE can run either in On-line or in Off-line mode. In On-line mode, SCORBASE communicates with the controller over the USB channel. If the Control On state is selected, SCORBASE controls the robot, peripherals and I/O device. In Off-line mode, SCORBASE can be used only in the Control Off state (useful for programming and debugging). The active mode is displayed in the status bar.

To change to On-line, select Options | On-line.

To change to Off-line, select Options | Off-line.

If SCORBASE is opened in On-line, or On-line is selected from the Options menu, this message appears as SCORBASE searches for the controller:




If the controller is detected, On-line mode is activated.

If the controller is not detected, Off-line remains the active mode.


Control On / Control Off – CON/COFF

The Control On state enables servo control of the axes and I/O device. This state is available only in On-line mode. In the Control Off state, axis movement commands cannot be executed. The Control state (On or Off) is displayed in the lower right corner of the status bar.

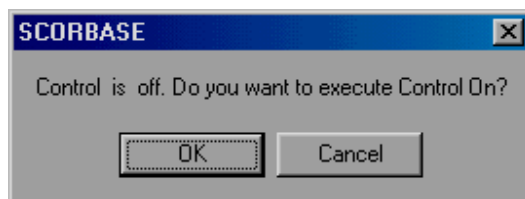
To enable control of the axes, do one of the following:

- Select Option | Control On.
- Click the Control On icon .
- Press the F5 key.

To disable control, do one of the following:

- Select Option | Control Off.
- Click the Control Off icon .

If you have disabled control and SCORBASE opens in On-line mode, or On-line mode is selected after detection of the controller, this prompt appears:



Press OK to enable control or press Cancel to remain in the Control Off state.

The controller automatically disables control if an impact condition, trajectory error or thermic overload error occurs during execution of a movement command. If you attempt to move the axes when control is disabled, this error message appears:



When SCORBASE is in Off-line mode, the Control On/Off state cannot be altered.

5

Position Definition

Every SCORBASE project includes a set of pre-defined positions and a program that sends the robot from one position to the other. Prior to running a program all the positions used in that program should be defined. SCORBASE offers various tools to define and store positions that will be used in the programs.

The following SCORBASE tools are used in the position definition process.

- Manual Movement dialog box
- Teach Positions (simple or expand)
- Robot movement dialog box
- Position data dialog bars
- Position window

To activate the dialog boxes which are most useful for position definition, select Window | Teach & Edit.

Any of the following four methods can be used for position definition:

No.	Method	Level
1	Absolute position Joint coordinates	1, 2, Pro
2	Relative position Joint coordinates	2, Pro
3	Absolute position Cartesian coordinates	2, Pro
4	Relative position Cartesian coordinates	2, Pro

Note: Peripheral position definition can only be performed in the Pro level.

Joint and Cartesian Coordinate Systems

Defining a position in SCORBASE can be done by using either the Joint or Cartesian coordinate systems. In both systems, a robot position is defined using five parameters derived from the data supplied by the five axes encoders. An encoder is an angular movement sensor attached to the axes motor.

A Peripheral position is always defined using one variable that stores the sensor output (encoder value) of that position.

Joint Coordinate System

A robot position in Joint coordinates is defined by five angle values, representing each angle of the joints. The joint names are Base, Shoulder, Elbow, Pitch, and Roll.

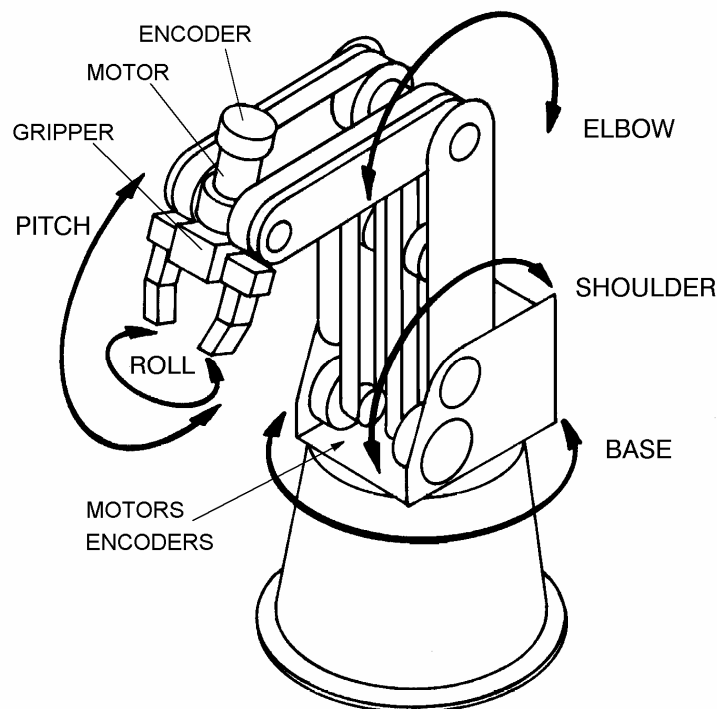


Figure 5-1: Robot Joints

For example after homing, the robot position in Joints coordinates is:

Axis #1 - Base = (0°)

Axis #2 - Shoulder = (-120°)

Axis #3 - Elbow = (-95°)

Axis #4 - Pitch = (-88°)

Axis #5 - Roll = (0°)

Cartesian (XYZ) Coordinate System

A robot position in Cartesian (or XYZ) coordinates is defined by these parameters.

- The distance of the robot's Tool Center Point (TCP) from the point of origin (the center bottom of the robot base), along the three axes that describe three-dimensional space (X,Y,Z).
- The Pitch and Roll angles of the gripper, specified in angular units.

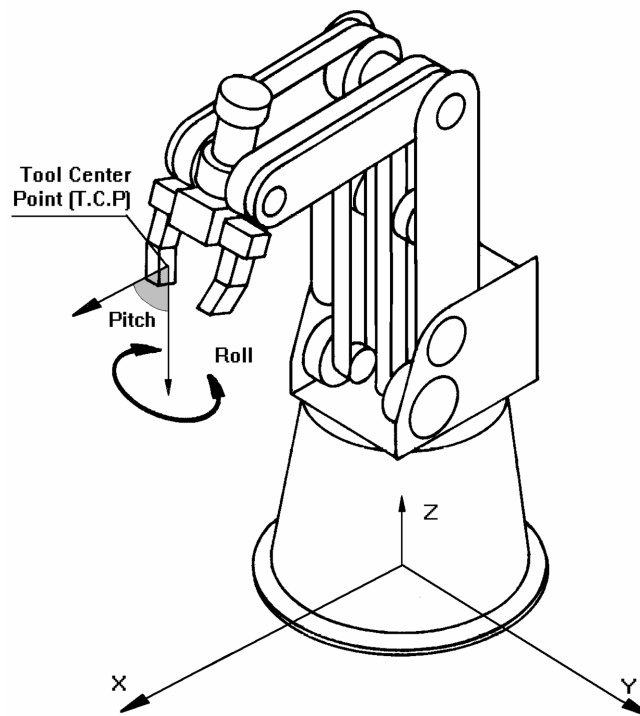


Figure 5-2: XYZ

For example after homing, the robot position in Cartesian coordinates is defined as:

$X = (-169) \text{ [mm]}$

$Y = (0) \text{ [mm]}$

$Z = (-503) \text{ [mm]}$

$\text{Pitch} = (-63^\circ)$

$\text{Roll} = (0^\circ)$

A position recorded in one coordinate system can be converted by SCORBASE to another coordinate system.

Absolute and Relative Positions

SCORBASE offers two methods of defining a robot or peripheral position: Absolute and Relative. The two methods are applicable in Cartesian and in Joint coordinates.

An *absolute* position is defined using all five robot position parameters. If the Joint coordinate system is used, the robot position is defined using the Base, Shoulder, Elbow, Pitch, and Roll angles. In the XYZ coordinate system, a position is defined using the X, Y, Z values in millimeters, and the Pitch and Roll angles in degrees. An absolute position is usually a fixed position in world space.

A *relative* position is a position whose coordinates are defined as an offset from a *reference position* coordinates. If the coordinates of the reference position change, the relative position moves along with it, maintaining the same offset. A relative position can be defined in either Cartesian or Joint coordinate values.

A position can also be defined as *relative to current*. In this case, the relative position is calculated as an offset from the coordinates of the current robot position.

Record and Teach

Although the terms *teach* and *record* are often used interchangeably, SCORBASE makes the following distinction:

Record position: defines a robot position in a Joint coordinates system.

Teach position: defines a robot position in a Cartesian coordinates system.

Manual Movement Dialog Box

Recording a robot position (in Joint coordinates) is done by manipulating the robot to the required position and then recording it. The Manual Movement dialog box allows direct control and manipulation of the robot and peripheral axes.

The Manual Movement dialog box is automatically opened when a project is opened, or when the Window | Teach & Edit display setting is selected.

To open the Manual Movement dialog box when there is no open project, select View | Manual Movement.



Figure 5-3: Manual Movement Dialog Box (SCORBOT ER-4U)

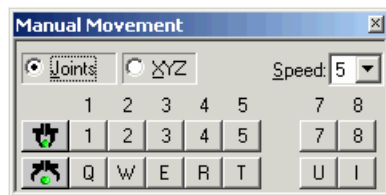


Figure 5-4: Manual Movement Dialog Box (SCORBOT ER-2U)

Note: Axis 6 is not applicable in SCORBOT-ER 2u.

The following chart explains how clicking the buttons in the Manual Movement dialog box (or pressing the corresponding keys on the keyboard) controls the robot and peripheral movements.

Joints When Joints is selected, clicking the buttons (or pressing the corresponding keys on the keyboard) moves one robot axis at a time, as described below:

Keys	Joint Motion
1 / Q	Rotates the BASE right and left.
2 / W	Moves the SHOULDER up and down.
3 / E	Moves the ELBOW up and down.
4 / R	Moves the wrist (PITCH) up and down.
5 / T	Rotates the wrist (ROLL) right and left.
6 / Y	Opens and closes gripper via servo control.
7 / U	Moves peripheral axis #7 (if connected).
8 / I	Moves peripheral axis #8 (if connected).

XYZ

When XYZ is selected, clicking the buttons (or pressing the corresponding keys on the keyboard) moves the TCP, as described below.

Movements in XYZ mode are sometimes a combination of simultaneous movements of a few axes.

Keys	XYZ Motion
1 / Q	TCP moves along X-axis (back and forth).
2 / W	TCP moves along Y-axis (right and left).
3 / E	TCP moves along Z-axis (up and down).
4 / R	Axes move in order to change the gripper's pitch angle; the TCP position does not change.
5 / T	The gripper rolls; the TCP position does not change.



