Appendix A - General Glossary

Addition (ADD) algorithm

A Math algorithm that performs the named function on two inputs. Two constants, K1 and K2, are also available.

Alarm (ALRM) algorithm

A Selector algorithm that produces a high, low, and rate alarm on a measurement. It can also be used for a deviation alarm on the absolute error between the set point and the measurement.

Alarm alert message

A message that displays on the screen when an alarm occurs during Runtime. The message remains on the screen until the alarm is acknowledged or another alarm occurs.

Alarm Configuration menus (ALRM CNFG)

A set of submenus for configuring alarm and event parameters.

Algorithm configuration

A window (menu) where you enter data to set the parameters for a specific algorithm.

Alarm/Event log file

A file consisting of a list of alarms and operator events that occurred during Runtime.

Alarm Summary

A Runtime display that lists alarms that occur during Runtime. You access this display by pressing **[Alt-J]**.

Alarm-Event Summary

A Runtime display that lists alarms and operator events. You access this display by pressing **[F4]**.

Algorithm functional diagram

A schematic view of the signal flow through the algorithm.

Algorithm Runtime subwindow

A subwindow specific to the algorithm that allows the operator to adjust the parameters during Runtime.

Algorithm

A set of instructions to perform a specific operation.

Alphanumeric field

A field that can contain alphabetic characters (A through Z), numbers (0 through 9), and the underscore(_).

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Analog Input (AIN) algorithm

An Input/Output (I/O) algorithm that receives an input signal from the I/O hardware and delivers a floating point value.

Analog Output (AOUT) algorithm

An Input/Output (I/O) algorithm that sends a floating point value to the output hardware, or converts a floating point value into a binary raw output value whose resolution is dependent on the output hardware.

Analog Selector function

A Dynamic Connection function in the Display Builder used to define a group of objects attached to an analog process variable. During Runtime, the values assumed by the analog variable determine which of the assigned objects is displayed on the screen.

AND algorithm

A Logic algorithm that performs the named function on two to four digital input values. An alarm is generated when the output becomes equal to the user set alarm value.

and algorithm

A Small Logic algorithm that performs the named logical function on two to six digital input values.

ASCII

An acronym for the American Standard Code for Information Interchange. This code uses the numbers 0 to 127 for text characters.

Auto/Manual Bias (AMB) algorithm

A Control algorithm that allows the operator to intervene in the process. The operator can place the algorithm into manual any time and position the output.

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Average (AVG) algorithm

A Selector algorithm that averages two to four inputs to produce its output.

Background Color

An Edit function in the Display Builder that lets you change the background color of the display.

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Batch Sequencing algorithm group

A group of algorithms that include the Ramp, Sequencer (SEQ), On-Delay Timer (TON), Off-Delay Timer (TOFF), One-Shot Timer (SHOT), Counter (CNT), and Message (MSG) algorithms.

Blink or Flash function

A Dynamic Connection function in the Display Builder that lets you specify that an object blink on and off, or flash between two different colors during Runtime when the variable that is linked to the object is TRUE.

Boot-up
To start the computer. A computer boots by loading a program into memory from an external source, such as a disk.

Boot-up display
A start-up display that can be the standard boot-up display contained in a file called BOOT.GSP, or a boot-up display you create.

Button
A rectangular image on the screen where you click to select an action.

Calculation algorithm group
A group of algorithms that include the Lead/Lag (LLAG), Dead Time (DTIM), Characterizer (CHAR), Filter (FILT), Logarithm (LOG), Exponent (Ex), and Simulation (SIM) algorithms.

Characterizer (CHAR) algorithm
A Calculation algorithm that produces an output value based on a linear interpolation of the measurement on a piecewise, linear characteristic curve.

Checkpoint (CKPT) algorithm
A Specials algorithm that saves the complete database in response to a digital signal.

Clicking

Positioning the cursor on a field, file name, etc., and then pressing and releasing a mouse button quickly.

Color function

A Dynamic Connection function in the Display Builder that lets you specify the color change of an object if one of the signals linked to the object is TRUE. It is useful for highlighting alarm conditions or temperature changes, such as indicating flow in a pipe.

Color palette

A selection from the Display Builder Main Window that lets you choose one of 16 colors to create color graphic displays.

Communication Configuration menu (COMM CNFG)

A menu in the Strategy Builder used to configure serial ports.

Configurator

A term used to refer to the Strategy and Display builders collectively.

Connect function

A selection from the Strategy Builder Main Window that lets you channel the flow of measurements and control information from block to block in the strategy.

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Connection
Where a line joins a block in a strategy.

Control algorithm group
A group of algorithms used to drive the process variable to the desired value. The control algorithms do not operate on the set-point of the input and measurement, but on the error between them. This group includes the Proportional Integral Derivative (PID), Proportional Derivative (PD), Integral (INTG), Auto/Manual Bias (AMB), DGAP, and Totalizer (TOT) algorithms.

Conventional memory
Memory residing in the first 640 Kbytes of address space in the PC RAM memory map.

Convert to AutoCAD
An Edit function in the Strategy Builder that lets you convert the strategy file to an AutoCAD DXF-formatted file so the strategy file can be used with AutoCAD and other CAD packages.

Convert to Graphic
An Edit function in the Strategy Builder that lets you convert the currently loaded strategy file in the Strategy Builder into a display file.

Copy

An Edit function in both the Display and Strategy Builders. In the Strategy Builder, it lets you copy blocks in your strategy from one location to another. In the Display Builder, it lets you duplicate an object or group of objects in your display.

Cosine (COS) algorithm

A Math algorithm that performs the named function on one input. Bias, amplitude, phase, and frequency can be set.

Counter (CNT) algorithm

A Batch Sequencing algorithm that accumulates pulse inputs and provides a floating point number output of the number of pulses it counted since it started or last reset.

Create Block & Connection Report

An Edit function in the Strategy Builder that creates ASCII text files reporting the blocks for the Database List Report and connections for the Connection Signal List Report in the strategy.

Cursor On/Cursor Off

An Edit function in the Display Builder that lets you display the X and Y coordinates of the cursor when it is anywhere in the display window. You can turn the cursor display off by clicking on the Cursor Off icon.

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Cut & Paste

An Edit function in the Strategy Builder with two purposes. It deletes parts from a strategy and saves them to a separate cut & paste file (Cut function). It also inserts a previously defined cut & paste file into a strategy (Paste function).

Cut Dynamic Connection function

A Dynamic Connection function in the Display Builder that lets you delete all the dynamic connections that exist for the selected dynamic objects in the current display.

Data Display function (process point) (PPT)

A Dynamic Connection function in the Display Builder that lets you create a field that displays the value of a variable in the database during Runtime. To invoke this function, click on the PPT icon in the Dynamic Connection subwindow.

Data Entry (DE) function

A Dynamic Connection function in the Display Builder that lets you create fields in which the operator enters the values of variables into the database during Runtime . A DE field is not updated by PC-30. It displays the value of the variable at the time the display was originally invoked (or the last value entered, if any).

Date/Time function

A Dynamic Connection function in the Display Builder that lets you create a field that displays the current date or time, or both in a variety of formats.

Dead Time (DTIM) algorithm

A Calculation algorithm that introduces a transport delay into the measurement signal.

Default function

The selection that is used when no other selection is specified. For example, the Edit function is the default Strategy Builder operation. Once you finish working with another Strategy Builder function, the Edit function is automatically enabled.

Device Alarms

Alarms initiated by the actual hardware device. (These alarms are not supported for all device drivers.)

Device Blocks (DEV1 - DEV120)

Blocks placed in the strategy to represent device drivers.

DGAP algorithm

A Control algorithm that compares two analog values, setpoint and measurement, and sets or resets two digital outputs based on the difference between the values.

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Digital Animator function

A Dynamic Connection function in the Display Builder used to define a series of objects to be displayed sequentially based on the state of a digital process variable. During Runtime, when the digital variable goes to its true state (logical 1), the assigned objects are displayed in the sequence where they were created with the Display Builder.

Digital Input (DIN) algorithm

An Input/Output (I/O) algorithm that brings a digital input into the system and initiates an alarm on it.

Digital Output (DOUT) algorithm

An Input/Output (I/O) algorithm that sends the input bit to the output hardware.

Display (DISP) algorithm

A Specials algorithm that shows one of eight operator displays at Runtime, based on external digital events. This algorithm also has an automatic recipe-download capability.

Display Builder

An icon-based system of windows and a mouse used to create custom displays that can be linked to a strategy.

Display Button function

A Dynamic Connection function in the Display Builder that lets you define a text button on a display screen that the operator can tab and select during Runtime. The Display Button is an easy way to create a custom window system for any operator or screen. Invoke the Display Button function by clicking on the GRP icon in the Dynamic Connection subwindow.

Display Key Macros

A Display Builder Main Window selection that creates Display Key Macros, allowing the operator to invoke specific graphic displays during Runtime.

Display Security Level

An Edit function in the Display Builder that lets you set a security level associated with a specific display.

Display Size

An Edit function in the Display Builder that lets you view the size of a display. To invoke this function, click on the % (percent) icon in the Edit subwindow.

Display Update Period

An Edit function in the Display Builder that lets you change the Display Update Period set in the System Configuration window in the Strategy Builder.

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Divide (DIV) algorithm

A Math algorithm that performs the named function on two inputs. Two constants, K1 and K2, are also available.

DOS

The operating system required for IBM and compatible computers, needed to use PC-30.

Dragging

Selecting an object, holding the mouse button down while you move the mouse, and releasing the mouse button. As you move the mouse across the desk, the object moves across the screen and stops when you release the mouse button.

DXF to GRP

A utility for converting an AutoCAD DXF file to a PC-30 GRP Display file.

Drawing Tools palette

A selection from the Display Builder Main Window that lets you create display objects, including lines, rectangles, circles, arcs, and text.

Dynamic Connection function

A Display Builder Main Window selection that lets you link a display to individual process variables that can be graphic- or data-oriented. For example, you can link the value of a process variable to the location of an object during Runtime, the object moves within a specified distance horizontally.

Dynamic Data Entry (DDE) function

A Dynamic Connection function in the Display Builder that lets you create fields on a display screen that perform both data display and data entry operations. A DDE field lets the operator observe the changing values contained in this field during Runtime.

Dynamic Query/Delete function

A Dynamic Connection function in the Display Builder that displays information about previously created dynamic links. The Query function also lets you specify various parameters for objects linked with the Flash, Data Display, and Data Entry functions. The Delete function deletes size, location, color, blink, and selector links.

Dynamic Report to Disk

An Edit function in the Display Builder that reports the dynamic connections that exist in the current display and generates an ASCII-formatted, dynamic report file in the current directory.

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Dynamic Symbol (faceplate) function

A Dynamic Connection function in the Display Builder that lets you define a group of objects or symbols containing many dynamic connections and use it as a single dynamic object. Each individual faceplate can be saved into a library and reused.

Dynamic display

A display that changes during Runtime as process variables in the database change. For example, a graphic object can change in color as a specified variable changes in value.

Edit function

A selection from the Main Window of the Strategy and Display Builders. In the Strategy Builder, it is the default function that consists of various commands to modify, report, and constrain strategy blocks. In the Display Builder, the Edit function consists of commands to modify or create displays.

EMS memory (Expanded memory)

A paged memory system where a 64 Kbyte segment of memory space between address 640K and 1 Meg serves as a “window” into a much larger memory array.

Eraser function

A Strategy Builder Main Window selection that lets you remove blocks or connections from the strategy or remove the entire strategy. A Display Builder Main Window selection that lets you erase one or more objects from the display or erase the entire display.

Event Summary

A Runtime display that lists operator events. This screen can be accessed by pressing **[Alt-V]**.

Event-Driven Historian (HIST) algorithm

A Specials algorithm that allows data logging to be started and stopped based on process conditions and events or by operator request.

Exit function

A Strategy Builder Main Window selection that lets you leave the Strategy Builder and return to DOS. A Display Builder Main Window selection that returns you to the Strategy Builder.

Exponent (Ex) algorithm

A Calculation algorithm that performs the named function on one input. Gain, Gain1, Gain2, and bias can be set.

Extended memory

Memory residing at address above 1 Megabyte.

Faceplate

A group of objects or symbols containing dynamic connections grouped together by the Dynamic Symbol (faceplate) function to be used as a single dynamic object.

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F(x) algorithm

A Math algorithm that is a general-purpose calculation block. Analog and digital output signals are calculated as a function of analog and digital inputs and local registers.

Field

A category of information to be entered (or selected by toggling through a series of choices) in a window or subwindow. For example, the Shift Start Time field in the Shift Historian List window requires that you enter the shift length in hours. A window may allow data entry when configuring the strategy, but not permit the operator to change the data during Runtime.

File Utility

Lets you read directories, delete files, and copy files between disks during Runtime without exiting to DOS.

File name

An eight-character DOS main file name selected for an individual file.

Files function

A selection from the Main Window of the Strategy and Display Builders that lets you save, load, and delete strategy or display files.

Fill and Unfill

An Edit function in the Display Builder that lets you fill and unfill rectangles, circles, ellipses, and shapes drawn with the Segmented Line tool.

Filter (FILT) algorithm

A Calculation algorithm that is a second-order Butterworth filter whose output value goes through the high/low output limits and the alarm function.

Find Tag

An Edit function in the Strategy Builder that lets you locate a specific tagged block from within the current strategy.

Flex-Size Convert to AutoCad

An Edit function in the Strategy Builder that lets you convert a selected portion of a strategy file to an AutoCAD DXF-formatted file so the strategy file can be used with AutoCAD and other CAD packages. (Compare **Convert to AutoCad** operation).

Flex-Size Convert to Graphic

An Edit function in the Strategy Builder that lets you convert a selected portion of the currently loaded strategy file into a display file. (Compare **Convert to Graphic** operation).

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Function keys

Keys **F1** through **F10** that enable the operator to perform frequently used PC-30 commands during Runtime. Some keys are used in combination with the **[Alt]** key to perform another function.

