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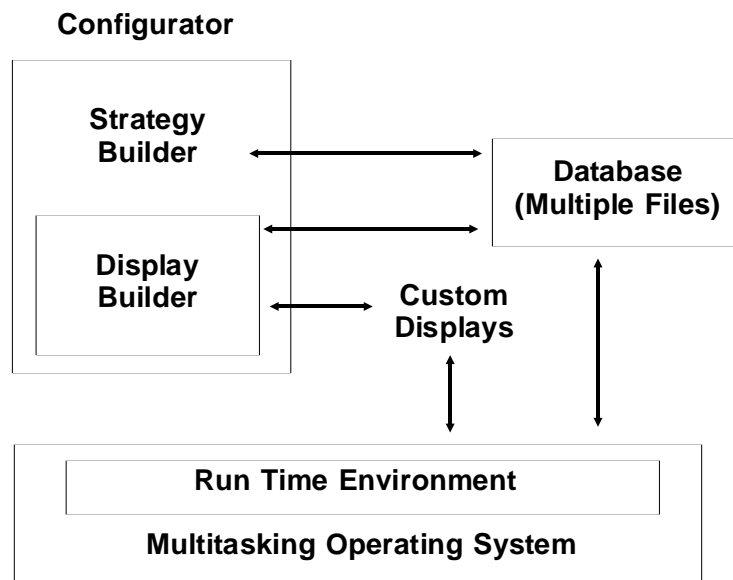
# 1 Introduction

## 1.1 Using This Program

PC-30 software is used to create total industrial process control operating environments (strategies) and to execute these strategies in real time (Runtime).

Software functions include both process control and Supervisory Control And Data Acquisition (SCADA). During Runtime, both graphic (dynamic color screens) and continuous data monitoring (numerical value logging, with or without real-time numerical display), is possible.

PC-30 consists of two modules; the Configurator and the Runtime system. Figure 1.1 shows a general overview of the basic PC-30 architecture.



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*Figure 1.1 Structure of PC-30 Software*

The configurator module consists of the Strategy Builder and the Display Builder. The Strategy Builder is used by the process engineer to create the overall strategy of process control and monitoring. The Display Builder is used to create a graphic interface to the process for the operators. As a result, a strategy database is created consisting of a set of files containing the configuration of the desired system and strategy and a set of custom displays for the operators.

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The Runtime system reads the strategy database and executes it in a custom real-time multi-tasking environment. The operator of the process uses the Runtime system to control the process, log data, and perform any of a set of standard functions.

### 1.1.1 The Strategy Builder

The Strategy Builder uses an icon-based system of menus and a mouse to simplify the creation of a control or data acquisition strategy. A large selection of algorithm blocks are the building blocks for the strategy. With PC-30, you connect the inputs and outputs to assemble a complete control loop.

The Strategy Builder includes the following features:

- An extensive set of industry-standard data collection and control algorithms
- A built-in user-defined algorithm,  $F(x)$ , executing any set of expressions using built-in variables
- An additional user-defined algorithm interface to routines created in the C programming language
- Complete documentation of the strategy database in printable form including algorithms, connections, and configurations
- Strategy database files that can be used by one or more Runtime systems
- New strategies that can easily be created by editing existing strategy files
- Key Macros that allow you to reassign Runtime keyboard functions to perform specific operations

The Strategy Builder creates (or modifies) a set of files called the strategy database. The following is a list of files created by the Strategy Builder. The term “strategy” indicates an eight-character DOS main file name that serves as the root name for all strategy database files.

<b><u>Filename</u></b>	<b><u>Function</u></b>
<strategy>.DB	Algorithm block database file
<strategy>.CA	I/O connection description file
<strategy>.CI	Algorithm connections database file
<strategy>.CFG	System configuration parameters and hardware I/O configuration
<strategy>.MDB	Stores information on peripherals (Int. I/O Blocks)
<strategy>.XDB	I/O connection database file

In addition, files with the extension .GSP contain the various PC-30 software menus and icons (not altered or accessed directly by the user). Specifically, CONFIG.EXE is the PC-30 builder program. Refer to Chapter 4: *The Strategy Builder* for complete information.

PC-30 includes over 60 algorithms from which you can choose when creating your strategy. The list on the following page tabulates algorithm groups available in your PC-30 software.