Open Gripper

Completely opens the gripper.



Close Gripper

Completely closes the gripper.



Go to position

Goes to the Go to Position command. Sends the axes to the selected position.



Go Linear to position

Goes to Go Linear to Position command.

The robot can be manipulated from the Manual Movement dialog box before it has been homed in Joint mode only. In fact, it is often necessary to bring the robot into a more suitable position before initiating the homing routine. However, an axis limit error message may appear during manipulation of a robot that has not been homed.

Movement of an axis continues as long as the button or key is pressed, or until a software or hardware limit is reached.

Robot Movement Dialog Box

The Robot Movement dialog box enables control over the robot in XYZ and Joint modes.

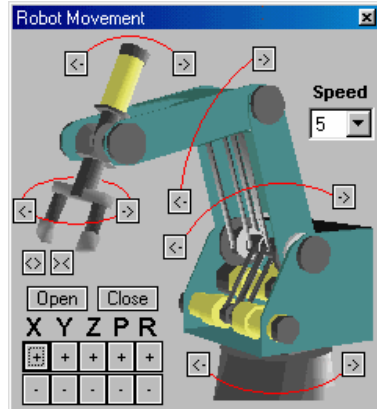


Figure 5-5: Robot Movement Dialog Box

Clicking on an axis image or the XYZPR buttons moves the robot as described in the Manual Movement dialog box above.

To open the Robot Movement dialog box, select View | Robot Movement.

Teach Positions Dialog Box

The Simple/Expanded Teach Positions dialog box enables the following:

- Teaching positions (in Joint coordinates).
- Recording positions (in Cartesian coordinates).
- Sending the axes to the recorded positions (when program is not running).

To display the description of the function of each icon in the Teach Position dialog box, simply place the mouse on the desired icon without clicking a mouse button.

The user can define 1000 positions. A higher computer (CPU and memory) can hold more positions.

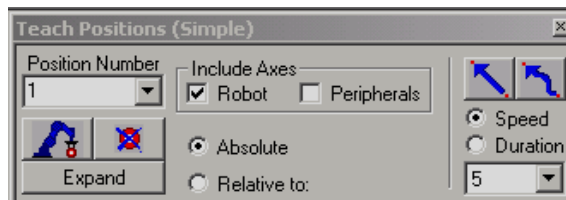






Figure 5-6: Teach Positions Dialog Box (Simple)

The Teach Position (Simple) dialog box offers the following options:

Position Number	1, 2 & Pro	A numerical name for position.
 Record	1, 2 & Pro	Records the current robot position (in joint coordinates) to the position displayed in the position number field.
 Delete	1, 2 & Pro	Deletes from memory the position in the position number field.
Expand/Simple	2 & Pro	Opens the Teach Positions (Expanded/Simple) dialog box.
Include Axes	Pro	Instructs the controller to define coordinates for Robot, Peripheral axes or both. A peripheral position can be recorded only in the Pro level.
Absolute / Relative to	2 & Pro	Defines positions either as absolute or relative to another position. When Relative to is selected, a Relative to field appears. Select either an existing position or Current. A position that is Relative to Current means that the reference position is the robot position at the time it is sent to that position.
 Go to Position	1, 2 & Pro	Executes the Go to Position command. Sends the axes to the selected position.
 Go Linear to Position	2 & Pro	Executes the Go Linear to Position command which sends the robot's TCP (Tool Center Point) from its current position to the selected position along a linear path (straight line). The linear motion applies only to the robot axes.
Speed	1, 2 & Pro	Selects the speed for all movement commands. 10 fastest, 1 slowest, 5 default.
Duration	Pro	Defines the time it takes to complete a movement command. The time is defined in tenths of a second. For further information, see Chapter 7.

Expand (2 & Pro)

Click Expand to open the Teach Positions (Expanded) dialog box:

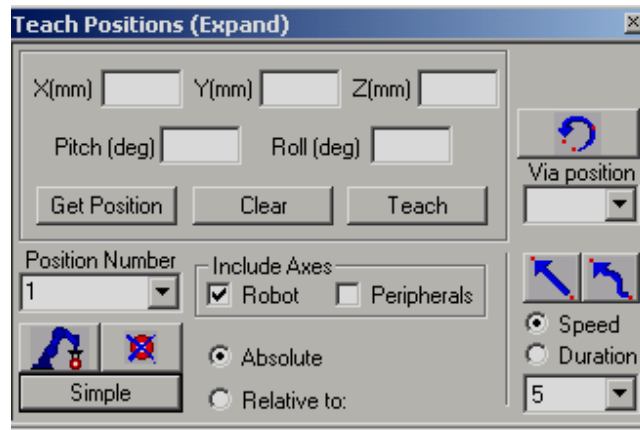


Figure 5-7: Teach Positions Dialog Box (Expand)

X(mm), Y(mm) Z(mm), Pitch (deg.) Roll (deg.)	Fields for displaying or changing the Cartesian coordinates of the selected position.
Get Position	Displays the Cartesian coordinates of the selected position.
Clear	Clears all position coordinate fields. The position data does not change.
Teach	Teaches position using the Cartesian coordinates system.
Go Circular	Executes the Go Circular to Position command. This command sends the robot in a circular path to the target position (in the position number field), via the position specified in the Via position field. The circular motion applies only to the robot.
Via position	Selects the intermediate position through which the Go Circular movement passes.
Simple	Toggles to the Simple Teach Position dialog box.

Record Positions (Joint Coordinates)

Record Absolute Position (Levels 1, 2 & Pro)

To record an absolute position:

1. Use either the Manual Movement dialog box or the Robot Movement dialog box to move the robot to the position you want to record.
2. Click on the Teach Position dialog box.
3. Type a Position Number in the Position number field, or select an Existing Positions number if you want to modify (overwrite) a previously defined position.
4. Select Absolute.
5. Select Include Axes (Robot or Peripherals):
 - a. Robot: to record a position for the robot axes.
 - b. Peripherals: to record a position for the peripheral axes (Pro level only).
 - c. The user can select both.
6. To record the current position, click the Record Position icon.

Record Relative Position (Level Pro)

To record a relative position:

1. Make sure you have first defined a reference position.
2. Move the robot to the position whose coordinates you want to record as relative to another position.
3. In the Position Number field in the Teach Positions (Simple) dialog box, enter a new position number.
4. Select Relative to, and enter a number (or select Current) for the reference position in the Relative to field.
5. Click Record. You have now recorded a relative position.

A position that is Relative to Current means the specified offset will be computed from the location at which the robot is positioned at the time it is sent to the relative position. If the reference position changes, the relative position also moves.

Teaching Positions (XYZ Coordinates)

In order to teach a position in XYZ coordinates, click Expand.

Teach Absolute Position (Levels 2 & Pro)

To teach an absolute XYZ position

1. Click Expand.
2. Enter XYZ Pitch and Roll values.
3. Click Teach.

To use existing position coordinates to define a new position (or modify that position's coordinates), do the following:

1. In the Position Number field in the Teach Positions dialog box, select an absolute position number.
2. Click Get Position. The XYZPR values of the position now appear in the XYZ Pitch Roll fields. **Note:** *If the position is relative, only the offset values will be displayed.*
3. In the Position Number field, enter a different number (or leave the position number if you want to modify that position).
4. To record a position for the robot axes, click Robot.
To record a position for the peripheral axes, click Peripherals.
To record positions for both, click Robot and Peripherals.
5. In one or more of the coordinate fields, enter a new value (in millimeters or degrees).
6. Click Teach.

Warning: If you click Record, the current TCP coordinates will be written to the selected position.

Teach Relative XYZ Position (Levels 2 & Pro)

To record a relative XYZ position:

Make sure you have first recorded the reference position.

1. In the Position Number field, in the Teach Positions dialog box, enter the new position number.
2. Select Relative to, and enter the number of the reference position in the Relative to field. All XYZ coordinate fields are blank or show 0.
3. In one or more of the coordinate fields, enter a new value (in millimeters or degrees).
4. Click Teach.

A position that is relative to current means the specified offset will be computed from wherever the robot is located at the time it is sent to the relative position.

If the reference position changes, the relative position moves accordingly.

List Positions Window

List Positions

The List Positions window displays the positions of the currently open project. The list is presented in tabular format. As default, the table presents position information in Joint and Cartesian coordinate systems.

Each row in the table represents a single position. To manipulate the list:

- Select a position (row).
- Right-click to display the popup window.

Positions - Er4cell1									
#	Coor.	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 7	Axis 8	Type
		X (mm)	Y (mm)	Z (mm)	Pitch (deg)	Roll (deg)	(mm/deg)	(mm/deg)	
1	Joint	0.00	-8.93	107.87	-8.93	0.00			Abs. (Joint)
	XYZ	200.00	0.00	20.00	-90.00	0.00			
2	Joint	0.00	-8.88	89.59	9.29	0.00			Abs. (Joint)
	XYZ	270.01	0.00	20.01	-90.00	0.00			
3	Joint	0.00	-2.95	65.09	27.87	0.00			Abs. (Joint)
	XYZ	340.00	0.00	20.00	-90.00	0.00			
4	Joint	45.00	-9.35	105.05	-5.70	45.02			Abs. (Joint)
	XYZ	149.99	149.99	19.99	-90.00	45.02			
5	Joint	45.00	-6.17	76.21	19.95	45.02			Abs. (Joint)

#	Coor.	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 7	Axis 8	Type
		X (mm)	Y (mm)	Z (mm)	Pitch (deg)	Roll (deg)	(mm/deg)	(mm/deg)	
1	Joint	0.00	-8.93	107.87	-8.93	0.00			Abs. (Joint)
	XYZ	200.00	0.00	20.00	-90.00	0.00			
2	Joint	0.00	-8.88	89.59	9.29	0.00			Abs. (Joint)
	XYZ	270.01	0.00	20.01	-90.00	0.00			

Figure 5-8: List Positions with Add Watch Bar on the Bottom

Position Popup Window

Position #3
Delete
Delete All
Add Watch
Show Joint
Show XYZ
<input checked="" type="checkbox"/> Show Both

Position No.	The number/row of the position in the list
Delete	Deletes the selected position.
Delete All	Deletes all listed positions from the SCORBASE memory.
Add Watch	Moves the position data to the watch list.
Show Joint	Shows only Joint values of all positions.
Show XYZ	Shows only the XYZPR of all positions.
Show Both	Shows both Joint and XYZPR values of all positions.

Note: The peripheral positions are always displayed using encoder counts.

Dialog Bars

SCORBASE offers three dialog bars that display all axes encoder counts and the robot position in Cartesian (XYZ) coordinates and Joint coordinates. All dialog bars are accessible at all levels via the View menu.