Global Dynamic Selection

An Edit function in the Display Builder that lets you select all of the graphic objects in the current display that contain dynamic connections. Clicking on the Global Dynamic Select icon from the Edit subwindow selects all dynamically connected objects.

Grid

A network of gray lines on the screen that you can turn on or off. The grid lets you control the placement of objects in the workspace, and is functional in both the Strategy and Display Builders.

Grid functions

An Edit function in the Strategy and Display Builders that lets you make the grid visible or invisible, turn the magnetism on or off, and change the size of the grid.

GRP to DXF

A utility for converting a PC-30 GRP Display file to a DXF file for use in AutoCAD.

Help window

A list and description of the various keys (function keys, Alt-key combinations, etc.) as a quick on-line reference for the operator during Runtime. This window is invoked by typing the ? (question mark) key.

High memory

The 64 Kbyte memory segment residing at address 1 Meg.

High Selector (HSEL) algorithm

A Selector algorithm that accepts from two to four analog input signals and selects as the output the highest input.

History (HIST) Algorithm

Algorithm block that generates history files. Up to 20 variables can be logged for each block. Refer to Event-Driven Historian algorithm for more information.

History Windows function

A Dynamic Connection function in the Display Builder that provides a method for displaying a specific history data file that was or is in the process of being logged by a strategy HIST block.

Icon

A graphic representation of an object, concept, or message. For example, the Erase function in the Main Window of the Strategy Builder is represented by a picture of an eraser.

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Initialized Data Entry (IDE) function

A Dynamic Connection function in the Display Builder that lets you create fields in which the operator enters the values of variables into the database during Runtime. This field is similar to a Data Entry field, but you initialize the value of the variable in the Display Builder.

Input/Output (I/O) algorithm group

A group of algorithms that translate between the floating point engineering values and logical values used within PC-30 and the signals received from and sent to the I/O hardware. The I/O algorithm group includes the Analog Input (AIN), Analog Output (AOUT), Digital Input (DIN), and Digital Output (DOUT) algorithms.

Input/Output (I/O) Configuration menu (I/O CNFG)

A menu which lists all device driver types configured in the strategy.

Integral (INTG) algorithm

A Control algorithm that performs the named function to drive the process control variable (MEAS) to the desired value (SETPT).

Intelligent Input/Output (I/O) Device

A device that is a programmable-distributed control system.

Invoke Display Builder function

A Strategy Builder Main Window selection that lets you access the Display Builder without losing the current strategy.

Keyhelp Utility

A program that provides the ability to define a new set of Help menus.

Key Macro

A single keystroke used to initiate a recorded command to automatically carry out a sequence of actions (for example, invoke a unique display, copy files to a floppy disk, initiate a history replay, or another operation requiring a sequence of keystrokes).

Lead/Lag (LLAG) algorithm

A Calculation algorithm that allows the output to lead or lag the measurement in the frequency domain.

Line window

A selection from the Display Builder Main Window that lets you specify the line style and width.

Location function

A Dynamic Connection function in the Display Builder that lets you link the value of a process variable to the location of any object. During Runtime, the object moves within a specified distance horizontally or vertically in proportion to the percentage of full scale of the variable.

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Logarithm (LOG) algorithm

A Calculation algorithm that performs the named function on one input. Gain, Gain1, Gain2, and bias can be set.

Logic algorithm group

A group of algorithms that perform the specified logic function. This group includes the AND, OR, NAND, NOR, XOR, Pulse (PUL), and NOT algorithms.

Low Selector (LSEL) algorithm

A Selector algorithm that accepts from two to four analog input signals and selects as the output the lowest input.

Main Window

When you access the Strategy Builder, this is the initial screen that displays. It consists of nine functions (some of which have subwindows) that provide a basis for creating or revising a strategy. In the Display Builder, this is the window that displays when you select the Display Builder icon from the Strategy Builder Main Window. The Display Builder Main Window consists of eight functions (including the Display Key Macro function) and Color, Line, and Drawing Tools windows that let you create or revise a graphic display.

Math algorithm group

A group of algorithms that include the Addition (ADD), Multiplication (MULT), Division (DIV), Sine (SIN), Cosine (COS), Tangent (TAN), and F(x) algorithms.

Median Selector (MSEL) algorithm

A Selector algorithm that accepts from three to four analog input signals and selects as the output the median input (or the input closest to the average).

Menu (Algorithm Submenu)

A list of choices from where you select an algorithm with the mouse.

Message (MSG) algorithm

A Batch Sequencing algorithm that lets you create messages that can be invoked based on digital events in custom displays during Runtime.

Metaconf

A program to configure the PC-30 Configurator.

Mouse buttons

The buttons on the top of the mouse. Pressing a mouse button initiates an action wherever the cursor is pointed. Releasing the button confirms the action.

Mouse

The small device you roll around on a flat surface next to your computer.

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Move/Resize

An Edit function in the Strategy Builder that lets you move blocks and connections or resize them. The block connections are adjusted to the new size when a block is resized.

Move

An Edit function in the Display Builder that lets you reposition a selected object or group of objects in a display.

Move to Back

An Edit function in the Display Builder that allows you to display a graphic(s) that cover other existing graphics such that they it appears behind these existing graphics.

Move to Front

An Edit function in the Display Builder that allows you to display a graphic(s) that is hidden by other existing graphics such that it appears in front of the existing graphics.

Multiplication (MULT) algorithm

A Math algorithm that performs the named function on two inputs. Two constants, K1 and K2, are also available.

Multitasking operating system

A system which allows simultaneous execution of control, graphics, alarming, trending, data logging, file transfer, and input/output (I/O) drivers.

Named macros

Macros consisting of a series of Operator Interface Commands linked together to perform a single operation.

NAND algorithm

A Logic algorithm that performs the named function on two to four digital input values. An alarm is generated when the output becomes equal to the user set alarm value.

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Network algorithm (NODE 1 - NODE 32)

An algorithm that provides access to node blocks used when integrating the networking software into a control strategy. This algorithm is functional only when the Network software is installed.

NOR algorithm

A Logic algorithm that performs the named function on two to four digital input values. An alarm is generated when the output becomes equal to the user set alarm value.

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NOT algorithm

A logic algorithm that inverts its digital input.

not algorithm

A Small Logic algorithm that inverts its digital input.

Off-Delay Timer (TOFF) algorithm

A Batch Sequencing algorithm that provides a time-delay function for logic and sequencing schemes. It sets its logic output high when its logic input is set and keeps it high for a specified time after the input is reset.

On-Delay Timer (TON) algorithm

A Batch Sequencing algorithm that provides a time-delay function for logic and sequencing schemes. It sets its logic output high a specified time after its logic input is set.

One-Shot Timer (SHOT) algorithm

A Batch Sequencing algorithm that provides a controlled timing function for logic and sequencing schemes.

Operating system

The software your computer needs to run other programs.

Operator Event

A change to a Runtime parameter caused by an operator pressing a key or entering a value.

Operator interface command

A command that allows a selected key, key combination, or named macro to perform a variety of Runtime operations. An operator interface command can be used in any .KMS Key Macro Source File.

Options algorithm group

A group of algorithms that let you access any of the PC-30 options installed on the system. These options include:

SPC (statistical process control)
S/P (setpoint profiler)
HOST (Host communications)
REPORT (report generator)
RECP (recipe module)
FILE-XFER (Network file transfer)
SHADOW (Shadow)
USER TASK (User task)
MODEM (modem support for Host communications)
NETWORK (PC-30 Software networking)
HOST COMM (Host communications)
TOUCH (touch screen operator interface)
MOUSE* (Runtime mouse support)
COMM (external communications option)
ALM CACH* (alarming for cached points)

***** Included with PC-30

OR algorithm

A Logic algorithm that performs the named function on two to four digital input values. An alarm is generated when the output becomes equal to the user set alarm value.

or algorithm

A Small Logic algorithm that performs the named logical function on two to six digital input values.

Packed Analog Input (PAIN) algorithm

A Packed Input/Output (I/O) algorithm that receives up to eight input signals from the I/O hardware and outputs floating point values.

Packed Analog Input/Output (PAIO) algorithm

A Packed Input/Output (I/O) algorithm that provides the function of the PAIN and PAOT algorithms.

Packed Analog Output (PAOT) algorithm

A Packed Input/Output (I/O) algorithm that sends up to eight floating point values to the output hardware or converts up to eight floating point values into binary raw output values whose resolution is dependent on the output hardware.

Packed Digital Input (PDIN) algorithm

A Packed Input/Output (I/O) algorithm that brings up to 16 digital inputs into the system and initiates alarms on them.

Packed Digital Input/Output (PDIO) algorithm

A Packed Input/Output (I/O) algorithm that provides the function of both the PDIN and PDOT algorithms.

Packed Digital Output (PDOT) algorithm

A Packed Input/Output (I/O) algorithm that sends up to 16 digital inputs to the output hardware.

Packed Input/Output (I/O) algorithm group

A group of algorithms that is similar to the standard I/O algorithm group but processes multiple signals simultaneously. The Packed I/O algorithm group includes the Packed Analog Input (PAIN), Packed Analog Output (PAOT), Packed Analog I/O (PAIO), Packed Digital Input (PDIN), Packed Digital Output (PDOT), and Packed Digital I/O (PDIO) algorithms.

Palette

One of two Display Builder subwindows (Color or Line palettes) from which you can select different color and line options.

Pan & Zoom function

A selection in both the Strategy and Display Builder Main Menus that lets you expand and compress the amount of workspace viewed in the window with the Zoom function and move the viewing area around the workspace with the Pan function.

Password menu

A menu for configuring security levels and their corresponding passwords.

Pick Field

A process point.

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Pick Field function

A dynamic connection function in the display builder that lets you direct any object to execute a single operator interface command or a macro that exists in the current Key Macro library.

Plug-in Input/Output (I/O) board device

A device consisting of one or more cards that are installed directly into slots in the computer.

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 lets you graphically indicate where you want to work.

PPT (process point) function

Refer to Data Display function.

Print Block & Connection Report

An Edit function in the Strategy Builder that prints the Database List Report and the Connection Signal List Report files on the system printer.

Print Current Screen

An Edit function in the Strategy Builder that prints the current screen image of the strategy.

Print Display

An Edit function in the Display Builder that prints the display that is visible on the screen.

Print Dynamic Report

An Edit function in the Display Builder that prints the dynamic connections in the current display. The report is not saved to disk.

Programmable logic controller (PLC) device

A device that is interfaced into PC-30 over serial communications lines.

Prompt

A message that appears on the screen verifying an operation, asking for information, or giving directions. For example, when you select the Delete function, a prompt appears verifying that you want to delete the selected file.

Proportional Derivative (PD) algorithm

A Control algorithm that performs the named function to drive the process variable (MEAS) to the desired value (SETPT).

Proportional Integral Derivative (PID) algorithm

A Control algorithm that performs the named function to drive the process variable (MEAS) to the desired value (SETPT).

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Pulse (PUL) algorithm

A Logic algorithm that produces an output pulse of one scan time whenever its digital input first makes the transition from 0 to 1.

pulse (pul) algorithm

A Small Logic algorithm that produces an output pulse of one scan time whenever its digital input first makes the transition from 0 to 1.

Query function

A Strategy Builder Main Menu selection that lets you set the algorithm parameters of each block and reports the details for each connection made between strategy blocks.

RAM (random-access memory)

An area within your computer used to store data temporarily until you save it to disk.

Ramp (RAMP) algorithm

A Batch Sequencing algorithm that produces an analog value that is steered up or down by the sum of the two rate values.

Recipe display

A display created by the Initialized Data Entry (IDE) field that stores initial values for the specified values in the strategy. It lets the operator load the display during Runtime and, with one key sequence, simultaneously enter all the data in the fields into the running database. A recipe display is created by using the IDE function in the Dynamic Connection submenu.

Resize

An Edit function in the Display Builder that lets you stretch or shrink a selected object or change the ratio of its dimensions.

Rotate

An Edit function in the Display Builder that rotates an object 90 degrees in a clockwise direction.

Rubber Stamp function

A Display Builder Main Menu selection that lets you group multiple objects together as a symbol that can be used as a single object. A symbol can be edited as a whole or as individual objects. You can create a library of symbols to reuse in your displays. This function is used to group objects that are not dynamically linked.

Runtime System

A real-time, multitasking operating system for on-line control and monitoring.

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Runtime Screen Saver

Causes the Runtime screen to become blank after a specified amount of time has elapsed with no keyboard or mouse movement. Moving the mouse or pressing a key restores the Runtime screen. The Runtime Screen Saver is configured in the SYS algorithm block

Select function

A Strategy Builder Main Menu selection that consists of a submenu of algorithms (except for System Configuration). The System Configuration window sets basic values and preferences that determine the overall behavior of PC-30 at Runtime. The algorithms lead to the graphic placing of a block in the workspace as you build the strategy.

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, it is enclosed in a selection box. When you select a menu icon, it is highlighted with a filled background. Some icons remain selected until you make another selection.

Selector algorithm group

A group of algorithms that include the High Selector (HSEL), Low Selector (LSEL), Median Selector (MSEL), Average (AVG), Alarm (ALRM), and Switch (SWCH) algorithms.

Selector function

A Dynamic Connection function in the Display Builder that lets you link multiple objects to corresponding digital signals. If a signal is TRUE during Runtime, then the object to which it is linked is selected for display.

Sequencer (SEQ) algorithm

A Batch Sequencing algorithm that is the functional analog of a drum-type stepper switch. It includes 31 user-defined patterns.

SHOT Algorithm

Refer to One-Shot Timer.

Simulation (SIM) algorithm

A Calculation algorithm that biases, lags, integrates, and adds noise to the measurement signal simulating process variables to test control strategies.

Sine (SIN) algorithm

A Math algorithm that performs the named function on one input. Bias, amplitude, phase, and frequency can be set.