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<b><u>Group</u></b>	<b><u>Description</u></b>
<b>I/O</b>	Analog & digital I/O.
<b>Packed I/O</b>	Analog & digital I/O in a packed form.
<b>Calculation</b>	A variety of calculation values for filtering, log functions, lead/lag, and others.
<b>Logic</b>	Boolean/ladder logic functions such as “and” and “or”.
<b>Small Logic</b>	A compact version of logic functions for use when system memory is limited and only a minimum number of algorithm inputs is needed.
<b>Flip-Flops</b>	Simulate the functions of electronic sequential circuits.
<b>Math</b>	Basic mathematical functions such as addition, multiplication, sine, and cosine and a user-definable algorithm, F(x).
<b>Batch</b>	A set of batch control algorithms including drum sequencer capabilities with forward and reverse sequencing, a ramping function, timers, etc.
<b>Selectors</b>	Selects an output from a group of inputs that is either the high, low, median, or average or the inputs, or selects one of the inputs by a switch function.
<b>Control</b>	A set of common control algorithms.
<b>User</b>	Up to seven custom algorithms based on C language functions that you provide for custom extensions.

<u>Group</u>	<u>Description</u>
<b>Specials</b>	Includes a history block that can be triggered under program control, a database checkpoint block for updating a warm start file, a display block for invoking a specific display when certain events occur, etc.
<b>Options</b>	Access to any of the PC-30 options installed in the system, for example, Statistical Process Control, Report Generation, etc.
<b>Network</b>	Allows PC-30 configuration to run on network (available only when the network option is installed).

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Refer to Chapter 6: *Algorithms* for complete information.

The strategy builder also supports a wide range of real world I/O devices with specific device drivers. Refer to Chapter 5: *I/O Device Configuration* for complete information on how to configure the drivers.

**1.1.2  
The Display  
Builder**

The Display Builder can only be accessed from within the Strategy Builder. It uses an icon-based system, utilizing menus and a mouse to simplify the drawing of custom displays that can be linked to your strategy. A wide variety of shapes, colors, and type support the creation of complex displays. Some aspects of the displays can be dynamically linked to strategy variables so that their color or size reflects the state of the process at Run-time.

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The Display Builder includes the following features:

- A complete drawing environment for creating displays from a standard set of graphic primitives
- Snap-to-grid capabilities for easy alignment of objects and the creation of same-size shapes
- Rubber-stamp capability for capturing frequently used symbols, reusing them without having to redraw them, and storing them on disk in libraries
- Dynamic linking of displays to process variables, creating effects such as real-time bar graphs
- Displays containing data display fields or data entry fields corresponding to variables in the strategy
- Initialized data entry fields in displays providing a quick way to store and enter entire groups of process values as a single recipe
- Display Key Macros provide the ability to reassign Runtime keyboard functions for specific operations. For example, you can view operator graphic displays generated by the Display Builder onto the Runtime screen with a single Runtime keystroke.

The Display Builder creates (or modifies) display files, some of which may contain data values. The following is a list of files created by the Display Builder. The term “file name” indicates an eight-character DOS main file name that serves as the root name for all display files.

<u>File Name</u>	<u>Function</u>
<file name>.GRP	one custom display
<file name>.SMB	library of symbols to be reused in multiple drawings (Rubber Stamp)

In addition, files with the extension .GSP contain the various PC-30 software menus and icons (not altered or accessed directly by the user), in particular BOOT.GSP contains the start-up display for initial operator orientation.

Refer to Chapter 7: *The Display Builder* for complete information.

### 1.1.3 The Runtime System

The Runtime system transparently replaces the DOS operating environment with a real-time, multi-tasking operating system to handle the intense demands of on-line control and monitoring. The Runtime system does not use the icon-based interface of the builder module. It uses the standard PC keyboard function keys to invoke a wide range of features. The mouse can be used during Runtime but is optional.

The Runtime system includes the following features:

- Execution of the complete strategy of industry-standard and user-created algorithms in real-time
- Complete compatibility with the DOS file exchange system
- Strategy execution frequency control
- Unlimited number of user-created displays that can be invoked automatically or by the operator in a variety of ways
- Display of live process data in displays dynamically linked to process values

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- Dual window structure providing simultaneous graphic display along with inspection and/or data entry for each algorithm
- Real-time trending of both analog and digital data with snapshot save and replay capabilities
- Dedicated alarm and status message area on screen
- Alarming on first-out basis with prioritized squelch and selective acknowledgment standard
- Event and alarm logging capabilities
- Data logging to disk in Lotus 1-2-3 readable file format. This can be done under operator control or invoked by process events.
- Files that can be copied, deleted, etc., during real-time execution
- Ability to view Runtime open files from remote nodes on a network using the DOS SHARE.EXE file sharing utility.
- On-line tracing of signal flows upstream and downstream throughout the strategy by the operator
- Multilevel password security
- The ability to display on screen, a previously saved or currently active history file combining live and historical data
- The ability to invoke user created Help menus (that convey your key assignments) during Runtime

The Runtime system reads and acts on the basic strategy database set of files and creates history files as requested. The operator can, with the correct security level, update certain files in the database.