Encoder Counts Dialog Bar

The Encoder Counts dialog bar displays the current values of the encoders for each of the eight axes.

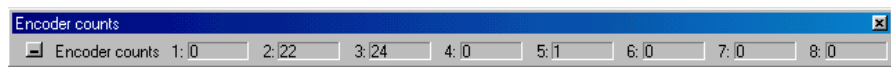


Figure 5-9: Encoder Counts Dialog Bar

To display the Encoder Counts dialog bar, select View | Dialog Bar | Encoders. The encoder values change whenever the axes are moved.

These values are set to 0 (or close to zero) after the Search Home command is executed.

XYZ Dialog Bar

The XYZ dialog bar displays the current Cartesian (XYZ PR) values of the TCP.

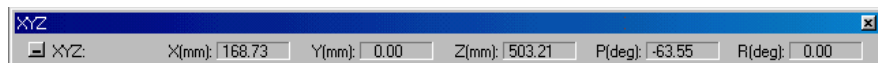


Figure 5-10: XYZ Dialog Bar

To display the XYZ dialog bar, select View | Dialog Bar | XYZ.

The values shown in the above example are the Joint values after the Search Home command is executed.

Joints Dialog Bar

The Joints dialog bar displays the angles between the two links of the joint, in degrees.



Figure 5-11: Joints Dialog Bar

To display the Dialog bar, select View | Dialog Bar | Joints.

The values shown in the above example are the XYZ values after the Search Home command is executed.

Using a Teach Pendant with SCORBASE

The Teach Pendant is a hand-help terminal that permits the operator direct control of the robot and peripheral axes. In addition to controlling movement of the axes, the Teach Pendant may be used for recording positions, sending the axes to recorded positions, and other functions.

To control the axes from the Teach Pendant, SCORBASE must be operating in the On-line mode, and the Teach/Manual switch on the Teach Pendant must be switched to Teach. This disables control of the axes from SCORBASE dialog boxes.

All Teach Pendant operations are reflected in the SCORBASE dialog boxes. For example, positions recorded by the Teach Pendant will appear in the Position Number list in the Teach Positions dialog box; and encoder and XYZ values will change in the Encoder Counts and XYZ dialog boxes.

The Teach Pendant operation is described fully in the Teach Pendant for Controller User Manual.

6

Program Editing

A SCORBASE program is a set of instructions written by the user to control the robot, peripheral equipment and to communicate with external I/O devices. This chapter explains how to create and edit a SCORBASE program.


The following tools are used for program editing:

- Program commands editor.
- Command tree that lists all SCORBASE commands.

Opening and Closing a Program

Every SCORBASE program is part of a SCORBASE project. A project also includes the user-defined positions, project data and, if RoboCell is installed, a virtual cell (3dc file). Only one project can be opened at a time.


To open a saved program, open the project containing the desired program by doing one of the following:

- Select File | Open Project...
- Click on the Open an Existing Project icon .
- Press Ctrl + O.

In all cases, the *Load Project* window will open, prompting you to select the project that contains the program you want to edit.

The program is displayed in the Program window.

To open a new program, open a new project by doing one of the following:

- Select File | New Project...
- Click on the Create a new project icon .
- Press Ctrl + N.

To activate the dialog boxes that are most useful for program editing, select Window | Teach & Edit. The screen layout that appears depends on the currently selected SCORBASE level.

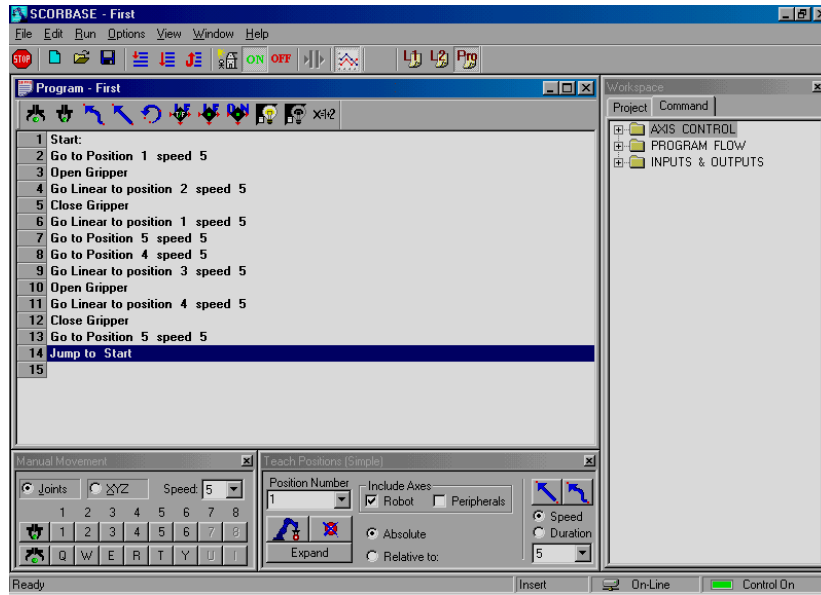


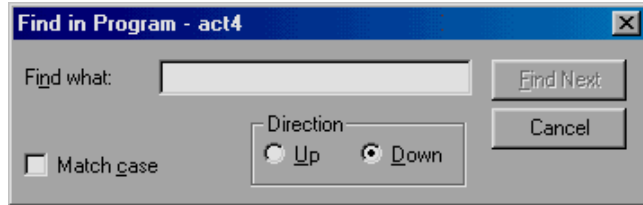
Figure 6-1: Project Window - Pro Level

Program Editing Tools

SCORBASE is a text based programming language in which every command is a single text line. SCORBASE programs are edited by means of the usual Windows text editing options, which can be accessed:

- Via the Edit menu
- By pressing the designated keys
- By right-clicking the mouse in the program window to open a pop-up menu.

Cut - Ctrl+X	Deletes selected text or lines from the program, and places it on the Windows and SCORBASE clipboards.
Copy - Ctrl+C	Places a copy of selected text or lines from the program on the Windows and SCORBASE clipboard.
Paste - Ctrl+V	Inserts the contents of the SCORBASE clipboard into the program.
Find - Ctrl+F	Opens a dialog box that allows you to search for any string, such as a command or text.

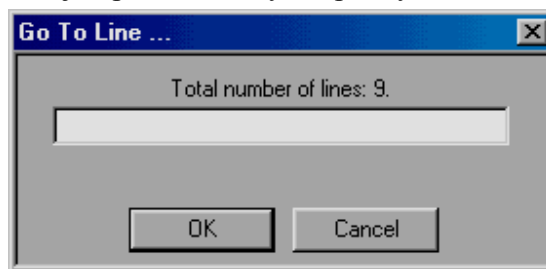


Find Next - (F3) Repeats the last Find operation for the next occurrence. (Accessible also from the Find dialog window).

Command/Remark (*...) Inserts/deletes asterisk at beginning of a command line.

SCORBASE ignores command lines that start with an asterisk. This feature is useful for debugging.

Go to Line Opens a dialog box that displays the total number of lines in the program and prompts you for a line number. Type in the number. The program editor will jump to the line you specify.



In addition, use the keyboard for the following functions:

[Ins] Toggles between Insert and Overwrite modes. The active mode is shown in the Status bar.

When Insert is active, a new command is inserted into the program above the line currently marked by the cursor.

[Del] Deletes the line or lines currently marked by the cursor.

[Ctrl+Home] Brings the cursor to the first line of the program.

[Ctrl+End] Brings the cursor to the last line of the program.

[PgUp] Displays the previous page of program lines.

[PgDn] Displays the next page of program lines.

Adding and Editing Commands

SCORBASE commands are organized in a Command Tree.

- At the Introductory level (Level 1), only basic commands appear in the Command Tree.
- At the Advanced level (Level 2), the number of commands is increased.
- At the Professional level (Pro Level), all commands are accessible.

To see the Command Tree, click the Command tab in the Workspace window.

SCORBASE commands are grouped into these categories:

- Axis & Control
- Program Flow
- Inputs & Outputs
- Advanced - By default, this category is hidden. Select Options | Advanced Options | Advanced Commands to display these commands.
- Vision - By default, this category is hidden. Select Options | Advanced Options | ViewFlex Commands to display these commands.

Clicking on a category opens/closes the list of commands.

To add commands to a program, do one of the following:

- Double-click on the desired command in the Command Tree.
- Type the two letters written next to the command.
- Click on the command icons in the Program window (applicable only for selected commands).

If you are working in Insert mode, the new command line is added above the currently selected (highlighted) line. If you are working in Overwrite mode, the new command replaces the selected line

Many commands open dialog boxes for completing the command line parameters.

To change a command parameter, click on the command to re-open the command dialog box. Change the required parameter, and click OK to close the dialog box. *Note: For safety reasons, certain parameters are not accessible by the user, i.e., they appear grayed, and can be changed only by Intelitek support personnel.*

To delete, cut, copy and paste a line, use the usual Windows tools.

Axis Control Commands

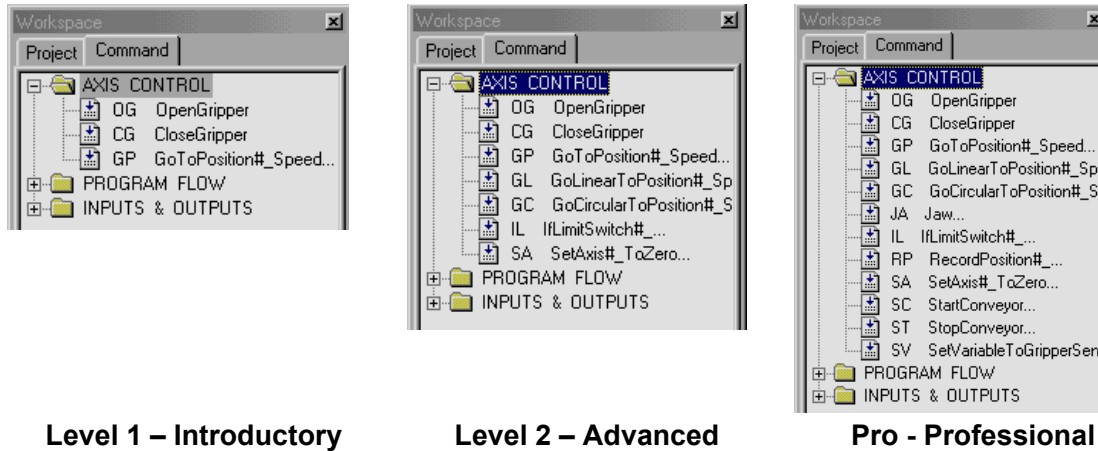
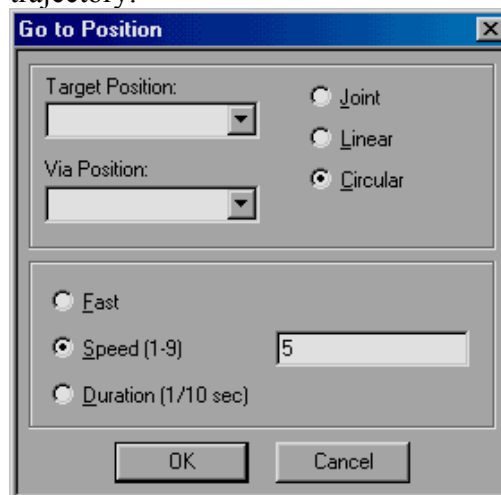


Figure 6-2: Command Tree - Axis Control

Icon	Command	Levels	Description
	OG Open Gripper	1,2,Pro	Fully opens the gripper.
	CG Close Gripper	1,2,Pro	Fully closes the gripper (on itself, or on a grasped object).
	GP Go to Position	1,2,Pro	Opens the Go to Position dialog box. The Go to Position command sends the robot to a recorded position, in the shortest time, using Point to Point (P to P) control. In Point to Point control, all axes move independently and there is no control over the TCP trajectory.