Single loop controller device

A device that is an intelligent subsystem optimized for controlling individual or multiple loops.

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Size function

A Dynamic Connection function in the Display Builder that lets you link the value of a process variable to the size of a rectangle, circle, or ellipse. It is useful for representing bar graphs, thermometers, tanks with changing levels, etc.

Small Logic algorithm group

A group of algorithms that are shortened versions of the standard Logic algorithm group. They do not have descriptions and ASCII names associated with their outputs nor do they generate alarms. They have two digital outputs. This group includes the and, or, xor, pulse (pul), and not algorithms.

Smooth and Unsmooth Lines

An Edit function in the Display Builder that lets you smooth out the angles between line segments or restore a line to its original shape.

Snapshot

A current trend that can be saved to the hard drive as a data file during Runtime. The system can save 40 snapshots.

Specials algorithm group

A group of algorithms that include the Event-Driven Historian (HIST), System (SYS), Display (DISP), Timer, and Checkpoint (CKPT) algorithms.

State Field function

A Dynamic Connection function in the Display Builder that lets you create a field in a graphic file that can display multiple text messages during Runtime.

Strategy

A plan for acquiring data from input/output (I/O) hardware and, depending on your application, logging it to disk, making calculations on it, and using the results to monitor or control a batch or continuous process.

Strategy Builder

An icon-based system of menus and a mouse used to create a control or data-acquisition strategy. The Strategy Builder defines the strategy that will later be executed in the Runtime module. It creates or modifies the basic strategy database set of files.

Strategy database

A set of files containing the configuration of the system and the strategy.

Strategy Key Macros

Macros created in the Strategy Builder that let you reassign Runtime keyboard functions to perform specific operations.

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Stroke text
A proportionally spaced font that changes size with the Zoom function. It is one of two styles of text in the Text submenu.

Switch (SWCH) algorithm
A Selector algorithm that represents a single-pole, single-throw switch.

System Alarm
An alarm initiated by the PC-30 Runtime System.

System (SYS) algorithm
A Specials algorithm that has nine digital input and ten digital output variables that allow optional connections to certain global PC-30 Software database variables.

System Configuration menu (SYS CNFG)
A menu for configuring system parameters.

System Key Macros
Key Macros that invoke PC-30's displays and submenus.

Tag Magnifier
An Edit function in the Strategy Builder that displays the tag name of each strategy block on which the cursor is placed.

Tag Sort function
Provides a sorted display of tags in the strategy during Runtime.

Tag name
A unique tag identification assigned to a block.

Tangent (TAN) algorithm
A Math algorithm that performs the named function on one input. Bias, amplitude, phase, and frequency can be set.

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Timer (TIME) algorithm
A Specials algorithm that drives its digital outputs high or low based on the system time and date. This algorithm can be used to schedule events in the system.

TOFF algorithm
Refer to Off-Delay Timer.

TON algorithm
Refer to On-Delay Timer

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Totalizer (TOT) algorithm
A Control algorithm that accepts an analog input and accumulates it over time. Its primary purpose is to accumulate totals of flows whose flow rates are represented by analog signals.

Trend List menu (TRND LIST)
A menu for configuring tags that appears in the system trend.

Trend Window Function
A Dynamic Connection function in the Display Builder that lets you create trend windows that show the value of up to eight variables during Runtime. The trend windows created in the Display Builder are attached to displays and cannot be changed by the operator.

Typewriter text
A fixed-style font that does not change size with the Zoom function. It is one of two styles of text in the Text submenu.

Upper memory
Memory residing in the address space between 640K and 1 Meg. This memory resides in the memory *holes* in the address range. The amount of upper memory available is dependent on the hardware configuration of the PC.

User algorithms
Algorithms you can create to perform special functions or calculations required by your application.

Virtual Mouse
A generic mouse driver which supports all types of mice.

Window/Subwindow

A record for data entry. Also an entry screen or subscreen (window within a window).

Wireless Connections

Connections you make between strategy blocks without physically drawing the connection lines.

XOR algorithm

A Logic algorithm that performs the named function on two to four digital input values. An alarm is generated when the output becomes equal to the user set alarm value.

xor algorithm

A Small Logic algorithm that performs the named logical function on two to six digital input values.

XMS (Extended Memory Specification)

A standard method for allocating and manipulating extended memory, high memory, and upper memory.

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Appendix B - Variables Glossary

This appendix includes a list of algorithm abbreviations, a description of each of the parameters used in the PC-30 Software algorithms, and a table of all available connection variables for each algorithm block.

Each description includes the variable type and range. The variable type can be floating point, integer, bit, or character string. Bit types can take on the value of 1 (Y) or 0 (N). The letter E following the variable type indicates that the parameter can be configured in the Strategy Builder to receive a signal from an external signal source. Unless otherwise noted, parameters can be set by the user during configuration and Runtime.

Most of the parameters in this glossary appear in both the configuration menu and the Runtime subwindow. Those parameters that appear only during configuration or Runtime are noted. In some cases, a parameter name that appears in the configuration window differs slightly from the corresponding name in the algorithm subwindow during Runtime. In these cases, the Runtime name is shown in parentheses following the configuration name. If the Runtime name is different, it also appears as a separate entry with a reference to the corresponding configuration name.

B1 Algorithm Abbreviations

The following algorithm abbreviations are used in this glossary:

Abbreviation	Algorithm
ADD	Addition
AIN	Analog Input
ALRM	Alarm
AMB	Auto/Manual Bias
AOUT	Analog Output
AVG	Average
CHAR	Characterizer
CKPT	Checkpoint
CNT	Counter
COS	Cosine
DGAP	DGAP (no abbreviation)
DIN	Digital Input
DISP	Display
DIV	Division
DOUT	Digital Output
DTIM	Dead Time
e^x	Exponent
FILT	Filter

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Abbreviation	Algorithm
F(x)	F(x) (no abbreviation)
HIST	Event-Driven Historian
HSEL	High Selector
INTG	Integral
LLAG	Lead/Lag
LOG	Logarithm
LSEL	Low Selector
MSEL	Median Selector
MSG	Message
MULT	Multiplication
PAIN	Packed Analog Input
PAIO	Packed Analog Input/Output
PAOT	Packed Analog Output
PD	Proportional Derivative
PDIN	Packed Digital Input
PDIO	Packed Digital Input/Output
PDOT	Packed Digital Output
PID	Proportional Integral Derivative
RAMP	Ramp (no abbreviation)
SEQ	Sequencer
SHOT	One-Shot Timer
SIM	Simulation

Abbreviation	Algorithm
SIN	Sine
STAT	Statistics
SWCH	Switch
SYS	System
TAN	Tangent
TIME	Timer
TOFF	Off-Delay Timer
TON	On-Delay Timer
TOT	Totalizer
TPO	Time Proportional Output
USER	User Algorithm

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B2 Configuration Variables

ACCUM

Accumulated time in the TON, TOFF, and SHOT algorithms.

ACK PR 1

This SYS algorithm bit causes all alarms with priorities greater than or equal to the ALM PR 1 setting to be acknowledged. (Bit, E)

ACK PR 2

This SYS algorithm bit causes all alarms with priorities greater than or equal to the ALM PR 2 setting to be acknowledged. (Bit, E)

ACK VALUE

Bit specifies the starting value for the ACK signal (i.e. an unacknowledged alarm) of this I/O block. Entering **Y** sets the bit to 1, entering **N** sets the bit to 0. (Bit cannot be changed during Runtime)

ADDRESS

The I/O device base address used by a non-serial driver. This is a view-only field in the Runtime subwindow.

ALARM ACK

In the SYS algorithm, alarm acknowledgment causes a global acknowledgment of all system alarms. (Bit, E)

ALARM BIT

Specifies the bit that indicates an alarm is present in the I/O point. (Bit cannot be changed during Runtime).

ALARM PRIORITY (PRIORITY)

The Alarm Priority determines if an alarm is sounded, displayed, logged, or printed during Runtime. All alarms with priorities greater than or equal to the system squelch level (and the function's sub-squelch level) are sounded, displayed, etc.
(0 <= PRIORITY <= 9; integer)

ALMDBAND (DBAND)

Dead band is the amount of hysteresis in the high and low alarms. It prevents the alarms from tripping on and off as the output fluctuates above and below the alarm value. An alarm is set (1) when the algorithm output or intelligent I/O point exceeds the high alarm or low alarm value. It is not reset until the algorithm output (or intelligent I/O point) returns to the normal range by an amount equal to the dead band value. (Floating point for algorithm outputs cannot be changed during Runtime.)

ALM->EVT

Allows alarms generated by the block to show up as events instead of alarms during Runtime. This only applies to PDIN, PDIO, DIN, AND, NAND, OR, NOR, NOT, XOR, and CNT algorithm blocks. If this field is set to Y, alarm conditions for the block show up as events only. If set to N, the block alarms in the normal fashion. (Bit cannot be changed during Runtime).

ALM PR 1

Any alarms that exist in the system that have a priority setting greater than or equal to the **ALM PR 1** value cause the RALM output variable in the System (SYS) block to go true (logical 1). (Integer cannot be changed during Runtime).

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ALM PR 2

Any alarms that exist in the system that have a priority setting greater than or equal to the **ALM PR 2** value cause the DALM output variable in the System (SYS) block to go true (logical 1). (Integer cannot be changed during Runtime).

ALM VAL (ALRM VAL)

Alarm value is the output value that causes the discrete algorithm to go into alarm. (Bit, E)

ALRM VAL

Refer to ALM VAL.

AMP

Refer to AMPL.

AMPL (AMP)

Amplitude is a gain factor used with the SIN, COS, and TAN functions to cause larger or smaller swings in the output. (Floating point)

APPEND

Toggles between appending to a single file or creating multiple data files when data logging is stopped and restarted. (Bit)

AR1, AR2, AR3, AR4

Analog registers in the F(x) algorithm.

AUTORST

If enabled, auto reset causes the CNT algorithm to reset to the preset value after the maximum count is reached. (Bit)

BIAS

Bias represents an amount that is added to a controller output. In the SIM, PID, PD, INTG, and AMB algorithms, this amount is multiplied by a gain before adding (BIAS * KBIAS). (Floating point, E)

Bias represents an offset in the LOG, Ex, SIN, COS, and TAN algorithms. (Floating point)

BLD TIME (BTIME)

Bleed time is the time constant (in minutes) used to prevent an output bump when a controller is switched from manual to automatic. This variable is useful only on controllers that do not possess integral action. The output bleeds from the current manual value to the desired automatic value at the specified rate determined by bleed time. (Floating point)

BSTEP

Backward step causes the SEQ algorithm to step from the present pattern to the previous pattern when it is pulsed. It is used with the SKIP, C1STEP, and C2STEP inputs to produce various stepping patterns. (Bit, E)

BTIME

Refer to BLD TIME.

C1STEP/C2STEP

C1STEP and C2STEP are used with FSTEP and BSTEP to cause the SEQ algorithm to skip forward or backward to the next pattern in which flag bits are set in positions 15 (C2STEP) or 16 (C1STEP). (Bit, E)

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CNT UP

Steering input to the CNT algorithm. If set, CNT UP causes the counter to count up. If reset, the counter counts down. (Bit, E cannot be changed during Runtime)

COM PORT

The communication port used by a serial driver. This is a view-only field in the Runtime subwindow. (1 <= COM PORT <= 4: integer)

CONTROL

A digital input that starts and stops the timer algorithms TON, TOFF, and SHOT. It displays in the subwindow only as a data display field. (Bit)

DALM

Refer to DEV ALM.

DBAND

Refer to ALMDBAND.

DEADBAND

Refer to ALMDBAND.

DELAY (TIMSET)

The amount of time in which the output of the SHOT algorithm remains TRUE after it is toggled. (Floating point)

DERV

Derivative time is a tuning parameter in the PID controller. (Floating point, E)

DESC

Description that identifies an algorithm block. (30 character string cannot be changed during Runtime.)

DEV

A logical device number that is a view-only field in the Runtime subwindow. (1 <= DEV # <= 120)

DEV ALM (DALM)

Deviation alarm is the value of ABS(SETPT - MEAS) that causes the deviation alarm bit to be set (1). The deviation alarm bit is reset (0) when ABS(SETPT - MEAS) falls below (DEV ALM - DV DBAND). (Floating point, E)

DEVICE

The name of an I/O device. This is a view-only field in the Runtime subwindow. (6-bit character string)

DEVICE LOW RAW

Refer to RAW LOW.

DEVICE RAW RANGE

Refer to RAW RNG.

DGAIN

Refer to DYN GAIN.

DIAGRAM

The name of the display associated with the intelligent I/O point. This name can be used as a parameter in certain Key Macro function calls. (8 character name cannot be changed during Runtime.

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DIG INP
Number of digital inputs to the F(x) or User algorithm.

DIN1, DIN2, DIN3, DIN4
Digital inputs to the F(x) or User algorithm.

DISPLAY
The name of a custom display (created in the Display Builder) which can be displayed during Runtime by selecting one of the algorithm's fields with the **[F3]** key. (An 8-bit character string cannot be changed during Runtime.)

DISPLAY 1 to 8
File names of displays connected to digital inputs in the DISP algorithm. (An 8-bit character string cannot be changed during Runtime.)

DNLD DISP
In the SYS algorithm, download display causes all data entries in the current display to be downloaded into the system database. (Bit, E)

DOS EXIT
In the SYS algorithm, DOS exit causes the system to end the Runtime operation and exit to DOS. (Bit, E)

DOUT1, DOUT2, DOUT3, DOUT4
Digital outputs of the F(x) or User Algorithm.

DOWNLOAD

If Y, it forces writing to hardware on the Runtime start-up in AOUT, DOUT, PAOT, PDOT, PAIO, and PDIO algorithms. (Bit cannot be changed during Runtime.)