The following is a list of files created or updated or used by the Runtime system. The term “strategy” indicates an eight-character DOS main file name.

<u>File Name</u>	<u>Function</u>
<strategy>.NEW	Warm start version of .DB file for restarting after a system crash (for example, from a power outage)
<filename>.GRP	Display file optionally containing initialized data entry fields, used as a recipe when loaded and entered, and can be updated to reflect latest values, if desired
LOGnn.TXT	Alarm and event log files where nn is 00 to 99
TRENDnn.DAT	Trend snapshot where nn is 00 to 39
<filename>.PRN	History logs in Lotus 1-2-3 format generated by the event-driven Historian (HIST block)

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Refer to Chapter 8: *The Runtime System* for complete information.

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## 1.2 Using This Manual

This manual is designed to provide all the information you need to build strategies and displays, and use them in Runtime operations. It assumes a basic knowledge of the DOS operating system.

If you cannot find the information you need in this manual, you can call for technical support. Before calling Technical Support, refer to the Calling Technical Support section in Chapter 3: *Before You Begin*.

This manual is organized into the following chapters:

- Chapter 1: **This chapter**
- Chapter 2: **Installation** provides hardware and software requirements and installation instructions.
- Chapter 3: **Before You Begin** provides information on strategy design considerations, types of I/O drivers, and using the mouse. It also offers a general overview of the use of macros.
- Chapter 4: **The Strategy Builder** provides instructions on creating strategies.
- Chapter 5: **I/O Device Configuration** explains how to configure devices in a strategy.
- Chapter 6: **Algorithms** discusses the algorithms used in strategy creation and includes instructions on creating algorithm blocks to perform special functions.

- Chapter 7: **The Display Builder** describes how to create graphic representations of the strategy.
- Chapter 8: **The Runtime System** explains how to operate the Runtime system.

The Appendices portion of this manual includes a glossary, a section on supported peripheral hardware, a list of the PC-30 software files, and several technical references such as Estimating Strategy Database Size, and EMS and XMS Memory Support.

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### 1.2.1 Typographic Conventions

This supplement implements several typographical conventions that make this supplement easier to use and understand. The conventions that are used are as follows:

#### [Keystrokes]

Any time an individual or combination keystroke is required to be entered from the keyboard, it is identified by a bold typeface enclosed within square brackets. A combination keystroke, such as **[Alt-E]**, will have its individual keys separated by a hyphen. This indicates that both keys are required to be pressed simultaneously.

#### keyboard commands/text

Lowercase courier type is used to identify actual commands/text that you would be required to enter from the keyboard. The ↵ symbol is used to indicate that the **[Enter]** key should be pressed at that location.

#### *Default Settings*

Any default setting for individual system parameters can be identified at the end of the parameter's description paragraph. Each default setting is shown in an italic typeface.

#### <variables>

At times in this manual there are instances when there are several possible values that could appear as an entry or an output

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of a system variable or error message. All variables are identified by being enclosed within angle brackets.

**Hint** *Hints are provided to suggest a method of performing a specific operation or to verify tasks that have already been performed. Hints are always identified by the paragraph's italic typeface.*

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**Note;** Many times throughout this supplement notes and reminders are provided as supplemental information to the current topic. Notes provide information that may pertain to specific applications. Reminders refresh a topic that was discussed earlier and apply to the current topic.  
**Reminder;**  
**IMPORTANT;**  
**Caution;**  
**WARNING**

**IMPORTANT, Caution, and WARNING** notes identify specific information that is crucial to the operation or functionality of the topic currently being discussed. All notes and the like are enclosed within horizontal lines so that they stand out from ordinary text.



The pointing finger icon in the margin identifies paragraphs that provide an important procedure or piece of information pertaining to the current topic.

### 1.2.2 Cursor Icons

Both the Strategy and Display Builders now implement a series of new cursor icons that reflect the current mode of operation. Each of these cursor icons are identified and described in the following paragraphs.