Target Position	The destination of the movement. Enter a number or a variable in this field.
Via Position	The position via which the destination of the movement is reached. Enter a number or a variable in this field.

Movement Control

Joint	Checked if window is opened from the Go to Position command. When Joint is selected, the robot moves to the target position in Point to Point control (no control over TCP trajectory).
Linear	Check to modify the Go to Position command to Go Linear to (available only in Levels 2 and Pro). See the Go Linear to command for more details.
Circular	Check to modify the Go to Position command to Go Circular to (available only in Levels 2 and Pro). See the Go Circular to command for more details.

Speed/Duration

Fast	Executes the movement at the fastest speed possible.
Speed	Executes the movement at a slower speed. Enter a number from 1 through 9, or a variable, in the Speed field. Default: 5 (average speed).
Duration	Executes the movement in a specific amount of time. Enter the time in tenths of a second, or a variable. Available only in Pro Level.



GL Go Linear to
Position #_Speed
...

2,Pro

Sends the robot's TCP (tool center point) from its current position to the target position, along a linear path (straight line). The linear motion applies only to the robot axes.



GC Go Circular
to Position #_
Speed...

2,Pro

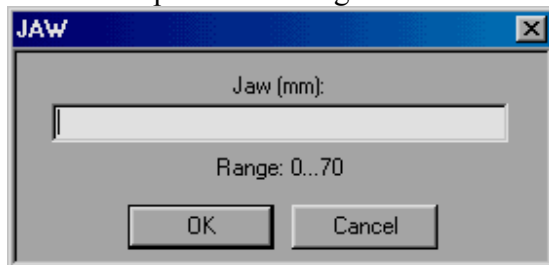
Sends the robot's TCP in a circular path to the target position, via the position specified in the Via Position field. The circular motion applies only to the robot.

Note: The Circular command follows the circle that blocks the triangle defined by the three positions (current TCP position and target position, and the intermediate position specified in the Via position field).

JA Jaw

Pro

Moves the gripper's jaw to the specified span. The command opens this dialog box:



Enter a number or a variable in the Jaw field.

Note: Accuracy cannot be guaranteed if the width is less than 5 mm or greater than 65 mm.

Jaw activates Servo Control for the gripper motor, whereas Open Gripper and Close Gripper commands do not use the gripper axis Servo Control.

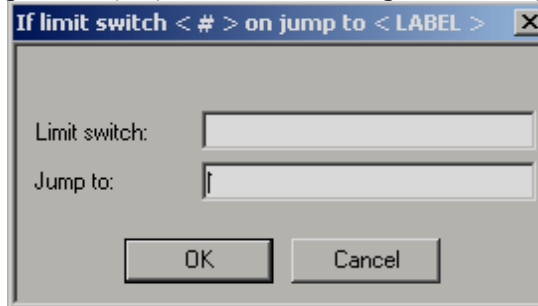
Unless you need the Jaw command for a specific application, the Open Gripper and Close Gripper commands are recommended.

Note: This command is applicable for SCORBOT ER-4u only.

IL If Limit Switch
< # > on jump to
<Label>

2,Pro

The IL is a conditional jump command. It causes program execution to jump to the line that contains the specified Label, if the selected axis micro switch is pressed (On). The command opens a dialog box.



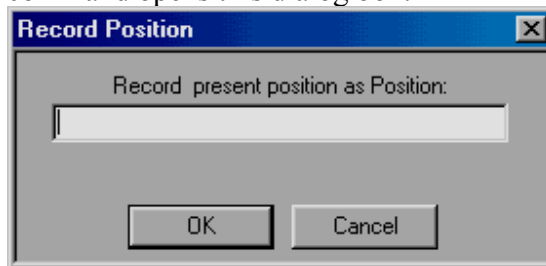
Enter the Axis number, or a variable in the Limit Switch field.

Enter the name of a Label in the Jump to field.

RP Record
Position #_

Pro

When the Record Position command is executed (during program execution), the controller records the current position data to the specified position. The command opens this dialog box:



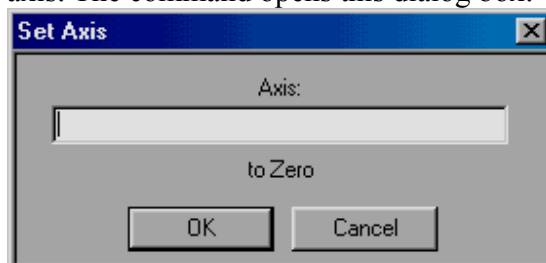
Enter a position number or a variable in the Record Present Position as Position field.

The Record Position command is useful when a position (and all relative positions that refer to that position) must be relocated, during program execution. This command updates the position data.

SA Set Axis #_
... (to Zero)

2,Pro

Initializes (sets to 0) the encoder count of the selected axis. The command opens this dialog box:



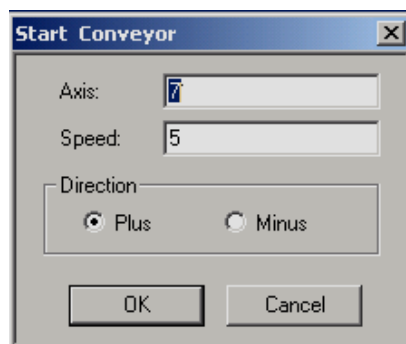
Enter a number or a variable in the Axis field.

SC Start
Conveyor

Pro

Starts the conveyor, as a speed-controlled conveyor. Movement of the conveyor will continue until a Stop Conveyor (ST) command is encountered.

The command opens this dialog box:



- Enter the Axis number in the Axis field
- Enter a number or a variable in the Speed field.
- Select a movement direction (Plus or Minus).

Note: When operating a speed controlled conveyor by means of the Start/Stop Conveyor commands, do not record positions, and/or use the Set Axis (to Zero) command for the conveyor, in the same program.

ST Stop
Conveyor

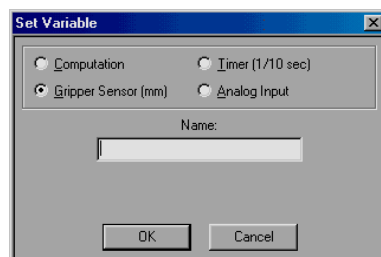
Pro

Stops the continuous motion of a conveyor that was initiated by a Start Conveyor command.

SV Set Variable
to Gripper Sensor

Pro

Assigns the value of the gripper opening (in mm) to a variable. This command is useful when there is a need to measure the object in the gripper, or to check the gripper status (open, closed or gripping an object).

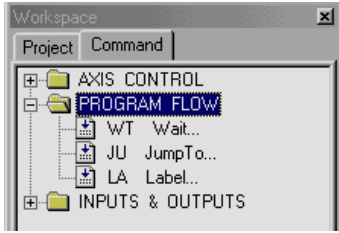


In the Name field, enter the name of the variable.

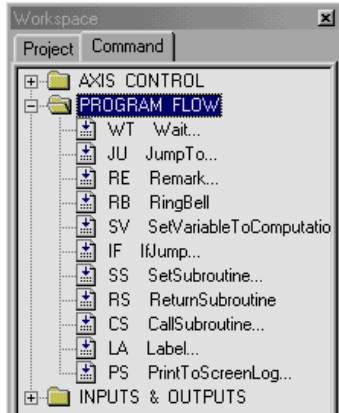
For more information on variables, refer to Chapter 7, Variable Programming.

Note: This command is applicable for SCORBOT ER-4u only.

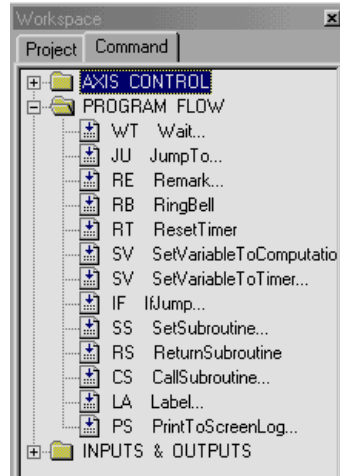
Program Flow Commands



Level 1 – Introductory



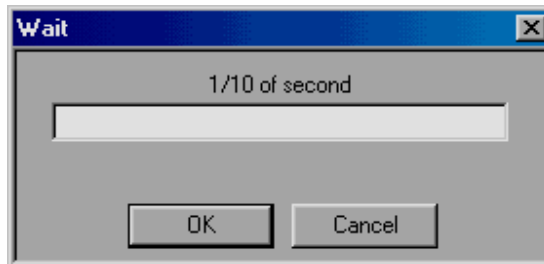
Level 2 – Advanced



Pro - Professional

Figure 6-3: Command Tree - Program Flow branch

Icon	Command	Levels	Description
	WT Wait (10ths of second)	1,2,Pro	Halts program execution for a specified time. The command opens this dialog box:
	JU Jump to	1,2,Pro	This unconditional jump command causes the program pointer to jump to the line that contains the specified Label. The command opens this dialog box:



Enter a number or a variable in the 1/10 of second field.

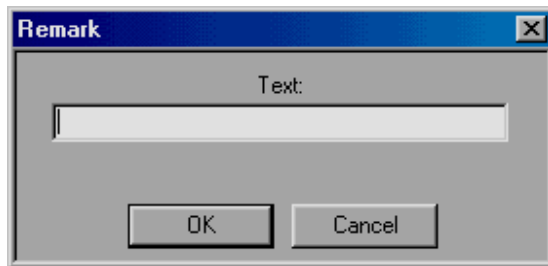


Enter the Label name in the Jump to field. (Be sure to include a line with this Label in your program.)