DOWNLOAD ON INIT

If Y, forces the intelligent I/O point to be written to the hardware on the Runtime start-up. (Bit)

DOWNLOAD ON SCAN

If Y, forces the intelligent I/O point to be written to the hardware every time the point is scanned. (Bit)

DR1, DR2, DR3, DR4

Digital registers in the F(x) algorithm.

DRIVER

Name of I/O device driver. This is a view-only field in the Runtime subwindow for I/O algorithms. (8-bit character string)

DTIME

Dead time represents the amount of signal delay (in minutes) in the DTIM algorithm. Since the DTIM algorithm has 180 slots for signal delay, the maximum specifiable dead time is 180 times the block scan rate in minutes. (0 <= DTIME <= 180 * SCAN/60: Floating point)

DV DBAND

Dead band for reset of DEV ALM. (Floating point cannot be changed during Runtime.)

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DYN GAIN (DGAIN)

Dynamic gain is the ratio of the time constants in the LLAG algorithm and represents the initial output rise for a step input. If the LLAG is represented in the time domain as (T1s + 1)/(T2s + 1), then DYN GAIN = T1/T2. Setting DYN GAIN = 0 transforms the LLAG to a first-order filter and setting DYN GAIN = 1 causes the output to track the measurement. (Floating point)

EBT

Refer to ENT BIT.

EMG PATTRN

The emergency pattern in the SEQ algorithm that is directed to the output whenever the ESTEP input is set. (A 16-bit pattern cannot be changed during Runtime.)

END SEC, END MIN, END HRS, END DAY, END MON, END YEAR

Ending time and date entries in the TIME algorithm. (Integer)

ENGINEERING UNITS

String name of up to 8 alphanumeric characters that specifies the units of an algorithms block's output or an intelligent I/O point. Examples are LB/HR, INCHES, VOLTS, etc. (String cannot be changed during Runtime for algorithm blocks)

ENT BIT (EBT)

Entered bit is an alternate means of driving the output in the DIN, PDIN, PDIO, DOUT, and PDOUT algorithms. When the algorithm is in the track mode, ENT BIT is the output. (Bit, E)

ENT VAL (EVL)

Entered value is the desired output value when the AIN, PAIN, and PAIO algorithms are placed into the track mode. (Floating point, E)

ENTVAL

Entered value is the desired output value when the SIN algorithm is placed into the track mode. (Floating point, E)

ESTEP

When ESTEP is set, it forces the output of the SEQ algorithm to be the emergency pattern (EMG PATTRN). (Bit, E)

EV1

Refer to ENT BIT, ENT VAL.

EXTERNAL ALARM (EXT ALM)

Bit that enables recognition of alarms generated by the device. This parameter is applicable only if the device supports external alarming. (Bit)

EXT ALM

Refer to EXTERNAL ALARM

EXT FBK (EXFBK)

Indicates when an external feedback is present. It is typically used in control applications to prevent the integral term from winding up. (Bit)

FILE

Refer to FILE NAME.

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FILENAME (FILE)

The name of the file to which data is logged in the HIST algorithm. (5-bit character string if not appending; 8-bit character string if appending)

FIL TIME (FILT)

Filter time is the time constant of the filtering action in the FILT, LLAG, AIN, PAIN, and PAIO algorithms. (Floating point, E)

FILT

Refer to FIL TIME.

FORCE DOWNLOAD

Refer to DOWNLOAD ON INIT.

FREQ

Frequency is a multiplication factor of the measurement (MEAS) signal that is used in the SIN, COS, and TAN algorithms. (Floating point)

FSTEP

Forward step causes the SEQ algorithm to step from its present pattern to the next when it is pulsed. It is used with the SKIP, C1STEP, and C2STEP inputs to produce various stepping patterns. (Bit, E)

FULL SCAN

If the I/O Scanner is set to ON DEMAND in the SYS CNFG menu, this I/O point is always scanned regardless of whether or not the point meets the conditions for scanning. Used in the AIN, DIN, PAIN, PAIO, PDIN, and PDIO algorithms.

GAIN, GAIN1, GAIN2

GAIN, GAIN1, and GAIN2 are multiplication factors used in the Ex, LOG, AMB, and TOT algorithms. (Floating point)

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GROUPN

A signal within the specified group to which the input is connected. This is a view-only field in the Runtime subwindow. (0 <= GROUPN # <= 15: integer)

HALM

Refer to HIGH ALARM.

HI ALM

Refer to HIGH ALARM.

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HI DBAND

High dead band is used in the DGAP controller in GAP operation only. It is the amount that the error must decrease below the HI GAP limit before the Q output is set to off. (Floating point, E)

HI GAP

Refer to HIGH GAP.

HI LIMIT (HLM)

High limit is the high output limit. The high range/low range takes precedence if the high limit falls outside their range. (Floating point, E)

HI NAME (HNAM)

The name assigned to the discrete output when it is 1 (TRUE). (An 8-bit character string cannot be changed during Runtime.)

HI RANGE

Refer to HIGH RANGE.

HIGH ALARM (HI ALM, HALM)

High alarm is the value of the algorithm output that causes the high alarm bit to be set (1). The high alarm bit is reset (0) when the output falls below HI ALM - ALM DBAND. (Floating point, E)

HIGH GAP (HI GAP)

High gap is used in the DGAP controller. It is the amount of error that causes the Q output to be set. (Floating point, E)

HIGH RANGE (HI RANGE, HRG)

The highest possible value of the algorithm output or intelligent I/O point. (Floating point cannot be changed during Runtime for algorithm blocks.)

HLM

Refer to HI LIMIT.

HNAM

Refer to HI NAME.

HOLD

Causes the algorithm to stop execution when set to 1 (TRUE). (Bit, E)

HRG

Refer to HIGH RANGE.

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IALM

Refer to INHIBIT ALARM.

IN1, IN2, IN3, IN4

Inputs to algorithms which appear in the bar graph faceplate in the Runtime subwindows.

INC/INC

When Increase/Increase is set to Y, an increasing measurement signal causes the controller output to increase (indirect mode). When set to N, an increasing measurement signal causes the output to decrease (direct mode). (Bit cannot be changed during Runtime.)

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INH ALM

Refer to INHIBIT ALARM.

INHIBIT ALARM (IALM, INH ALM)

Inhibit alarm stops alarm processing for this algorithm block or intelligent I/O point when it is set. (Bit, E)

INHIB ALM

In the SYS algorithm, inhibits all alarms. (Bit, E)

INIT

INIT is a Runtime parameter that initializes the time history of a Calculation algorithm and sets the output equal to the input. In the AIN algorithm, INIT initializes the filter. Initialization is done once at block start-up, but it can also be done by the operator during Runtime. (Bit)

INSTR HRG, INSTR LRG

Instrument high and low ranges are used in AIN, PAIN, and PAIO algorithms. (Floating point cannot be changed during Runtime.)

INT ALM

Refer to INTERNAL ALARM

INT PAR1, INT PAR2, INT VAR1 - INT VAR5

Integer Constants used by User algorithms.

INTERNAL ALARM (INT ALM)

If set to Y, PC-30 provides alarms for this point. (Bit)

INTGR

Integral time is a tuning parameter in the PID and INTG controllers. (0 <= INTGR <= 200.00 min: floating point, E). INTGR is a switch to integrate the input signal in the SIM algorithm. (Bit)

INVERT (INVT)

Invert specifies when the input bit should be inverted before processing. (Bit cannot be changed during Runtime.)

I/O SCAN

In the SYS algorithm, turns I/O scanner on and off. (Bit, E)

K1, K2

Gain factors for inputs in the ADD, MULT, and DIV algorithms. (Floating point)

KBIAS

Bias gain is the gain factor by which to multiply the BIAS before adding it to the controller output, (KBIAS * BIAS). (Floating point)

KNOISE

Refer to NOISGAIN.

LAG1

Value of the first first-order lag (in minutes) in the SIM algorithm. (Floating point)

LAG2

Value of the second first-order lag (in minutes) in the SIM algorithm. (Floating point)

LALM

Refer to LO ALM.

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LLM

Refer to LO LIMIT.

LNAM

Refer to LO NAME.

LO ALM

Refer to LOW ALARM.

LO DBAND

Low dead band is used in the DGAP controller in GAP operation only. It is the amount that the error must decrease above the LO GAP limit before the NOTQ output is set to off. (Floating point, E)

LO GAP

Refer to LOW GAP.

LO LIMIT (LLM)

Low limit is the low output limit. The high range/low range takes precedence if the low limit falls outside of the range. (Floating point, E)

LO NAME (LNAM)

The name assigned to the discrete output when it is 0. (An 8-bit character string cannot be changed during Runtime.)

LO RANGE

Refer to LOW RANGE.

LOCAL SETP

Setpoint configured in the menu or from the subwindow for the PID, PD, INT, and DGAP algorithms.

LOG ON

If Y, logging by the HIST algorithm is in progress.

LOW ALARM (LALM, LO ALM)

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Low alarm is the value of the algorithm output or intelligent I/O point that causes the low alarm bit to be set (1). The low alarm bit is reset (0) when the output or point rises above LO ALM + ALMDBAND. (Floating point, E)

LOW GAP (LO GAP)

Low gap is used in the DGAP controller. It is the amount of error which causes the NOTQ output to be set. (Floating point, E)

LOW RANGE (LO RANGE, LRG)

Lowest possible value of the algorithm output or intelligent I/O point. (Floating point for algorithm outputs cannot be changed during Runtime.)

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LOW RAW

Refer to RAW LOW.

MANUAL

Causes the algorithm to initialize in the manual mode if set. (Bit)

MAXDTIME

Maximum dead time in the DTIM algorithm (in minutes). MAXDTIME = 180 * SCAN / 60. This is a data display field in the Runtime subwindow. (Floating point)

MAXSTEP

Maximum number of steps in the SEQ algorithm before the sequencer wraps around to Step 1. (1 <= MAXSTEP <= 31: integer cannot be changed during Runtime.)

MN LIMIT

Manual limit indicates if the output limits (high/low limit) are enforced in the manual mode of operation. Typically, the output limits are enforced in the manual mode. (Bit cannot be changed during Runtime.)

MSG

Message selection from the MSG algorithm.

NOISE

Switch to insert noise in the SIM algorithm. (Bit)

NOISGAIN (KNOISE)

Gain of the noise generator in the SIM algorithm. (Floating point)

NUM BKPT

The number of point sets used by the characterizer. (2 <= NUM BKPT <= 20: integer cannot be changed during Runtime.)

NUM INPUT

Number of inputs to the algorithm. (Integer, range varies depending on the specific algorithm cannot be changed during Runtime.)

NUM SEL

The number of the input selected for output in the Selector algorithms. This is a data display field in the Runtime subwindow. (0 <= NUM SEL <= 4: integer)

NUM VARS

The number of variables to be logged with the HIST algorithm.

OFF DELAY (TIMSET)

Time delay for the TOFF timer. (Floating point, E)

ON DELAY (TIMSET)

Time delay for the TON timer. (Floating point, E)

ON SCAN

Refer to SCAN POINT.

OUT, OUT1, OUT2, etc.

Output of the algorithm that appears in the bar graph faceplate in the Runtime subwindow.

OUT FDBCK

If Y, the PAIO and PDIO algorithms *short circuit* the inputs to the algorithms to the outputs of the algorithms. When MANUAL is set to Y, this allows a Dynamic Data Entry (DDE) to read and write to the same I/O point.

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OVERFLOW

If Y, the CNT algorithm reached its highest possible count.

PATTERN 1 to 31

SEQ output patterns. Each pattern is a set of 16 bits that can be used to drive DOUT algorithms directly or can be used in further logic schemes. (A 16-bit patterns cannot be changed during Runtime.)

PBAND

Proportional band is a tuning parameter in the PID controller. (1<= PBAND <= 10,000: floating point, E)

PERIOD # (SELECTED PERIOD)

Selects period 0 or period 1 at the logging rate in the HIST algorithm. (Bit, E)

PERIOD 0, PERIOD 1

The rate in seconds at which the HIST algorithm logs data to disk. The range is 1/10, 1/4, 1/2, 1, 2, 3, and so on up to 32,767. Period 1 can be externally connected.

PHASE

Phase angle in degrees use with the SIN, COS, and TAN functions.

POINT DESCRIPTION

Description that identifies an intelligent I/O point. (30 character string cannot be changed during Runtime.)

PRESET

Starting value for the algorithm output after a reset. This variable is used in the RAMP and CNT algorithms. (Floating point)

PRINT 1 to 8

If Y, the display invoked by the DISP algorithm is automatically printed. (Bit cannot be changed during Runtime.)

PRIORITY

Refer to ALARM PRIORITY.

PULSE

If Y, the DIN, DOUT, PDIN, and PDOT algorithms blocks' output go high for one scan and then low on transition from 0 to 1 of the input to the algorithm.

PV

The process variable input appears in the bar graph faceplate in the Runtime subwindow.

RALM

Refer to RATE ALARM.

RAMP 1 (2) ON

Turns the ramp signals rate 1 (or rate 2) on or off. RAMP 1 On can be configured as external. RAMP 2 ON must be specified during configuration. (Bit, E for RAMP 1 ON)

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RAMP 1 (2) UP

Causes the ramp signals rate 1 (or rate 2) to ramp up or down. RAMP 1 UP can be configured as external. RAMP 2 UP must be specified during configuration. (Bit, E for RAMP1 UP)

RATE 1, 2

Rate inputs for the RAMP algorithm. Rate 1 can be specified during configuration in the Strategy Builder or can be externally sourced. Rate 2 is a constant which is specified during configuration. (Floating point, E for rate 1)

RATE ALARM (RATE ALM, RALM)

Rate alarm is the rate of change of the algorithm output that causes the rate alarm bit to be set (1). If the output changes more than the rate alarm between scan cycles, the alarm is set. (Floating point, E)

RATE ALM

Refer to RATE ALARM.