#### Arrow Cursor



This Arrow cursor icon is the default cursor and is used for Configurator pointing and block/connection/object selection operations.

#### Hourglass Cursor



The Hourglass cursor icon is displayed whenever PC-30 is actively working on a previously invoked Configurator operation. This cursor can be moved around the screen, but other Configurator operations cannot be performed until the current operation has completed. When the Hourglass cursor disappears, PC-30 has completed its operation(s) and you can continue with your Configurator work.

#### Connection Cursor



The Connection cursor icon is displayed whenever the Strategy Builder's Connection function is enabled. When you click on the Connection icon with the left mouse key, this cursor appears, indicating that block connections can be made. By positioning the tip of the Connection cursor icon inside the block to be connected (or placing it over the block's tag name in the case of Wireless Connections) and pressing the left mouse key, this initiates the Connection procedure.

**Find Tag Cursor**

The Find Tag cursor icon (a magnifying glass) is displayed whenever the Strategy Builder's Find Tag function is enabled. When you click the left mouse key on the FIND TAG icon in the EDIT submenu, this cursor appears. Positioning the dot in the center of the magnifying glass over a strategy block causes that block's tag name to appear in the Strategy Builder's message area (bottom of the screen, above the algorithm block icons).

**Pan & Zoom  
Cursor**

The Pan & Zoom cursor icon (a hand) is displayed whenever the Pan Mouse function is enabled. Enabling this function is performed by clicking the left mouse key on the Pan Mouse icon in the Pan & Zoom submenu. With this cursor icon displayed, you can pan the current strategy or display by dragging the mouse in the desired direction while holding down the left mouse key.

**Line Tool Cursor**

The Line Tool cursor icon (a pencil) is displayed whenever the Display Builder's Line Tool function is enabled. When you click on the Line Tool icon with the left mouse key (right mouse key to select a different line draw operation), this cursor appears in the Display Builder work area. When you click on a different icon, Display Builder function disables the Line Tool function and suspends the use of this cursor icon.

**Paint Fill Cursor**

The Paint Fill cursor icon (a paint bucket) is displayed whenever the Display Builder's Paint function is enabled. When you click on the Paint icon with the left mouse key, this cursor icon is displayed in the Display Builder work area. By positioning the tip of the spilling paint inside the area to be filled and pressing the left mouse key, that area fills with the currently selected color.

## 1.3 Using the Mouse

A mouse or compatible pointing device is required in the Configurator (Strategy and Display Builder), and is optional in Runtime.

This section provides information on using the mouse. It defines terms related to the mouse and discusses using both a two-button and a three-button mouse.

Refer to Chapter 2: *Installation* for mouse installation instructions.

### 1.3.1 Definitions

- Clicking/Click:** Positioning the cursor on a field, file name, etc., and then pressing and releasing a mouse key quickly.
- Dragging:** Selecting an object, holding the mouse key down while you move the mouse, and finally releasing the mouse key. As you move the mouse across the desk, the object moves across the screen and stops when you release the mouse key.
- Icon:** A graphic representation of an object, concept, or message. For example, the Erase function in the Main Menu of the Strategy Builder is represented by a picture of an eraser.
- Mouse:** A small device you move around on a flat surface next to your computer.
- Mouse Keys:** Keys (buttons) on top of the mouse. Pressing a mouse key initiates an action wherever the cursor is pointed. Releasing the key confirms the action.

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**Pointing:** Positioning the cursor on an object, field, etc., on the screen by moving the mouse. The mouse is referred to as a pointing device since it allows you to indicate graphically where you want to work.

**Selecting:** Pointing to something on the screen and clicking on it. When you select a display object in the Display Builder or a block in the Strategy Builder, a selection box appears around it. When you select a menu icon, it is highlighted with a filled background. Some icons remain selected until you make another selection.

### 1.3.2 Two Versus Three Button Mouse Operation

The instructions throughout the manual refer to using a three-button mouse. If you have a three-button mouse, follow the instructions as stated for pressing a specific button on the mouse. If you have a two-button mouse, such as a Microsoft Mouse, you must make the following functional adjustments in the instructions:

**If the manual says**

Press the left key

Press the center key

Press the right key

**On a two-button mouse**

Press the left key

Press the right key

Press the space bar

To perform multiple selections to select a group of blocks, connections, or objects, place the cursor on the additional item and press the space bar. That item is added to the group of selected objects.

Refer to the *Standard METACONF* section in Chapter 2: *Installation* for information on specifying 2- or 3-button mouse operations.

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