When the Jump command is used, Jump is checked in the dialog box. You can modify the Jump command to an IF jump command (conditional jumping) only in Levels 2 and Pro.

RE Remark 2,Pro

Allows insertion of a comment line for explanation and documentation into the program. The command opens this dialog box:



Enter up to 47 characters of text, including spaces.

RB Ring Bell 2,Pro

When executed, this command produces a beep, using the computer's internal loudspeaker.

RT Reset Timer Pro

SCORBASE uses a timer that measures time in units of tenths of a second. The timer starts operating when SCORBASE is opened.

The Reset Time command resets the value of the SCORBASE timer to 0.

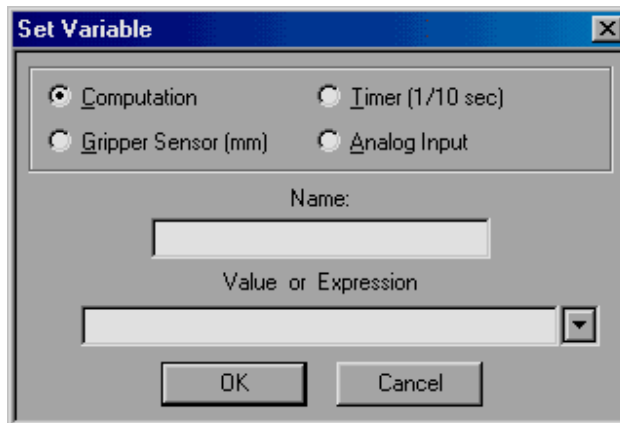
To use the timer, the timer value must be assigned to a variable, using the Set Variable command. (See the Set Variable command for more details).



SV Set Variable (to Computation) 2

Allows you to assign a value, or an expression (result of a specific computation), to a variable.

The command opens the Set Variable dialog box (Computation is checked).



In level 2, the Set Variable value can only be a result of computation. In the Pro level, variable values can be derived from other sources. For further information, see the Set Variable (to Timer, Gripper Sensor or Analog Input) command below.

Name Enter the name of the variable. The first character must be a letter.

Value or Expression Enter a value or a computation.
 To set the variable to a fixed value, enter a number (in the range of +/-1000000).
 To set the variable to the result of a computation, enter a string that consists of two arguments and an operator. An argument can be either an integer or a variable (e.g., fun*2).
 Click on the arrow to see a list of operators, or use the following list:

Arithmetic Operators

- + Addition
- * Multiplication
- Subtraction
- / Division

Algebraic Operators

- % Modulus (returns the remainder of the first argument divided by the second).
- ** Power (raises the first argument to the power of the second argument).

Logical (Boolean) Operators

&	And
	Or
^	Exclusive or

The result of a logical operation is 1 (True), or 0 (False). Any operand with a non-zero value is considered true, while a zero value is considered false.

Comparison Operators

<	Less than
>	Greater than
<=	Less than or equal to
>=	Greater than or equal to
<>	Not equal

By default, = is assumed to be the operator. You do not have to include it in the Value or Expression field.

Examples:

```
Set Variable COUNT = COUNT - 1
Set Variable C = A * C
Set Variable DD = DD + 1
Set Variable POS = P >= 1
Set Variable V1 = V <> 1
Set Variable VAR_A = A % 3
Set Variable M = M ^ 1
Set Variable R = 3 ** 2
```

For more information on variables, see Chapter 7, Variable Programming.

SV Set Variable (to Timer, Gripper Sensor or Analog Input) Pro

Allows you to assign a value, or an expression (result of a specific computation), to a variable.

In Pro level, there are four methods of setting a variable value:

Computation Variable value equals a constant, a variable, or a result of algebraic or Boolean computation. See the SV Set Variable (to Computation) command in Program Flow Commands above.

Gripper sensor	<p>Variable value equals the distance between jaws (in millimeters).</p> <p>See the SV Set Variable to Gripper Sensor command in Axis Control Commands above. This command is useful when there is a need to measure the object in the gripper, or to check the gripper status (open, closed or gripping an object).</p>
Timer	<p>Variable value equals the current value of SCORBASE timer.</p> <p>The SCORBASE timer starts operating when SCORBASE is opened.</p> <p>To initialize the SCORBASE timer in a program, use the Reset Timer (RT) command described above.</p>
Analog input	<p>Variable value equals analog input value.</p> <p>See the AI Set Variable to Analog Input # command in Input/Output Commands below.</p>

A value assigned using the SV command can be used for conditional jumping using the IF <Condition> Jump command. Actions can then be generated according to the variable value. The following example jumps the program cursor to a label if more than three seconds elapse after timer reset:

```
Reset Timer
...
Set Variable TIME to timer
IF TIME > 30 jump to PICKUP
```

For more information on variables, see Chapter 7, Variable Programming.



IF If Jump to 2,Pro

A conditional branch command, which is used to determine the program flow in relation to the value of the variables. The command opens this dialog box:



If the condition in the IF field is *true*, program execution jumps to the line specified by the label in the Jump to field.

If the condition in the IF field is *false*, program execution skips to the following line.

IF Enter the condition. The condition includes a variable name, a comparison operator and another variable name, or a number.

Jump to Enter the name of a Label. (Be sure to include a line with this Label in your program.)

Example:

```
If COUNTER > 0 jump to START_LOOP
Go to Position 1 speed 5
...
START_LOOP:
Go to Position 2 speed 5
```

If the value of Counter is greater than zero, the robot will go to Position #1.

If the value of Counter is equal to or less than zero, the robot will go to Position #2.

Use two equal signs (==) for equal operators. For example:

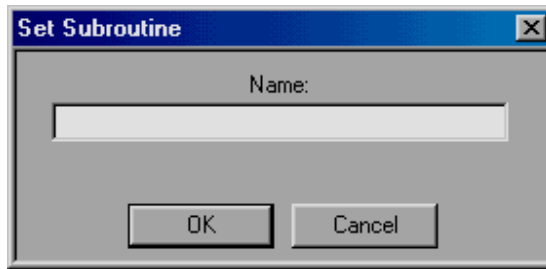
```
If COUNTER == 0 jump to END
```

The IF jump command can be converted to an unconditional jump command by selecting Jump (instead of If).

SS Set
Subroutine

2,Pro

Creates a subroutine. You can program up to 64 subroutines in one program. The command opens this dialog box:



In the Name field, enter a name or number for the subroutine.

***Note:** Create subroutines only at the end of the main program. Every subroutine must end with a Return from Subroutine command.*

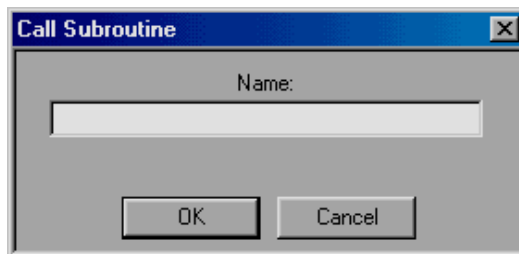
RS Return from Subroutine 2,Pro

Marks the end of a subroutine. At run time, this command terminates the execution of the subroutine, and the program resumes execution at the line that follows the Call Subroutine command.

***Note:** Every subroutine must end with a Return from Subroutine command.*

CS Call Subroutine 2,Pro

Activates the specified subroutine. The command opens this dialog box:



In the Name field, enter the name of the subroutine.

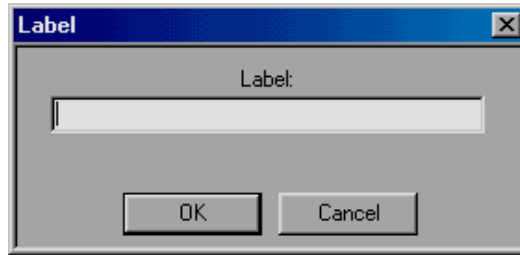
***Notes:** Use the Call subroutine command either from the main program or from another subroutine command.*

You can call the same subroutines several times from a few places in the program.

After the subroutine is executed, the program resumes execution from the line that follows the Call subroutine command.

LA Label 1,2,Pro

Marks a line in the program that is referenced by a Jump command. The command opens this dialog box:



In the Label field, enter a name.

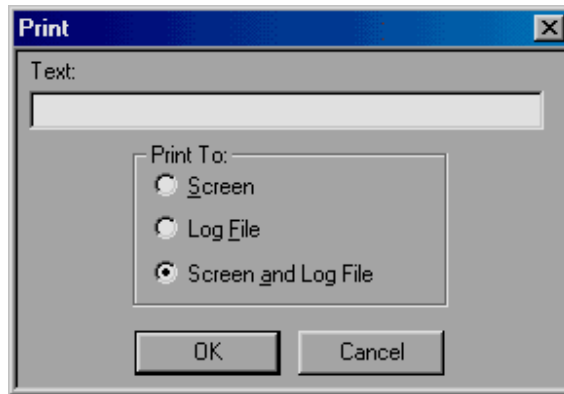
Do not include blank spaces, use an underscore.

Do not use the same label name more than once.

PS Print to
Screen & Log

2,Pro

Instructs SCORBASE to print data containing strings, messages and variable values to a log file, or to the message window, or to both. The command opens this dialog box:

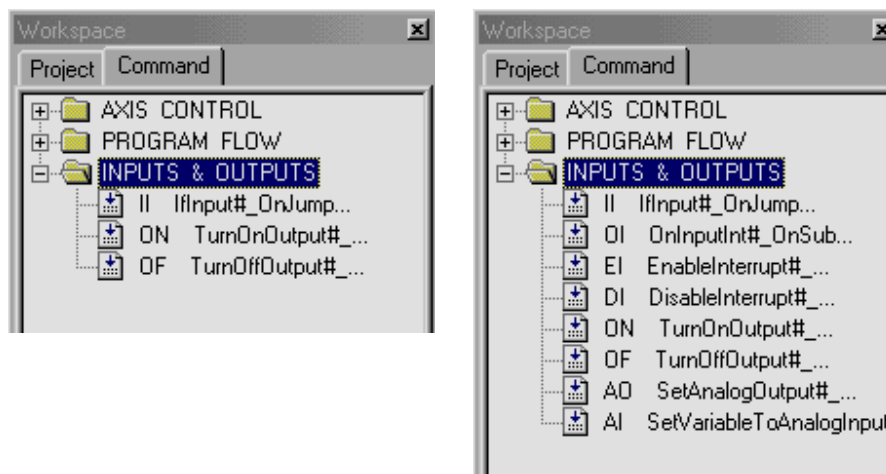


Enter text and spaces of up to 47 characters.