RAW

The unscaled values as read directly from the I/O hardware. This is a data display field in the Runtime subwindow. (Integer for analog I/O, bit for digital I/O)

RAW LOW

The raw value corresponding to the floating point low range value. (Integer)

RAW RNG

The difference between raw low and raw high, where raw low is the raw value corresponding to the floating point low range value and raw high is the raw value corresponding to the high range value. (Integer)

REAL1 - REAL8

Floating point constants used by user algorithms.

REAL INP

Number of analog inputs to the F(x) or User algorithms.

REAL PAR1 - REAL PAR4

Floating point constants used by user algorithms.

RECIPE 1 to 8

If Y, when the display is invoked by the DISP block, the data in the initialized data entry fields is entered into the database. (Bit cannot be changed during Runtime.)

REM SETP

Remote setpoint specifies if a remote setpoint is being used in a controller algorithm. (Bit)

RESET

Initializes the TOT algorithm and the Batch algorithms. (Bit, E)

RESET NAME

Any 8 character string giving the OFF (0) state of the digital I/O point. (String cannot be changed during Runtime.)

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REVERSE

Inverts the output in the AOUT and PAOT algorithms. (Bit cannot be changed during Runtime.)

RLIM

Maximum absolute ramp rate for the output of the RAMP algorithm. (Floating point cannot be changed during Runtime.)

RLIM ON

Enables or disables the rate limiting function (RLIM) for the RAMP algorithm. (Bit, E cannot be changed during Runtime.)

SCAN

Scan is the rate that the algorithm is scanned and processed. Possible scan rates are: 0.10, 0.25, 0.50, 1.00, 2.00, 6.00, 12.00, and 30.00 sec. (Floating point cannot be changed during Runtime.)

SCAN (Intelligent I/O points)

Adjusts the rate at which this point is scanned without changing the SCAN FREQ of the entire block. The field is a scaling factor of the SCAN FREQ. If the SCAN FREQ is set to 2 seconds and SCAN is set to 4, the I/O point is scanned every 8 seconds. (Integer cannot be changed during Runtime.)

SCAN CONTINUOUS

If set to Y, the I/O point is scanned continuously at a rate set by the SCAN FREQ and SCAN parameters. This setting overrides the ON DEMAND I/O scanning configured in the Strategy Builder. (Bit cannot be changed during Runtime.)

SCAN FREQ

The scan frequency is the rate at which the intelligent I/O block is scanned and processed. (Floating point cannot be changed during Runtime.)

SCAN POINT (ON SCAN)

If set to Y, the I/O point is scanned under the conditions set by the SCAN and SCAN CONTINUOUS parameters. If set to N, the I/O point is not scanned by PC-30. (Bit)

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SC SAVER

Bit in the System (SYS) block that enables (Y) or disables (N) the Runtime screen saver. The screen saver times out when there has been no mouse or keyboard activity during Runtime for a specified period of time (see **SVR TIME**). (Bit cannot be changed during Runtime.)

SECURITY

Defines the minimum security level which can acknowledge an alarm generated by the ALRM algorithm.

SELECTED PERIOD

Refer to PERIOD #.

SET NAME

Any 8 character string giving the ON (1) state of the digital I/O point. (String cannot be changed during Runtime.)

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SETPT (SP)

Setpoint is the local setpoint value. It typically represents the desired value of the measurement. SETPT tracks a remote setpoint if the remote setpoint parameter is set. (Floating point)

SILENCE

In the SYS algorithm, silence is the output value that causes all alarm annunciators that are turned on to be silenced.

SKIP

Skip step is used with FSTEP and BSTEP to cause the SEQ algorithm to skip the next or previous step. (Bit, E)

SNAP SHOT

In the SYS algorithm, snap shot causes a trend or plot snapshot to be taken and saved to disk. (Bit, E)

SQRT

Square root is an option on the input signal in the AIN algorithm. The square root is typically taken to linearize the flow signal coming from an orifice plate before any other processing of the input signal. (Bit cannot be changed during Runtime.)

SP

Refer to SETPT.

START

Start input to the HIST algorithm.

START ACK VALUE

Bit specifies the starting value for the ACK signal (i.e. an unacknowledged alarm) associated with the corresponding I/O point. This applies to Intelligent I/O points only. (Bit cannot be changed during Runtime)

STOP

Stop input to the HIST algorithm.

STRT SEC, STRT MIN, STRT HRS, STRT DAY, DTRT MON, STRT YR

Starting time and date entries in the TIME algorithm.

SVR TIME

Integer parameter in the System (SYS block that specifies the amount of time (in minutes) that must elapse with no mouse or keyboard action before the Runtime screen saver times out. (Integer cannot be changed during Runtime)

SW

Refer to SWITCH.

SWITCH (SW)

Used in the SWCH algorithm to select either input 1 (SWITCH = 0) or input 2 (SWITCH = 1) as the output. (Bit, E cannot be changed during Runtime.)

TAG

Refer to TAG NAME.

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TAG1 - TAG20

Tag name of the point to be logged by the HIST algorithm.

TAG NAME (TAG)

The tag name identifies the block and is used to sort the database and identify the source of alarms. (An 8-bit character string cannot be changed during Runtime.)

TARGET

A comparator value for the TOT and CNT algorithms. When the output reaches the target value, the algorithm's digital output is set. (Floating point, E)

TIMSET

Refer to DELAY, ON DELAY, OFF DELAY.

TRACK (TRK)

Track specifies whether the algorithm is in the track mode, a mode in which the algorithm output tracks the external feedback (PID, INTG, PD), the entered value (AIN, PAIN, PAIO), or the entered bit (DIN, PDIN, DOUT, PDOT, PDIO). (Bit, E)

TRISTATE

Specifies the mode of the DGAP algorithm. TRISTATE = Y specifies GAP output operation. TRISTATE = N specifies ON/OFF output operation. (Bit cannot be changed during Runtime.)

TRK

Refer to TRACK.

UNITS

Refer to ENGINEERING UNITS.

VAR1 - VAR20

Variable mnemonic of specified tag name to be logged by the HIST algorithm.

X,Y

In the CHAR algorithm, specifies a point on the characteristic curve.

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B3 Display Builder Connection Variables

The following lists the Display Builder connection variables associated with each algorithm block. These variables can be connected to dynamicized points in a display. Some variables may not apply to certain dynamic actions. These variables will not appear as a choice when configuring the dynamic point. (Refer to Chapter 7: *The Display Builder* for more information on dynamic points in a display).

For more information regarding individual algorithm blocks, refer to Chapter 6: *Algorithms*.

Block Name	Var.	Description
ADD		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	OUT	Block output
	INP1	Block input
	INP2	Block input
	K1	Gain factor for INP1
	K2	Gain factor for INP2
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
AIN		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	OUT	Block output
	HALM	Set if there is a high alarm
	LALM	Set if there is a low alarm
	RALM	Set if there is a rate alarm
	HALV	High level alarm limit
	LALV	Low level alarm limit
	RALV	Limit for output change between the next two scan cycles
	FAIL	Set if the device driver was unable to read this analog input due to a communications error.
	FILT	Value of the first-order filter time
	EVAL	Output value if the block is in track mode
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	TRCK	Set if the algorithm is in track mode
	IALM	Set if alarms for this block have been inhibited
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
ALRM		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	SETP	Set point

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Block Name	Var.	Description
	MEAS	Measurement
	R SP	Connection enabled for an external set point
	HALM	Set if there is a high alarm
	LALM	Set if there is a low alarm
	DALM	Set if there is a deviation alarm
	RALM	Set if there is a rate alarm
	HALV	High level alarm limit
	DALV	Alarm on absolute deviation of MEAS from SETP
	LALV	Low level alarm limit
	RALV	Alarm on high absolute rate
	IALM	Set if alarms for this block have been inhibited
AMB		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	MEAS	Measurement
	OUT	Block output
	BIAS	Bias output
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	HALM	Set if there is a high alarm
	LALM	Set if there is a low alarm
	HALV	High level alarm limit
	LALV	Low level alarm limit
	IALM	Set if alarms for this block have been inhibited
AND		
	TAG	Block tag name
	DESC	Block description
	DOUT	Block output
	NAME	HINAME when the output is 1; LONAME when the output is 0
	INP1-4	Block inputs
	ALM	Set if this block is in alarm
	IALM	Set if alarms for this block have been inhibited
	QNOT	Inverse of DOUT
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)

Block Name	Var.	Description
and		
	TAG	Block tag name
	DESC	Block description
	DOUT	Block output
	INP1-6	Block inputs
	QNOT	Inverse of DOUT
AOUT		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	MEAS	Measurement
	OUT	Block output
	FAIL	Set if the device driver was unable to read this analog input due to a communications error.
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	TRCK	Set if the algorithm is in track mode
	IALM	Set if alarms for this block have been inhibited
AVG		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	OUT	Block output
	INP1-4	Block inputs
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
CHAR		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	OUT	Block output
	MEAS	Measurement
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output

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Block Name	Var.	Description
CKPT		
	(NONE)	
CNT		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	DOUT	Set if target is reached
	OUT	Output of algorithm
	CNT	Count up or down (1 = up; 0 = down)
	RSET	Counter clears to the preset value and the digital output is reset
	HOLD	Algorithm operation has stopped without resetting the counter
	TARG	Value that sets the digital output when it is exceeded
	PSET	Value from which the counter starts counting after reset
	OFLO	Set if count exceeds the high or low range of the algorithm
	IALM	Set if alarms for this block have been inhibited
COS		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	MEAS	Measurement
	OUT	Block output
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	FREQ	Frequency
	AMPL	Amplitude
	BIAS	Bias input
	PHAS	Phase
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
DGAP		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	SETP	Set point
	MEAS	Measurement
	R SP	Connection enabled for an external set point
	HGAP	Allowable deviation above set point (if greater)

Block Name	Var.	Description
	LGAP	Allowable deviation below set point
	HBND	Dead band below HGAP
	LBND	Dead band above LGAP
	DALM	Set if there is a deviation alarm
	DALV	Alarm on absolute deviation of MEAS from SETP
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	R/L	Remote/local setpoint (local = 0; remote = 1)
	DOUT	Digital output 1 of algorithm
	MODE	1 = GAP mode; 0 = ON/OFF mode
	DO2	Digital output 2 of algorithm
	IALM	Set if alarms for this block have been inhibited
D Type Flip-Flop		
	TAG	Block tag name
	DOUT	Block output
	INP1-5	Block inputs
	QNOT	Inverse of DOUT
DIN		
	TAG	Block tag name
	DESC	Block description
	DOUT	Block output
	NAME	HINAME when the output is 1 (TRUE); LONAME when the output is 0 (FALSE)
	ENTB	Output value if the block is in track mode
	FAIL	Set if the device driver was unable to read this analog input due to a communications error.
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	TRCK	Set if the algorithm is in track mode
	ALM	Set if this block is in alarm
	IALM	Set if alarms for this block have been inhibited
	QNOT	Inverse of DOUT
DISP		
	TAG	Block tag name
	DESC	Block description
	FILE	File name of the attached display

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Block Name	Var.	Description
DIV		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	OUT	Block output
	INP1	Block input 1
	INP2	Block input 2
	K1	Gain factor for INP1
	K2	Gain factor for INP2
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
DOUT		
	TAG	Block tag name
	DESC	Block description
	DOUT	Block output
	NAME	HINAME when the output is 1 (TRUE); LONAME when the output is 0 (FALSE)
	ENTB	Output value if the block is in track mode
	FAIL	Set if the device driver was unable to read this analog input due to a communications error.
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	TRCK	Set if the algorithm is in track mode
DTIM		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	OUT	Block output
	MEAS	Measurement
	DTIM	MEAS to OUT delay (in minutes)
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output

Block Name	Var.	Description
EXP		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	OUT	Block output
	MEAS	Measurement
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
	GN 1	Gain factor for input
	GN 2	Gain factor for input
	BIAS	Input offset
F(x)		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	OUT1-4	Block analog outputs
	DIN1-4	Block digital inputs
	DO1-4	Block digital outputs
	AR1-4	Floating point values stored in registers
	DR1-4	Digital values stored in registers
FILT		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	MEAS	Measurement
	OUT	Block output
	FILT	Value of first order lag (in minutes)
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	HALM	Set if there is a high alarm
	LALM	Set if there is a low alarm
	HALV	High level alarm limit
	LALV	Low level alarm limit
	IALM	Set if alarms for this block have been inhibited

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Block Name	Var.	Description
HIST		
	TAG	Block tag name
	DESC	Block description
	FNAM	History file name associated with this block
	DOUT	1 = HIST block is logging; 0 = HIST block has stopped logging
HSEL		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	OUT	Block output
	INP1-4	Block inputs
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
J/K Type Flip-Flop		
	TAG	Block tag name
	DOUT	Block output
	INP1-5	Block inputs
	QNOT	Inverse of DOUT
INTG		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	SETP	Set point
	MEAS	Measurement
	OUT	Block output
	BIAS	Bias output
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
	INTG	Integral term
	HALM	Set if there is a high alarm
	LALM	Set if there is a low alarm
	DALM	Set if there is a deviation alarm

Block Name	Var.	Description
	RALM	Set if there is a rate alarm
	HALV	High level alarm limit
	DALV	Alarm on absolute deviation of MEAS from SETP
	LALV	Low level alarm limit
	RALV	Alarm on high absolute rate
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	R/L	Remote/local setpoint (local = 0; remote = 1)
	TRCK	Set if the algorithm is in track mode
	IALM	Set if alarms for this block have been inhibited
LLAG		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	MEAS	Measurement
	OUT	Block output
	FILT	Value of first order lag (in mounts)
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	HALM	Set if there is a high alarm
	LALM	Set if there is a low alarm
	HALV	High level alarm limit
	LALV	Low level alarm limit
	IALM	Set if alarms for this block have been inhibited
LOG		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	OUT	Block output
	MEAS	Measurement
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
	GN 1	Gain factor for input
	GN 2	Gain factor for input
	BIAS	Input offset