To print a value of a variable, place the variable name in single quote marks. For example: VARX='X' will print as VARX=50 (when the value of X is 50).

Click the desired print destination.

Input/Output Commands



Level 1 & 2 - Introductory & Advanced

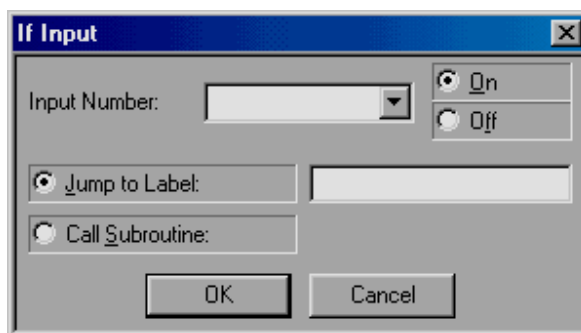
Pro - Professional

Figure 6-4: Command Tree - Inputs & Outputs Branch

II If Input #
On/Off Jump

1,2,Pro

Causes the program to jump to a label or call a subroutine, if the state of the tested digital input matches the status specified (On or Off). The command opens this dialog box:



In the *Input Number* field, enter the number of digital input (1-8), or a variable.

Select either *On* or *Off* for the state of the input.

Select either *Jump* or *Call Subroutine*; then complete the active field.

In the *Jump to* field, enter the name of a Label.

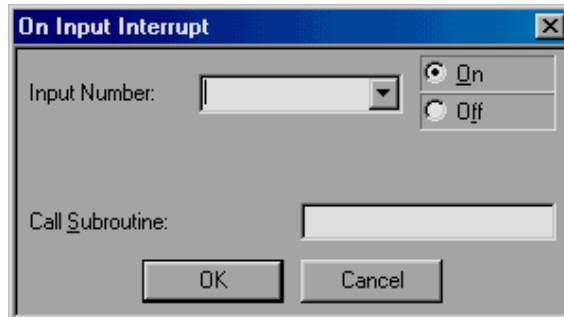
In the *Call Subroutine* field, enter the name of a subroutine, or a variable.

OI On Input
Interrupt # On/Off

Pro

Sets the condition for an input interrupt service. The service (Call Subroutine) will be performed whenever

the condition (input status) is satisfied, regardless of the current program pointer position. The command opens this dialog box:



- Input Number Enter the number of a digital input, a variable or the word ANY. Use of the word ANY causes any input (1-8) to evoke the interrupt state.
- On/Off Select the state of the input.
- Call Subroutine Enter the name of a subroutine that will be executed in case of interrupt.

An interrupt command causes the program to halt the command it is currently executing (which can also be a movement or a delay), and to immediately execute the command specified for this interrupt. If the specified command is a Call Subroutine, the program will resume from the point where it was suspended, as soon as the subroutine completes its execution.

An interrupt command can be disabled and enabled by means of the Enable Interrupt and Disable Interrupt commands described below.

Example:

On Input Interrupt 5, on call sub. SUB5

When input 5 is turned on, the program immediately calls subroutine SUB5. If any axes are moving when the interrupt occurs, they will immediately stop. When the subroutine is completed (Return from Subroutine command is reached), the axes will reassume the position and status that were interrupted, and the program will continue from that point.

DI Disable
Interrupt #

Pro

Causes the specified input interrupt to become inactive. When an interrupt is inactive, it is disregarded until the Enable Interrupt command reactivates it. The command opens this dialog box:



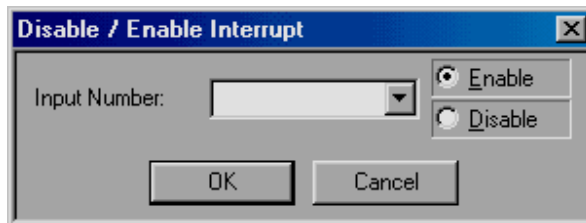
Input Number Enter an input number, a variable, or the word ALL.

Enable/Disable Select Enable in order to modify the command.

EI Enable Interrupt #

Pro

Causes the specified input interrupt to become active. The command opens this dialog box:



When an interrupt is active, it is waiting for an interrupt status (defined using the On interrupt command described above).

Input Number Enter an input number, a variable, or the word ALL.

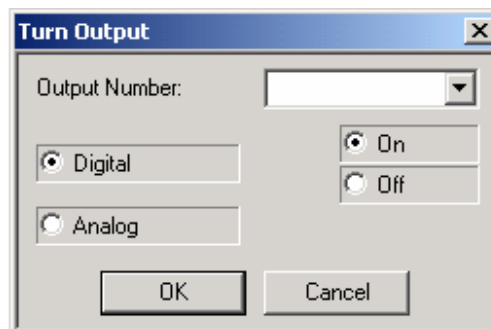
Enable/Disable Select Disable in order to modify the command.



On Turn On Output #

1,2,Pro

Sets the state of the specified digital output On. The command opens this dialog box:



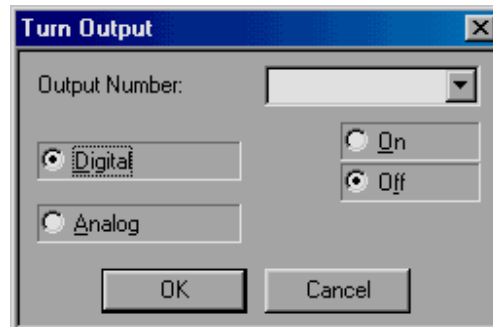
Output Number Select a number or type a variable name.

The default settings of Digital and On can be changed



OF Turn Off
Output #

1,2,Pro Sets the state of the specified digital output Off. The command opens this dialog box:

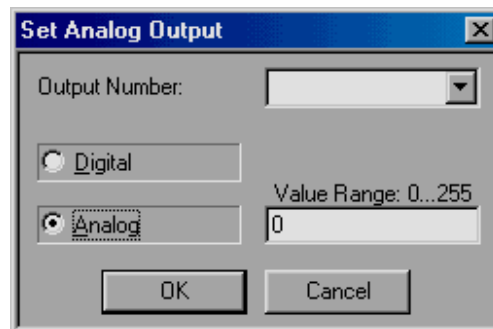


Output Number Select a number or type a variable name.

The default settings of Digital and Off can be changed

AO Set Analog
Output #

Pro Sets the state of the specified analog output. The command opens this dialog box:



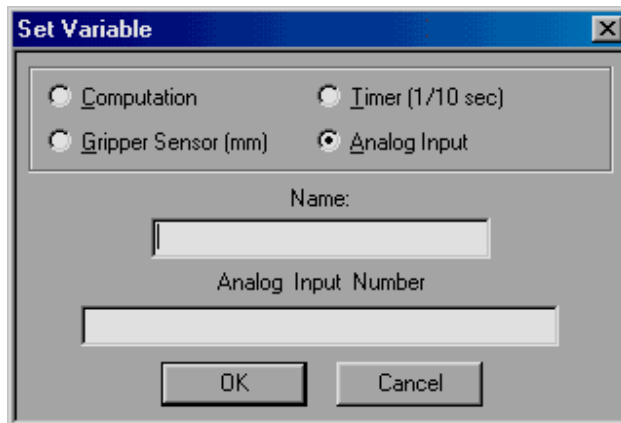
Output Number Enter a number (1 or 2), or a variable.

Value Range Enter a number between 0 and 255 which corresponds to the output voltage. The range of the output voltage is 0-10 V.

The Analog default setting can be changed.

AI Set Variable
to Analog Input #

Pro Sets the value of the specified analog input to a variable. The command opens this dialog box:

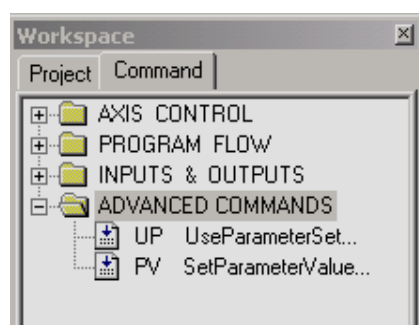


- | | |
|---------------------|---|
| Name | Enter the name of the variable. The first character of the name must be a letter. |
| Analog Input Number | Enter an input number (1-4) or a variable, where the variable value is an integer in the range of 0-255 corresponding to a controller input voltage of 0-10 volt. |

See also the description of the Set Variable commands in the preceding sections of this chapter.

Advanced Commands

Advanced Commands are displayed in the Command Tree when you select Options | Advanced Options | Advanced Commands.



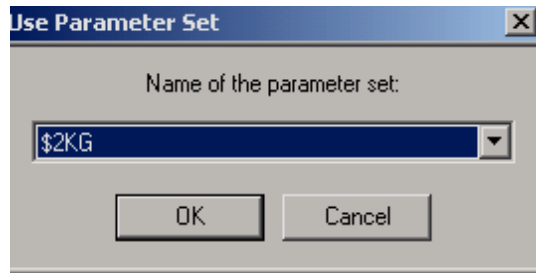
Pro - Professional

Figure 6-5: Command Tree - Advanced Commands

UP Use
Parameter Set

Pro

Specifies the Parameter Set to be used. The command opens this dialog box:



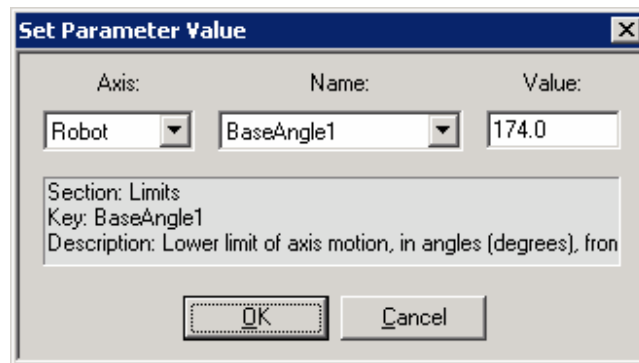
Open the drop-down list to select the desired Parameter Set and click OK.

See Parameter Set Windows for further information.

PV Set
Parameter Value

Pro

Sets the value for a selected device parameter by name. The command opens this dialog box:



Axis Open the drop-down list to select the axis for which you need to change the parameter.

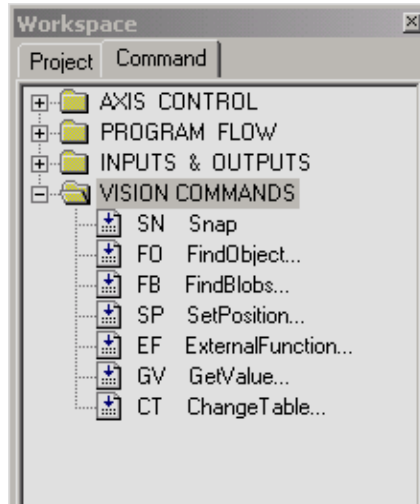
Name Open the drop-down list to select the parameter whose value needs to be changed.

Value Enter the new value.

The details of the selected parameter are automatically displayed.

Vision Commands

Vision Commands are displayed in the Command Tree when you select Options | Advanced Options | ViewFlex Commands. See the ViewFlex User Manual for full details.



Pro – Professional

Figure 6-6: Command Tree - Vision Commands

7

Variable Programming

The SCORBASE language allows variable programming. Variables allow you to write commands that change as the state of the robot or its environment changes during program execution. Therefore they are useful for creating loops and subroutines in robot programs.

To use a variable, it must first be defined using the Set Variable command (see Chapter 6, Program Editing).

Variable names can be up to 22 characters long. It is recommended, however, that you use meaningful names that are as short as possible. The first character of the name must be alphabetic.

In most editing commands, a variable can be specified instead of a numeric value.

A variable cannot be used to specify a Label or a Subroutine.

If, at run time, the program encounters a variable whose value is not defined or is out of range, an error message is displayed.

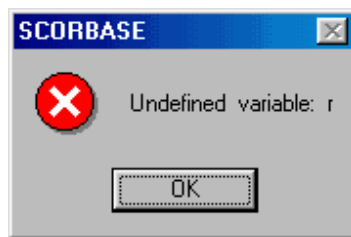


Figure 7-1: Undefined Variable Error Message

Using a Variable Instead of a Numeric Value

Example #1

```
Set Variable station1=5
Set Variable lamp=1
Go to Position station1 fast
Turn on output lamp
```

In this example, one of the robot stations named “*station1*” is recorded as position #5 and a lamp is connected to output #1. When the program initiates,

the value (5) is assigned to the variable named *station1* and the value (1) is assigned to the variable *lamp*. The following program lines send the robot to position “*station1*” and turn on a “*lamp*”. Using a meaningful name for the variable makes the programming, debugging and maintenance easier.

Example #2

```
Set variable pos = 0
Start:
Set variable pos = pos +1
Go to position pos fast
Wait 50 (10ths of seconds)
If pos < 5 jump to start
```

In this example, the robot moves to Pos. #1, #2, #3, #4 and #5. In every position the robot waits 50 seconds. After waiting at position #5, the program terminates.

Example #3

```
Start:
Set variable tested = 0
Loop:
Set variable tested = tested +1
If input tested off call sub off
If input tested on call sub on
If tested < 8 jump to loop
Jump to start
```

```
Set Subroutine off
Turn off output tested
Return from subroutine.
```

```
Set Subroutine on
Turn on output tested
Return from subroutine
```

In this example, the program sequentially scans digital inputs 1 through 8 in an endless loop.

If the tested input is *On*, the program turns **on** the corresponding output.

If the tested input is *Off*, the program turn the corresponding output **off**.

Monitoring Variable Value

To monitor a variable value, SCORBASE offers the following tools:

1. When SCORBASE is running and a Set Variable command is executed, the current value of the variable is displayed in the status line at the bottom of the screen.
2. When the program is *not* running, click on the Set Variable command in which the value is assigned to the variable, and then execute this line using the Run Single Line command. The variable value is displayed in the status line at the bottom of the screen.
3. The Print to Screen & Log (PS) command can also be used to print the actual value of a variable, by placing the variable name within single quote marks in the text to be printed.

Example:

```
Set Variable z = 5
```

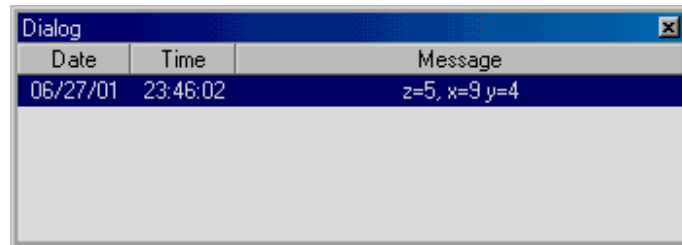
```
Set Variable x = 9
```

```
Set Variable y = x - z
```

```
Print to screen z='z' x='x' y='y'
```

When the program is running, the following messages appear in the status bar:

1. When the first line is executed, the message is z=5
2. When the second line is executed, the message is x=9
3. When the third line is executed, the message is y=4
4. When the fourth line is executed, this window opens:



8

Program Execution

The Program window and the dialog bars described in this chapter are used for activating and monitoring program execution.

Select Window | Run Screen to display only the Program window, which shows the section of the program currently executed.

- Status bar - indicates the currently executed line or current value of a variable.
- Dialog bars - show the Analog Input, Analog Output, Digital Input, Digital Output values. To activate the dialog bars that are most useful for program execution, select View | Dialog Bars and then the desired dialog bar from the pop-up menu.
- Log file - records data during program execution.

The screen layout depends on the currently loaded level of SCORBASE.

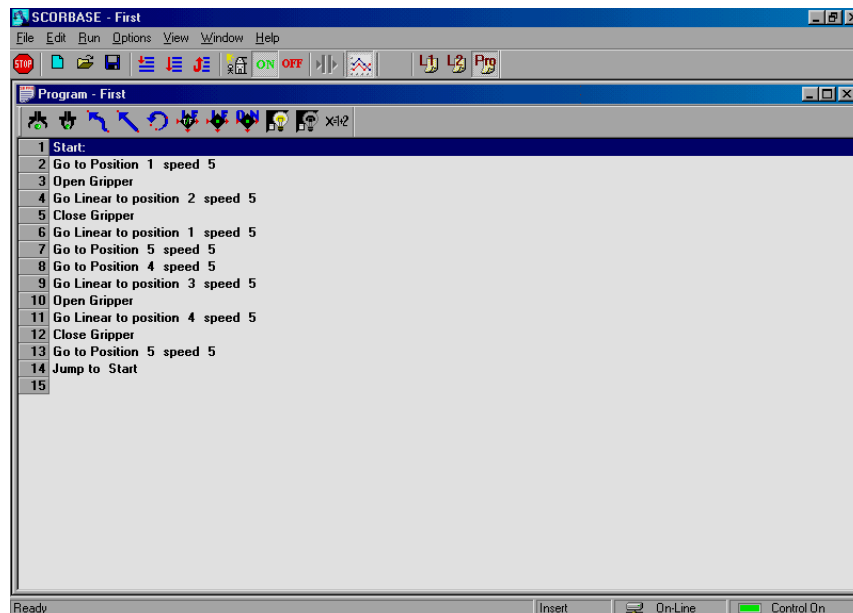


Figure 8-1: Run Screen Pro Level

Running a Program

SCORBASE offers three modes of running a program. To select the running mode do one of the following:

- Click the appropriate Run icon in the toolbar.
- Select one of the Run options in the Run Menu.
- Press the function key.



Single line (F6) Runs the currently selected (highlighted) line.



Single cycle (F7) Runs the program from the currently selected (highlighted) line. Running stops after the last line is executed.



Continuous (F8) Runs the program from the currently selected (highlighted) line. After the last line is executed, program execution continues from the first line.

The *[Run]* key on the Teach pendant *cannot be used* to start execution of SCORBASE programs.

Note: Always restart execution of a program from the first line after you have changed program data (e.g., recorded new coordinates for a position, edited a program line, etc.).

Halting Program Execution

Stop and Pause are the two methods of halting program execution from SCORBASE.

To stop or pause programs from SCORBASE do one of the following:

- Click the appropriate icon in the toolbar.
- Select Run | Stop, or Run | Pause.
- Press F9 / F10 - Make sure the SCORBASE application is the currently active window before you press F9 / F10.
- To STOP the program you can also press the red EMERGENCY button on the controller or press the ABORT key on the Teach Pendant (if installed).



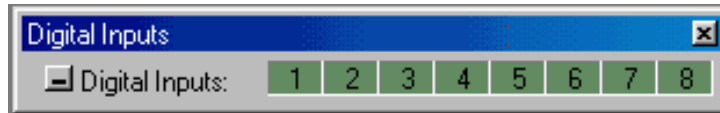
Stop (F9) Program execution is stopped **immediately**. Use this command only in emergencies.



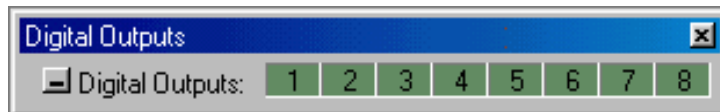
Pause (F10) Stops program execution only after the current command has been executed. Thus, axes may continue moving (to complete their motion) after the *Pause* command is issued.

Digital Inputs & Outputs Dialog Bars

The Digital Inputs & Outputs dialog bars show the status of the controller digital inputs and outputs. The display is available in all modes of operation.



Digital input dialog bar



Digital output dialog bar

In both dialog bars, when the I/O status is *Off* (false), the matching I/O number is dark green. When the I/O status is *On* (true), the matching I/O number is light green.

If control is On, the sixteen Output / Input LEDs on the front panel reflect the I/O status.

If control is On, clicking on an output number in the Digital Output dialog bar toggles the status of the controller's digital outputs.

In *Off-line* the Digital Output dialog bar can also be used to simulate the status of controller's digital inputs. This option is useful for checking the *If Input#_onJump* command.

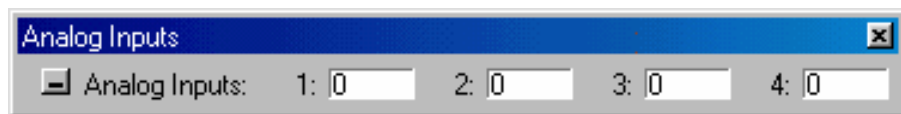
In On-line mode, to test the program response for the *If Input#_onJump* command, short the designated input terminal to the digital input ground.

Analog Inputs & Outputs Dialog Bars

SCORBASE can monitor and control four (4) analog inputs and two (2) analog outputs. The Analog Inputs & Outputs dialog bars show the values of the controller Analog Inputs and Outputs.



Analog Output



Analog Input

The Analog Inputs and Output resolution is 8-bit. The Analog Input / Output range is from 0 (minimum) to 255 (maximum).

Output values can only be manipulated when SCORBASE is operating On-line. To change the value of an Analog Output, do one of the following:

- Click Output (the color turn from light yellow to white), and type a number.
- Use the AO (Set Analog Output #) command, and run this line.

When the controller receives an Analog Input signal from an external device, the value (0-255) of the signal is reflected in the Input Value field.

SCORBASE Log File

The SCORBASE log file records the messages printed using the PS (Print to Screen Log) command. To print to a message to the log file, click either Log File or Screen and Log File.