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Block Name	Var.	Description
LSEL		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	OUT	Block output
	INP1-4	Block inputs
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
MSEL		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	OUT	Block output
	INP1-4	Block inputs
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
MSG		
	TAG	Block tag name
	DESC	Block description
	MSG	Message associated with the block
	INP1-4	Block inputs
MULT		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	OUT	Block output
	INP1	Block input 1
	INP2	Block input 2
	K1	Gain factor for INP1
	K2	Gain factor for INP2
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)

Block Name	Var.	Description
NAND		
	TAG	Block tag name
	DESC	Block description
	DOUT	Block output
	NAME	HINAME when the output is 1 (TRUE); LONAME when the output is 0
	INP1-4	Block inputs
	ALM	Set if this block is in alarm
	IALM	Set if alarms for this block have been inhibited
	QNOT	Inverse of DOUT
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
NOT		
	TAG	Block tag name
	DESC	Block description
	DOUT	Block output
	NAME	HINAME when the output is 1 (TRUE); LONAME when the output is 0
	INP1	Block input
	QNOT	Inverse of DOUT
not		
	TAG	Block tag name
	DOUT	Block output
	INP1	Block input
	QNOT	Inverse of DOUT
OR		
	TAG	Block tag name
	DESC	Block description
	DOUT	Block output
	NAME	HINAME when the output is 1 (TRUE); LONAME when the output is 0
	INP1-4	Block inputs
	ALM	Set if this block is in alarm
	IALM	Set if alarms for this block have been inhibited
	QNOT	Inverse of DOUT
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
or		
	TAG	Block tag name
	DOUT	Block output
	INP1-6	Block inputs
	QNOT	Inverse of DOUT

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Block Name	Var.	Description
PAIN		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	EVAL	Output value if the block is in track mode
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	TRCK	Set if the algorithm is in track mode
	IALM	Set if alarms for this block have been inhibited
	FAIL	Set if the device driver was unable to read this analog input due to a communications error.
	AO1-8	Analog outputs
	ALM	Set if the block is in alarm
	ALM1-8	Set if the corresponding point is in alarm
	HALM	Set if there is a high alarm
	HAM1-8	Set if the corresponding point is in high alarm
	LALM	Set if there is a low alarm
	LAM1-8	Set if the corresponding point is in low alarm
PAIO		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	EVAL	Output value if the block is in track mode
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	TRCK	Set if the algorithm is in track mode
	IALM	Set if alarms for this block have been inhibited
	FAIL	Set if the device driver was unable to read this analog input due to a communications error.
	AO1-8	Analog outputs
	AI1-8	Analog inputs
	PO1-8	Values being read from the device
	ALM	Set if the block is in alarm
	ALM1-8	Set if the corresponding point is in alarm
	HALM	Set if there is a high alarm
	HAM1-8	Set if the corresponding point is in high alarm
	LALM	Set if there is a low alarm
	LAM1-8	Set if the corresponding point is in low alarm

Block Name	Var.	Description
PAOT		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	FAIL	Set if the device driver was unable to read this analog input due to a communications error.
	AI1-8	Analog inputs
	PO1-8	Values being read from the device
PD		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	SETP	Set point
	MEAS	Measurement
	OUT	Block output
	BIAS	Bias output
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
	PB	Proportional band
	DERV	Derivative
	HALM	Set if there is a high alarm
	LALM	Set if there is a low alarm
	DALM	Set if there is a deviation alarm
	FBK	Set if external feedback is enabled
	HALV	High level alarm limit
	DALV	Alarm on absolute deviation of MEAS from SETP
	LALV	Low level alarm limit
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	R/L	Remote/local setpoint (local = 0; remote = 1)
	TRCK	Set if the algorithm is in track mode
	IALM	Set if alarms for this block have been inhibited
PDIN		
	TAG	Block tag name
	DESC	Block description
	FAIL	Set if the device driver was unable to read this analog input due to a communications error.

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Block Name	Var.	Description
	DO1-16	Digital outputs
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	TRCK	Set if the algorithm is in track mode
	ALM	Set if this block is in alarm
	AL1-16	Set if the corresponding point is in alarm
PDIO		
	TAG	Block tag name
	DESC	Block description
	FAIL	Set if the device driver was unable to read this analog input due to a communications error.
	DI1-16	Digital inputs
	DO1-16	Digital outputs
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	TRCK	Set if the algorithm is in track mode
	ALM	Set if this block is in alarm
	AL1-16	Set if the corresponding point is in alarm
PDOT		
	TAG	Block tag name
	DESC	Block description
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	TRCK	Set if the algorithm is in track mode
	FAIL	Set if the device driver was unable to read this analog input due to a communications error.
	DI1-16	Digital inputs
PID		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	SETP	Set point
	MEAS	Measurement
	OUT	Block output
	BIAS	Bias output
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
	PB	Proportional band
	INTG	Integral term

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Block Name	Var.	Description
	DERV	Derivative term
	HALM	Set if there is a high alarm
	LALM	Set if there is a low alarm
	DALM	Set if there is a deviation alarm
	FBK	Set if external feedback is enabled
	HALV	High level alarm limit
	DALV	Alarm on absolute deviation of MEAS from SETP
	LALV	Low level alarm limit
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	R/L	Remote/local setpoint (local = 0; remote = 1)
	TRCK	Set if the algorithm is in track mode
	IALM	Set if alarms for this block have been inhibited
PUL		
	TAG	Block tag name
	DESC	Block description
	DOUT	Block output
	NAME	HINAME when the output is 1 (TRUE); LONAME when the output is 0
	INP1	Block input
	QNOT	Inverse of DOUT
pul		
	TAG	Block tag name
	DOUT	Block output
	INP1	Block input
	QNOT	Inverse of DOUT
RAMP		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	OUT	Block output
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
	HALM	Set if there is a high alarm
	LALM	Set if there is a low alarm
	RALM	Set if there is a rate alarm
	HALV	High level alarm limit

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Block Name	Var.	Description
	LALV	Low level alarm limit
	RAT1	Ramp rate 1
	RAT2	Ramp rate 2
	PSET	Base value from which to start ramp
	HOLD	Set if ramping has stopped
	RSET	Ramp algorithm reset value
	IALM	Inhibits all alarms generated by this block
	RP1O	Determines if rate 1 participates in changing output
	RP1U	Output to ramp up at rate
	RP2O	Determines if rate 2 participates in changing output
	RP2U	Output to ramp up at rate 2
	RLMO	Rate limiting turned on or off
	RLIM	Absolute rate limit
R/S Type Flip-Flop		
	TAG	Block tag name
	DOUT	Block output
	INP1-5	Block inputs
	QNOT	Inverse of DOUT
SEQ		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	ESTP	Emergency step pattern selected
	FSTP	Forward step
	BSTP	Backward step
	SKIP	Skip step
	HOLD	Defer stepping
	RSET	Go back to step 1 or EMG if ESTEP is selected
	C1ST	Cycle 1 step
	C2ST	Cycle 2 step
	DO1-16	Digital outputs
	ST1-31	Steps 1 to 31
	EMST	Emergency step

Block Name	Var.	Description
SHOT		
	TAG	Block tag name
	DESC	Block description
	CONT	Control bit that transfers the state of the outputs when TRUE
	NAME	HINAME when the output is 1 (TRUE); LONAME when the output is 0
	RSET	Resets the timer to its initial state
	HOLD	Suspends timer operation
	TSET	Name used for the DELAY parameter in the Runtime subwindow
	DOUT	Digital output of algorithm
	DO2	Inverse of DOUT
SIM		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	MEAS	Measurement
	OUT	Block output
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HALM	Set if there is a high alarm
	LALM	Set if there is a low alarm
	HALV	High level alarm limit
	LALV	Low level alarm limit
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	IALM	Set if alarms for this block have been inhibited
SIN		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	MEAS	Measurement
	OUT	Block output
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	FREQ	Frequency
	AMPL	Amplitude
	BIAS	Bias input
	PHAS	Phase
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output

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Block Name	Var.	Description
STAT		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	MEAS	Measurement
	AVG	Average of the sample
	MIN	Minimum value in the sample
	MAX	Maximum value in the sample
	SIGM	Standard deviation of the sample
	STSD	Short-term standard deviation of the sample
	ON	Set when sampling starts
	DONE	set when a group sample is done
	SMP#	Indicates number of current sample
SWCH		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	OUT	Block output
	INP1	Block input 1
	INP2	Block input 2
	SWCH	Selects input 1 or 2 (0 = input 1; 1 = input 2)
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
SYS		
	(NONE)	Block tag name
T Type Flip-Flop		
	TAG	Block tag name
	DOUT	Block output
	INP1-5	Block inputs
	QNOT	Inverse of DOUT

Block Name	Var.	Description
TAN		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	MEAS	Measurement
	OUT	Block output
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	FREQ	Frequency
	AMPL	Amplitude
	BIAS	Bias input
	PHAS	Phase
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
TIME		
	TAG	Block tag name
	DESC	Block description
	NAME	HINAME when the output is 1 (TRUE); LONAME when the output is 0
	DOUT	Digital output of algorithm
TOFF		
	TAG	Block tag name
	DESC	Block description
	CONT	Control bit that transfers the state of the outputs when TRUE
	NAME	HINAME when the output is 1 (TRUE); LONAME when the output is 0
	RSET	Resets the timer to its initial state
	HOLD	Suspends timer operation
	TSET	Name used for the DELAY parameter in the Runtime subwindow
	DOUT	Digital output of algorithm
	DO2	Inverse of DOUT
TON		
	TAG	Block tag name
	DESC	Block description
	CONT	Control bit that transfers the state of the outputs when TRUE
	NAME	HINAME when the output is 1 (TRUE); LONAME when the output is 0
	RSET	Resets the timer to its initial state
	HOLD	Suspends timer operation
	TSET	Name used for the DELAY parameter in the Runtime subwindow
	DOUT	Digital output of algorithm
	DO2	Inverse of DOUT

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Block Name	Var.	Description
TOT		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	MEAS	Measurement
	DOUT	Block digital output
	OUT	Block analog output
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	HLIM	Upper limit of the algorithm output
	LLIM	Lower limit of the algorithm output
	HALM	Set if there is a high alarm
	LALM	Set if there is a low alarm
	HALV	High level alarm limit
	LALV	Low level alarm limit
	HOLD	Suspends totalizing when TRUE
	RSET	Totalizer resets to initial state when TRUE
	TARG	Value of total that causes the digital output to be set to 1
	IALM	Inhibits all alarms for this block
TPO		
	TAG	Block tag name
	DESC	Block description
	UNIT	Engineering units of the block
	SETP	Set point
	MEAS	Measurement
	OUT	Block analog output
	DOUT	Block digital output
	QNOT	Inverse of DOUT
	BIAS	Bias output
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	PB	Proportional band
	INTG	Integral term
	DERV	Derivative term
	CYL	Sets the 100% duty cycle (in minutes)
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
	R/L	Remote/local setpoint (local = 0; remote = 1)
	TRCK	Set if the algorithm is in track mode
	IALM	Set if alarms for this block have been inhibited
	DALM	Set if there is a deviation alarm
	DALV	Alarm on absolute deviation of MEAS from SETP

Block Name	Var.	Description
USER		
	TAG	Block tag name
	DESC	Block description
	HRNG	Engineering value of the algorithm output at 100% of span
	LRNG	Engineering value of the algorithm output at 0% of span
	DIN1	Block digital input 1
	DIN2	Block digital input 2
	INP1-4	Block analog inputs
	OUT	Analog output 1
	OUT2	Analog output 2
	DOUT	Digital output 1
	DO2	Digital output 2
XOR		
	TAG	Block tag name
	DESC	Block description
	DOUT	Block output
	NAME	HINAME when the output is 1 (TRUE); LONAME when the output is 0
	INP1-4	Block inputs
	ALM	Set if this block is in alarm
	IALM	Set if alarms for this block have been inhibited
	QNOT	Inverse of DOUT
	A/M	Auto/Manual mode (Auto = 0; Manual = 1)
xor		
	TAG	Block tag name
	DOUT	Block output
	INP1-6	Block inputs
	QNOT	Inverse of DOUT

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B4 Algorithm Block Signals

The following lists the Strategy Builder input and output signals associated with each algorithm block.