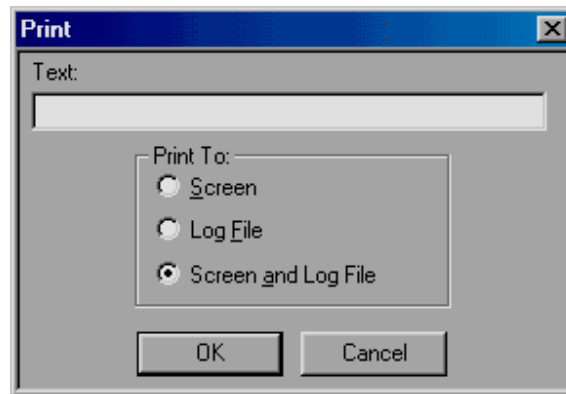


Figure 8-2: Print To Screen Command

The Log file is initialized (cleared) each time SCORBASE is loaded.

To see the file content, open the file SCBS.LOG using a text editor (such as WordPad). The file is located in the SCORBASE subdirectory named BIN.

SCORBASE generates a backup file each time the program is closed.

9

Project Files Management

A SCORBASE project includes the following files:

- SCORBASE program (file extension *.SBP)
- Recorded Position files (file extension *.PNT)
- Project data (file extension *.WS)
- Graphic image (if RoboCell is installed – file extension 3DC).

All commands (except for Open) relate only to the SBP, PNT and WS files.

Opening or saving a project from the File menu opens or saves all project files (three or four files).

As default, all files are located in the Projects directory (folder) in the ER 2U or ER 4U directory (depending on which robot is being used for the project).

Project Management

SCORBASE project files are managed by means of the usual Windows file tools, which can be accessed by icons or via the File menu.



New (Ctrl+N)

Opens a new, untitled, project named *Untitled*. All project-related files are created.



Open (Ctrl+O)

Opens a Load Project File dialog box for opening a previously saved project. All project-related files are opened.



Save (Ctrl+S)

Saves the currently active project. If the project has not previously been saved (i.e., is untitled), a dialog box for specifying the project name opens.

All project-related files are saved.

Save As...	<p>Opens the Save Project dialog box for saving the currently active project under a new name.</p> <p>All project-related files are saved under that new name.</p> <p>As default, all projects are saved in a Projects folder.</p>
Print Program	<p>Prints the program.</p> <p>The Program window must be active to select this option</p>
Print Positions	<p>Prints the position table.</p> <p>The Position window must be open and active to select this option. You can open the Position window by selecting Window Project or View List Positions.</p>
Print 3D image	<p>Prints the 3D image (if RoboCell program is installed).</p>
Print Preview 3D Image	<p>Opens a dialog window that shows how the printed cell will appear on paper.</p>
Print Charts	<p>Opens a dialog box to select the specific axis chart for display or printout. Only one axis can be selected at a time.</p>
Print Preview Charts	<p>Opens a screen, which displays the selected axis chart before printout showing how the printed cell will appear on paper.</p>
Import 3D Model	<p>Opens the Import 3D Image dialog window showing the graphic module files (*.3DC files).</p>
Edit 3D Model	<p>Opens the Graphic Module in CellSetup.</p>
View File	<p>Opens the <i>View File</i> window to display the program or position of any selected project.</p>
Exit	<p>Quits SCORBASE. If changes to a program or position file have been made, but not yet saved, a warning message will be displayed.</p>

10

System Setup

SCORBASE offers the following setup options to enable system configuration:

- Display options.
- Operation mode and Programming level.
- Hardware setup.

Display Options

The display options enable optimal usage of the screen area. SCORBASE offers three basic display options and a wide range of dialog bars and windows through which the user can see and change system data.

Simulation & Teach

Available only if RoboCell is installed. For further information, see the RoboCell User Manual.

Teach & Edit

When a SCORBASE project is opened, the screen is set for the Teach & Edit display mode. In this mode, these windows and dialog boxes are displayed:

- Program window that holds the SCORBASE program.
- Manual Movement dialog box.
- Teach Position dialog box.
- Workspace window that shows:
 - Project data, i.e., positions, user program and graphical display (if installed).
 - SCORBASE commands tree.

To open the Teach & Edit layout, select Window | Teach & Edit.

Run Screen

The Run Screen display option opens only the program window. When the program is running, the currently executed line is highlighted and information on the currently executed command is displayed in the status bar.

Project Screen

The Project Screen display option holds the Program window, Workspace window, and the Position window.

When the program is running, the currently executed line is highlighted, and information on the currently executed command is displayed in the status bar.

Line Number

SCORBASE allows you to show/hide the line numbers displayed in the Program window. Select Options | Line Numbers.

By default, program line numbers are displayed.

Reload Last Project at Start-up

When SCORBASE is initiated, the program can be set up to automatically open the last project. To toggle this option, select/deselect Options | Reload Last Project at Startup. A checkmark appearing next to this option indicates that the option is on.

Additional Display Options

Joint	Shows angle of the robot joints.
XYZ	Shows position coordinates of the TCP.
Digital output	Shows digital output status and enables toggling an output status.
Digital input	Shows the digital input status. Enables toggling an input status in Off-line mode, for program debugging.
Analog output	Displays the value (0-255) of Analog output 1 and 2. These values can also be modified through this dialog bar.
Analog input	Displays the value (0-255) of Analog inputs 1-4. Enables setting a value for an input in Off-line mode, for program debugging.
Encoders	Shows the eight encoders values.

All Dialog bars are accessible from the View menu.

The screen is adjusted to prevent window and dialog bars overlapping.

Movement information	Displays the following: <ul style="list-style-type: none">• Position error for all eight axes• Home switch status (for all eight axes). The number 1 indicates the switch is on (pressed) while 0 indicates the switch is off (released).• Selected axis (1 – 8) PWM value. The PWM value indicates the power sent to the axis motor.
Messages	Displays the content of the PS (Print To Screen) commands.

SCORBASE Levels

SCORBASE offers three programming levels:

- Introductory (Level 1)
- Advanced (Level 2)
- Professional (Pro)

A higher level offers more commands and tools. Levels can be selected from the Tool bar or from the Options menu.

Display of the Advanced Commands and the Vision Commands is activated by selecting Options | Advanced Options.

Hardware Setup

SCORBASE allows you to define the devices that are connected and operated by the controller as Axes 7 and 8. The following peripherals can be connected to the Controller USB:

- Rotary Table, 24V Catalog #1009
- Conveyor Belt (gray), 24V Catalog #1010
- 1.0m Linear Slidebase, belt-drive, 24V Catalog #1020
- 1.8m Linear Slidebase, belt-drive, 24V Catalog #1021
- Linear Table 0.3m, 24V Catalog #1013
- XY-Table, 24V Catalog #1014
- Motor Kit 24V Catalog #1234

Note:

The following peripherals are not supported:

- 1.0m Linear Slidebase, belt-drive, 24V Catalog #1018
- 1.8m Linear Slidebase, belt-drive, 24V Catalog #1019

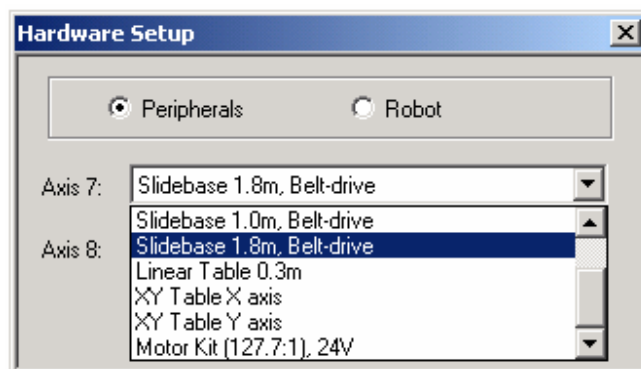
Contact your local distributor for further information

Do not change the hardware setup unless you are authorized to do so.

To define the devices, select Options | Hardware Setup.

The Hardware Setup dialog box opens.

Click on the arrow to open the list of available devices, and then click on the desired device.



Appendix A

The following table describes the command line options that were added to version 4.9.1 to enable the integration of user applications with SCORBASE.

Before operating SCORBASE with these command line options, follow and obey all warnings and cautions provided in the user application manuals to prevent, for example, hazards from moving parts.

The SCORBASE command line format that is required when using the options described in the table is provided, as follows:

SCORBASE.EXE [Optional INI File] [Optional Switches]

Option	Description
/A	Determines which system SCORBASE supports, as follows: A=[system type] (where system type is 9,4,2).
/C	Closes the SCORBASE application. This command can be activated only when SCORBASE is open.
/D	Determines the SCORBASE projects directory.
/E	Restores the SCORBASE application. This command can be activated only when SCORBASE is open.
/F	Opens the SCORBASE workspace file name or new project that can be defined by the user, as follows: F = [SCORBASE workspace file name] : Opens the specified workspace. F = [NEW] or [NEWP] : Opens a new project for PRO level. F = [NEW2] : Opens a new project for level 2. F = [NEW1] : Opens a new project for level 1.
/H	Performs auto homing from online mode. For example, SCORBASE.EXE SCBS.INI /H
/L	Loads a specific workspace in simulation mode. For example, SCORBASE.EXE SCBS.INI /L="C:\PROGRAMES\INTELITEK\ROBOCELL\PROJECTS\ER4u\Er4Cell1.WS"
/M	Minimizes the SCORBASE application. This command can be activated only when SCORBASE is open.

/O	Loads SCORBASE in online mode. For example, SCORBASE.EXE SCBS.INI /O
/R	Loads a specific workspace and runs SCORBASE. For example, SCORBASE.EXE SCBS.INI /R="C:\PROGRAM FILES\INTELITEK\ROBOCELL\PROJECTS\ER4u\Er4Cell1.WS"
/S	Loads SCORBASE in simulation mode. For example, SCORBASE.EXE SCBS.INI /S
/T	Displays the SCORBASE application on top of the desktop at all times.
/U	Prevents the SCORBASE application from staying on top of the desktop. This command can be activated only when SCORBASE is open.

Examples of SCORBASE command line procedures are provided, as follows:

Loading a workspace in simulation mode:

- At the prompt, type the following:
SCORBASE.EXE /S /L="C:\PROGRAM FILES\INTELITEK\ROBOCELL\PROJECTS\ER9u\Act3.WS". The workspace will be loaded in simulation mode.

Loading the software in online mode and homing the robot:

- At the prompt, type the following:
SCORBASE.EXE /O /H /R="C:\PROGRAM FILES\INTELITEK\ROBOCELL\PROJECTS\ER4u\Er4Cell1.WS". The workspace will be loaded in online mode and the robot will be homed.