Block Name	Input Signals			Output Signals		
ADD	INP1	INP2	LLIM	OUT	ACK	
	HLIM					
AIN	AIN	IALM	HALM	OUT	TRCK	RALM
	LALM	RALM	DALM	LALM	HALM	A/M
	FILT	TRCK		ACK	FAIL	
ALRM	MEAS	SP	HALM	RALM	DALM	LALM
	LALM	RALM	DALM	A/M	R/L	OUT
	IALM			ACK		
AMB	MEAS	HLIM	LLIM	OUT	TRCK	HALM
	IALM	HALM	LALM	LALM	A/M	R/L
	BIAS			ACK		
AND	INP1	INP2	INP3*	A/M	DOUT	IALM
	NP4*	IALM				
and	INP1	INP2	INP3*	DOUT	QNOT	
	INP4*	INP5*	INP6*			
AOUT	MEAS			AOUT	A/M	FAIL
AVG	INP	INP2	INP3*	OUT	A/M	ACK
	INP4*	HLIM	LLIM			
CHAR	MEAS	HLIM	LLIM	OUT	ACK	
CKPT	INP					
CNT	CNT	RSET	TARG	DOUT	OUT	OFLO
	IALM	CTUP	HOLD			

*Optional input

App-B Var Gloss

Block Name	Input Signals			Output Signals		
COS	MEAS	HLIM	LLIM	OUT		
DGAP	MEAS	IALM	DALM	DOUT	DO2	DALM
	HBND	LBND	HGAP			
	LGAP	SP				
DIN	DIN	IALM	EVAL	DOUT	TRCK	A/M
	TRCK	RSET		ACK	ALM	FAIL
				QNOT		
DISP	DIN1*	DIN2*	DIN3*			
	DIN4*	DIN5*	DIN6*			
	DIN7*	DIN8*				
DIV	INP	INP2	LLIM	OUT		
	HLIM					
DOUT	INP	EVAL	TRCK	DOUT	A/M	TRCK
				FAIL		
DTIM	MEAS			OUT	A/M	
EXP	MEAS	HLIM	LLIM	OUT		
FILT	MEAS	IALM	HLIM	OUT	HALM	LALM
	LLIM	HALM	LALM	A/M	ACK	
	FILT					
F(x)	INP*	INP2*	INP3*	OUT	OUT2	OUT3
	INP4*	DIN1*	DIN2*	OUT4	DOUT	DO2
	DIN3*	DIN4*		DO3	DO4	
HIST	STRT	STOP	PERD	DOUT		
	PSEL					
HOST	DIN1	DIN2	DIN3			
	DIN4					
HSEL	INP1	INP2	INP3*	OUT	A/M	ACK
	INP4*	HLIM	LLIM			

*Optional input

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Block Name	Input Signals			Output Signals		
INTG	MEAS	HLIM	LLIM	OUT	TRCK	DALM
	IALM	HALM	LALM	LALM	HALM	A/M
	DALM	FBK	INTG	R/L	ACK	
	BIAS	SP	TRCK			
LLAG	MEAS	IALM	HLIM	LALM	HALM	A/M
	LLIM	HALM	LALM	OUT	ACK	
	FILT					
LOG	MEAS	HLIM	LLIM	OUT		
LSEL	INP1	INP2	INP3*	OUT	A/M	ACK
	INP4*	HLIM	LLIM			
MSEL	INP1	INP2	INP3*	OUT	A/M	ACK
	INP4*	HLIM	LLIM			
MSG	DIN1	DIN2*	DIN3*			
	DIN4*					
MUL	INP	INP2	LLIM	OUT		
	HLIM					
NAND	INP1	INP2	INP3*	A/M	DOUT	IALM
	INP4*	IALM		QNOT		
NOR	INP1	INP2	INP3*	A/M	DOUT	IALM
	INP4*	IALM		QNOT		
NOT	INP			A/M	DOUT	IALM
				QNOT		
not	INP			DOUT	QNOT	
OR	INP1	INP2	INP3*	A/M	DOUT	IALM
	INP4*	IALM		QNOT		
or	INP1	INP2	INP3*	DOUT	QNOT	
	INP4*	INP5*	INP6*			

*Optional input

App-B Var Gloss

Block Name	Input Signals			Output Signals		
PAIN	PAIN	IALM	EVAL	AO1	AO2	AO3
	TRCK			AO4	AO5	AO6
				AO7	AO8	FAIL
PAIO	PAIO	IALM	TRCK	AO1	AO2	AO3
	EVAL	AI1	AI2*	AO4	AO5	AO6
	AI3*	AI4*	AI5*	AO7	AO8	FAIL
	AI6*	AI7*	AI8*			
PAOT	AI1	AI2*	AI3*	PAOT	FAIL	
	AI4*	AI5*	AI6*			
	AI7*	AI8*				
PD	MEAS	HLIM	LLIM	OUT	TRCK	DALM
	IALM	HALM	LALM	LALM	HALM	A/M
	DALM	FBK	PB	R/L	ACK	
	DERV	BIAS	TRCK			
	SP					
PDIN	PDIN	TRCK		DO1	DO2	DO3
				DO4	DO5	DO6
				DO7	DO8	DO9
				DO10	DO11	DO12
				DO13	DO14	DO15
				DO16	FAIL	ALM
PDIO	PDIO	TRCK	DI1	DO1	DO2	DO3
	DI2*	DI3*	DI4*	DO4	DO5	DO6
	DI5*	DI6*	DI7*	DO7	DO8	DO9
	DI8*	DI9*	DI10*	DO10	DO11	DO12
	DI11*	DI12*	DI13*	DO13	DO14	DO15
	DI14*	DI15*	DI16*	DO16	FAIL	ALM
PDOT	TRCK	DI1	DI2*	PDOT	TRCK	A/M
	DI3*	DI4*	DI5*	FAIL		
	DI6*	DI7*	DI8*			
	DI9*	DI10*	DI11*			
	DI12*	DI13*	DI14*			
	DI15*	DI16*				

*Optional input

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Block Name	Input Signals			Output Signals		
PID	MEAS	HLIM	LLIM	OUT	TRCK	DALM
	IALM	HALM	LALM	LALM	HALM	A/M
	DALM	FBK	PB	R/L	ACK	
	INTG	DERV	BIAS			
	SP	TRCK				
PUL	INP			A/M	DOUT	IALM
				QNOT		
pul	INP			DOUT	QNOT	
RAMP	HLIM	LLIM	IALM	OUT	HALM	LALM
	HALM	LALM	RT1			
	RP1U	RP1O	RP2U			
	RP2O	RSET	HOLD			
REPORT	DIN1	DIN2	DIN3	DO1	DO2	DO3
	DIN4			DO4		
RECIPE	DIN1	DIN2	DIN3	DO1	DO2	DO3
	DIN4			DO4		
SEQ	FSTEP	BSTEP	SKIP	DO1	DO2	DO3
	C1ST	C2ST	HOLD	DO4	DO5	DO6
	ESTEP	RSET		DO7	DO8	DO9
				DO10	DO11	DO12
				DO13	DO14	DO15
				DO16	ST1	ST2
				ST3	ST4	ST5
				ST6	ST7	ST8
				ST9	ST10	ST11
				ST12	ST13	ST14
				ST15	ST16	EMST
SHOT	CONT	RSET	HOLD	DOUT	DO2	
	TSET					
SIM	MEAS	HLIM	LLIM	OUT	HALM	LALM
	HALM	LALM	IALM			
SIN	MEAS	HLIM	LLIM	OUT		

*Optional input

Block Name	Input Signals			Output Signals		
STAT	MEAS	INIT	ON	OUT	OUT2	OUT3
	STRB			OUT4	OUT5	SMP#
				DONE		
SWCH	INP	INP2	HLIM	A/M	OUT	ACK
	LLIM	SWCH				
SYS	DOS	DNLD	INP	ANNC	ALM	ACK
	SCAN	ACK	ANNC	RALM	DALM	HALM
	INHB	STOP	ACK1	LALM	FAIL	TRCK
	ACK2					
TAN	MEAS	HLIM	LLIM	OUT		
TIMER				DOUT	DO2	
TOFF	CONT	RSET	HOLD	DOUT	DO2	
	TSET					
TON	CONT	RSET	HOLD	DOUT	DO2	
	TSET					
TOT	MEAS	HLIM	LLIM	OUT	DOUT	HALM
	IALM	HALM	LALM	LALM	HOLD	RSET
	TARG	HOLD	RSET			
TPO	MEAS	IALM	DALM	OUT	DOUT	QNOT
	PB	INTG	DERV	DALM	A/M	R/L
	BIAS	SP		ACK		
USER	INP*	INP2*	INP3*	OUT	OUT2	DOUT
	INP4*	DIN1*	DIN2*	DO2		
XOR	INP1	INP2	INP3	A/M	DOUT	IALM
	INP4*	IALM		QNOT		
xor	INP1	INP2	INP3*	DOUT	QNOT	
	INP4*	INP5*	INP6*			

*Optional input

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Appendix C - Supported Devices

PC-30 works with IBM equipment and true compatibles. The following hardware was tested and is known to be compatible with PC-30:

C1 Displays

PC-30 supports all EGA-compatible monitors and the following controller cards:

IBM EGA controller board

Quadram Quadega+

Video 7 Vega

ATI EGA Wonder

Everex EGA

C2 Graphic Input Devices

The following graphic input devices were tested and are recommended as being fully compatible with PC-30:

CH Products RollerMouse (Configurator only)

Genius Serial Mouse (V8.06 or higher)

Kraft Serial Trackball

Logitech Bus mouse

Logitech C7 & C9 Serial Mouse

Logitech Serial Trackman

Microsoft Bus & Serial Mouse
Mouse Systems Corp. PC Mouse
Summagraphics Mouse

The following graphic devices are ***INCOMPATIBLE*** with PC-30:

Genius Serial Mouse (versions before V8.06)
CH Products RollerMouse (in Runtime only)

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C3 Printers

The following color printers are supported by PC-30:

ACT Chromajet II
Calcomp Colormaster or Plotmaster
Canon PJ-1080A
Diablo C-150
HP Paint Jet (recommended) *
IBM Color JetPrinter *
Mitsubishi G-500
Quadram Quadjet
Sharp JX-720
Tektronix 4693D
Tektronix 4696
Xerox 4020 *

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Other supported printers:

- AST Turbo Laser
- Canon BJ-80
- Canon LBP-8A2
- Conographics Conovision 2000
- Epson GQ-3500
- Epson MX-80 *
- HP LaserJet
- HP Laser Jet+ and LaserJet Series II
- HP ThinkJet
- IBM ProPrinter *
- Kyocera F-1010 Compact Laser
- Okidata LaserLine
- Okidata Microline 192 Plus and 193 Plus
- Quadram Quadlaser
- Xerox 4045 Laser CP Model 50

* Printer Driver included in standard PC-30 software package. For other printers, request the Printer Tool Kit (Model: PRINTER) which is available free of charge.

C4 Computers

The following is a list of IBM PC and compatible computers known to be 100 % fully compatible with the PC-30 Software. This is followed by the list of computers known not to be 100% compatible.

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Known 100 Percent Compatible Systems

Action Instruments BC-XX
ADAC-4000
Allen-Bradley, T35, T60
AMDEX RPC-55
American Micro Tech, AMT-386
AST (All Models)
Bently XT, 286 & 386
Club AT286 & 386
Comark 286 & 386 Floor Mount
Compaq Deskpo 286 & 386, Notebook
Compu-add 286 & 386
Daisy Data
Digitronics Sixnet IC-286
Dell Computers 286 & 386 machines
Gateway-2000 386 & 486
HP Vectra ES/12 and newer models
IBM PC AT
IBM PS/2 Model 50,55,60,70,75 & 80
IBM 7532,7552,7561 Industrials
IDT 286 & 386 Industrial
IMS 286 & 386
Micro Express ME-286 & ME-386
Micro Smart (386 SX)
NEC Powermate SX
NEC desktop and lap-top computers
Nematron IWS4000 & IWS5000
PC'S Limited
Radix Microsystems
Tandon Notebook
TBS 386
Texas Micro 286 & 386 Industrial
Toshiba 1600,3100,3200,4400,5100,5200,5400
Xycom 682 (VME), 4150 Industrial
Zenith 286 & 386

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Known Incompatible Systems

HP Vectra, Old Models
AT&T 6300
Swan Computer
(will work with software modification to RLL hard drive)
Prolog PC/2 STD card
Ziatech Z1000
NEC new models
(serial ports are not PC-30 compatible; will work if different COM cards are installed)

Appendix D - PC-30 Files

D1 Program Files

The following files are part of (or used by) PC-30. The term *driver* indicates the DOS file name of a device driver. All PC-30 Software systems require at least one device driver and may have more.

CONFIG.EXE

The Strategy and Display Builder program.

RUNTIME.EXE

The PC-30 Software Runtime System.

<driver>.DES

A description of the device driver to be used by the Strategy Builder.

<driver>.MNU

The device driver configuration menu or menus to be used by the Strategy Builder.

<driver>.DRV

The actual device driver software needed to interface the Runtime System to the I/O hardware.

App-D PC-30 Files

EGA.DEV

IBM EGA device driver.

*.MNU

Configuration menu files.

ICONS.ICN

System Icon file.

<8 char>.GSP

Includes displays such as menus/windows, and the trend display.

<8 char>.SMB

Graphic symbol files that are created and used in the Display Builder.

CONF104.FNT

Text font files used by the Builder and the Runtime System.

<8 char>.GRP

Files of graphic displays created by the Display Builder. The extension GRP refers to Graphic Interface.

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D2 Database Files

The following files are created by the Strategy and Display Builders to be used by the Runtime System and for documentation purposes. The term *strategy* indicates an eight-character DOS file name assigned to the strategy and shared by all database files for that specific strategy.

<strategy>.DB

The algorithm database file containing the parameters for all algorithms in the strategy.

<strategy>.CI

The algorithm connection interface file.

<strategy>.CA

The I/O connection description file.

<strategy>.MDB

Peripheral database file used with Distributed Device Drivers (e.g. Bristol, Taylor, Mac)

<strategy>.XDB

The I/O connection database file containing information about the hardware configuration.

<strategy>.CFG

The system configuration parameters file. This file contains information for trend list, historian list, system configuration, communication configuration, and password security.

<strategy>.CIR

These files are the Connection and Database report files, respectively. (simple ASCII text)

<strategy>.DBR

Document the CI and DB information.

D3 Runtime Data Files

The Shift Historian generates history files in the Lotus 1-2-3 .PRN format. The main file name depends on the type of history file and the time that it is generated as shown in the following table. Files generated by the HIST Block also have extensions of .PRN, but the names are configurable.

Scope of File	Naming Convention
Hourly	HHmmddhh.PRN
Shift	HSmmdds.PRN
Daily	HISDmmdd.PRN
Weekly	HISWmmdd.PRN

Key:

mm	Month of the year (1-12)
dd	day of the month (0-31)
hh	hour of the day (0-23)
s	shift (1-4)

Note: Use capital letters as specified.

LOG<nn>.TXT

Alarm and Event log file. (Default name)

TREND<nn>.DAT

The Trend Snapshot files are stored as .DAT files. Forty files may be stored. PC-30 appends the file name with a suffix number (nn) from 1 through 40. After 40, the suffix numbering returns to the beginning of the sequence.

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Appendix E - Estimating Database Size

The PC-30 Software is an engineering, operations, and management information tool for use with a wide variety of I/O devices.

Because of the flexibility of PC-30, the number of instruments which can be connected to a given system or the number of points which may be brought in for control and monitoring differs with each application, depending on what the system is intended to do. The purpose of this appendix is to help ensure that your database meets the criteria of a PC-30 application. It is intended for estimating purposes for planning the size of your database.

It should be noted that the figures given in this document are based on an IBM PC/AT. Parameters such as available memory can differ as much as 5 to 10K, depending on the computer used and how it allocates its memory. Using the DOS command CHKDSK can help you determine how much memory is available on your computer once DOS is loaded.

E1 System Memory Allocation

Although it is not required, PC-30 does support use of expanded memory EMS LIM 4.0. In this section, memory allocation is discussed in the event EMS is not used. For calculations involving EMS, refer to Section E3 of this appendix.

To run PC-30, your personal computer must have 640K of user RAM. DOS 2.1 or higher must also be loaded into the system. The most current version of DOS in common usage is DOS 3.30. This is the version of DOS used in the calculations and examples in this book. Using DOS 3.1 or 3.21 can slightly increase the available memory for database building.

This assumes that your CONFIG.SYS file is set up as follows:

```
Buffers = 20
Files = 55
```

Note The **Files=** statement controls the number of Runtime files that can be open at any one time. This can be expanded to 250, but will increase memory usage. The minimum setting is 55.

DOS 3.3 and Version 5.0 of PC-30 Runtime occupy approximately 490K of user RAM. The remaining 150K of RAM is available for communications interface software and control strategies (referred to as the Database). The amount of memory required for each device driver, or interface package, is fixed. Device driver sizes are given in Section E6, *Device Driver and Option Sizes*. The space occupied by the application database varies, depending on the number of variables being used in the control strategy. The next section explains how to estimate how much memory is required for your particular application.

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E2 Application Database Size

When you are pursuing a project involving PC-30 Software, it is important to be able to estimate the memory requirement for your database. To figure out this requirement, it is necessary to understand the various types of blocks available, their sizes and how many of each are needed for the application. To figure out whether the system can accommodate the desired functionality, you must determine the total byte count of all physical devices, I/O blocks, history blocks, F(x) etc. and subtract it from the available database memory. Based on the number of each type of block used and the size of each, you can determine whether the system has enough memory to deal with the application or not. For applications using EMS, refer to Section E3, *Using EMS*.

Exactly what is considered a *device* differs with various types of I/O hardware. With Opto 22, each brain board is considered one device. When using Allen-Bradley or Modicon Programmable Logic Controllers (PLCs), each node on the highway or network is considered one device.

☞ The following is an example of database estimation using MICRO-SCAN 500. Assume there are ten 500R controllers. Each device block for MICRO-SCAN is considered a loop controller block, and allows you to bring in a maximum of 16 variables from the instrument. The byte count for a loop controller block is the same, regardless of how many variables are used. The application calls for historical trending of process, setpoint, and output from each controller (the Event Historian is used).

The calculation looks like this:

10 Loop Controller blocks	12,000 bytes
2 History blocks	3,564
Total	15,564 bytes

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Adding all the other elements of the equation:

MICERC Device Driver (all driver files)	39K
Database requirement (PC-30 device blocks)	15K
Total	54K
	x1.08
Total Database size	58K

Device drivers are made up of two files: one with the extension .DRV and one with the extension .DES. When EMS is detected, that is where the .DRV portion of the driver is loaded. The .DES portion remains in RAM. With most drivers, this is insignificant; however, with some, it is a necessary consideration. These are indicated in Section E5, *Device Driver and Option Sizes*.

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Standard or Packed I/O?

If you use a device such as Opto or Allen-Bradley, you generally have to feed the inputs and outputs from these device blocks through PC-30 I/O blocks. These can be either standard I/O blocks or packed I/O blocks. Refer to Section E6, *Block and Variable Byte Counts* for byte counts of these blocks.

App-E DB Size

The following example is an application calculated using standard first and then packed I/O. There are 40 analog inputs, 22 analog outputs, 70 digital inputs, and 30 digital outputs. For this application it is required that data be logged on all analog inputs, analog outputs and 50 calculated process points.

	Standard I/O		**Packed I/O**	
40 analog inputs	40 AIN	6120	5 PAIN	2720
22 analog outputs	22 AOUT	2442	3 PAOT	1320
70 digital inputs	70 DIN	9030	5 PDIN	650
30 digital outputs	30 DOUT	3510	2 PDOT	460
1 device driver block	1 DEV	120	1 DEV	120
6 history blocks	6 HIST	10692	6 HIST	10692
20 F(x) blocks	20 F(x)	8400	20 F(x)	8400
80 misc digital blocks	80 Slogic	5400	80 Slogic	5400
	Totals	46182	**Totals**	**30230**

Note As entered, descriptions for each point in a packed algorithm block increases the block size by 31 bytes. The size increases according to the last description entered, even if some descriptions are skipped (e.g. if only the 3rd point is given a description, the size increases by 3 * 31 = 93 bytes). Descriptions are entered when configuring the algorithm block.

Based on the configuration described above, the total database size requirement is **46,182 bytes** of system memory if standard Analog and Digital I/O blocks are used. The system memory requirement will be **30,230 bytes** if Packed Analog and Digital I/O are used.

E3 Using EMS

EMS means Expanded Memory, and refers to memory above 1M byte. The memory between 640K and 1Mbyte is called Extended Memory and very few application software packages can use it. However, you must have greater than 1M byte of RAM memory in order to have EMS.

There are various methods of installing EMS depending on the particular computer you are using, but you must use EMS LIM version 4.0. (LIM refers to Lotus-Intel-Microsoft, the consortium which developed the technology).

When EMS is installed in your system, PC-30 checks for it during Runtime initialization. If it detects EMS, all drivers and options which are EMS compatible are loaded in the memory pages above 640K, and reside there during Runtime.

Certain options also have portions which remain in RAM, even though they are mostly running from EMS. These are indicated on the EMS worksheet in Section E7, *Database Sizing Worksheets*.

The Mouse option (if you are using the mouse option in Runtime) resides in EMS and run from there.

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E4 Determining Available Memory

As mentioned earlier, each personal computer differs in its allocation of system memory, and the database estimates given in the previous section are only estimates. Once you begin to engineer the project, you need to determine maximum system memory which is actually available.

Maximum available memory refers to the amount of memory available while running a *null* strategy. A null strategy is created by saving an *empty* strategy in the configurator. The *empty* strategy should have all the options you want to use enabled, and all communication ports needed by your application installed and scan times entered. The I/O scanner should be ON. You should also create a *null* display by saving a blank display screen. The steps to calculate maximum available memory for your computer are:

1. Create a null strategy.
2. Create a null display.
3. Enter Runtime and run the null strategy.
4. Call up the null display.
5. Check available memory by pressing **[Alt-A]**. This is the maximum available memory. It takes into account the small differences in how each computer allocates memory.

Periodically running your strategy with a null display and the I/O Scanner on, while not actually hooked up to I/O, as you engineer your project allows you to check the size of the emerging database. Remember that PC-30 does not let you run a strategy with incomplete connections!

There are ways to increase your maximum available memory and to minimize the size of your database. To increase available memory, you can decrease the number of buffers in the CONFIG.SYS file (it is not recommended that you go lower than 10) and eliminate any terminate and stay-resident programs.

When using strategies containing Intelligent I/O, database size can be optimized by using the internal PC-30 alarms (accessed by using the *Override Defaults* option in the Device Configurator menus) instead of bringing in alarms from the instruments.

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Hint *Entering Runtime after running the Configurator is not advisable since the mouse driver is resident in memory. Reboot the computer and enter Runtime directly.*

To calculate the actual load size of your strategy, note the following file sizes (in bytes). You can see this information in DOS.

1. Any drivers used in the strategy (add the .DRV and .DES files; for example, MOD30.DRV and MOD30.DES together make up the MOD 30 Driver).

2. The .MDB file of your strategy (for example, if you named your strategy REPORT1, the file would be REPORT1.MDB).

3. The largest .GRP (display) file of your application.

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Add to this the sizes of the following files (in bytes). These are found by loading your strategy in the configurator, then clicking on the % icon in the EDIT function.

4. The peripheral database.

5. The number of connections * 12.

6. [DB(DOS) - DB (% icon)] * .05.

The total of items 1 through 6 is the actual load size of your application. If this is less than maximum available memory, the strategy should run in PC-30 Runtime.

E5 Device Driver and Option Sizes

The chart on the following page lists the device driver sizes in both conventional and EMS memory (if EMS is supported). A summarized list of EMS compatible drivers is provided in *Appendix F5*.

☞ It should be noted that new drivers are continuously being developed and existing drivers are continuously being upgraded to support EMS. The list provided in this manual is accurate at the time of publication.

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The chart below lists the option sizes.

Option Sizes

Option	Option Size	
Touch (Touch screen interface)	4K	
Modem (Modem support for Host)	8K	
Host (Host Communications)	37K	
User Task (User Task)	15K	
S/P (Setpoint Profiler)	21K	
SPC (Statistical Process Control)	20K	
Reports (Report Generator)	67K	
Recipes (Recipe Module)	67K	
NETWORK (PC-30 Networking)	71K	(39K with EMS)
Remote Supervisory Station	58K	(36K with EMS)

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Device Driver	Size	w/EMS
ABB Kent Taylor MP90	N/A	N/A
ABB Kent-Taylor 200R	N/A	N/A
ABB Kent-Taylor ICN	68K	4K
ABB Kent-Taylor MOD30	68K	4K
Acromag ACMAG	20K	- *
Action Instr. ACTION	12K	2K
ADAC Corp. ADAC-G1	17K	-
ADAC Corp. ADAC-G2	14K	8K
Advanced Engr. ADVCTL	23K	1K
AEG Modicon MODASCII	23K	2K
AEG Modicon MODBUS	10K	3K
AEG Modicon MODPLUS	18K	-
Allen Bradley KT2PLC2	35K	-
Allen Bradley KT2PLC5	43K	-
Allen Bradley KTPLC2	36K	-
Allen Bradley KTPLC5	45K	-
Allen Bradley PLC2	30K	2K
Allen Bradley PLC3	18K	-
Allen Bradley PLC5	30K	2K
Allen Bradley PLC5/250	22K	-
Allen Bradley SLC500	25K	1K
Analog Devices ADI6B	28K	1K
Analog Devices ADIRTI	4K	-
Analog Dev. MAC1050	N/A	N/A
Analog Dev. MAC1060	28K	2K
Analog Dev. MC4000	18K	-
Analog Dev. MC5000	20K	-
Analog Dev. MC6000	29K	-
Andover Cntls ANDOVER	36K	1K
Applied Digital Ctrls ADC	27K	1K
Barber-Colman CIMAC	31K	2K
Barber-Colman COLMAN	32K	12K
Barber-Colman MAQP	22K	2K
Barber-Colman WEB I/O	N/A	-
Barber-Colman WEB PLC	N/A	-
Bristol Babcock BRISTOL	38K	2K
Burr Brown BBROWN	5K	-
Cegelec GEM80	N/A	N/A
Chemap CHEMAP	27K	2K
Daniels Instr. MODASCII	24K	2K
Data Trans. DATATRAN	5K	-
DGH DGH	27K	1K
Digitronics Corp. SIXNET	6K	-
Dutec DUTEC	12K	2K
Eagle Sgn. Cntrls EAGLE	22K	2K
Emerson Ind. EMERSON	25K	1K
Eurotherm EUROTHRM	30K	9K
Festo FESTO	19K	1K
Fisher & Porter DCI	32K	1K
Foxboro Company FOX	32K	-
Fuji Electric FUJIPLC	35K	3K
Fuji Electric PYHPNA	30K	2K
GE Fanuc GENIUS	29K	3K
GE Fanuc PCIM	43K	2K
GE Fanuc PLC	11K	3K
GE Fanuc SNP	37K	4K
Grayhill PROMUX	8K	2K
Honeywell HONEYWEL	28K	25K
Honeywell ISSC	14K	-
Honeywell S9000	26K	1K
K-Tron International K10	35K	-
K-Tron Inter. K10S	49K	15K
K-Tron Inter. VERTECH	29K	2K
Keithley Metrabyte	7K	-
Leeds & Northrup	30K	2K
LFE LFEPUP	30K	2K
Maple Systems ODET	22K	1K
Measurement Sys.	24K	2K
Measurement Tech. MTI	22K	1K
Metrabyte MBDAS	14K	-
Metrabyte WRKHORSE	21K	2K
Mitsubishi ASERIES	33K	2K
Moore Industries CAM	28K	2K
Moore Industries CCS	30K	-
Moore Ind. MOORE324	10K	-
Moore Products MOORE	32K	8K
Omron Elec. OMRNE5AX	23K	1K
Omron Elec. OMRON	14k	2K
OPTO 22 CYR200	32K	2K
OPTO 22 CYRANO	22K	-
OPTO 22 OPTOMUX	15K	3K
OPTO 22 PAMUX	15K	-
Phoenix Cont. PHOENIX	9K	-
Powers Proc. POWERS	31K	9K
Powers Proc. POWERSII	28K	1K
Reliance AUTOMAX	21K	1K
Reliance RELIANCE	13K	2K
Reliance RELMAX	23K	1K
Schlumberger	25K	-
Siemens Auto. ET100	9K	-
Siemens Auto. SIEM4700	22K	1K
Siemens Auto. SIEMENS	13K	2K
Siemens Auto. SINECH1	14K	-
Siemens Auto. SINECL1	22K	1K
Square D SYMAX	22K	3K
Square D SYMAX422	45K	15K
Strawberry Tree STRBRY	8K	-
Telemacanique	62K	-
Texas Instr. 550	9K	-
Texas Instr. TI305	11K	2K
Texas Instr. TICVU	32K	2K
Texas Instr. TIPLC	12K	2K
Texas Instr. TIWAY	31K	3K
Toshiba TOS	20K	3K
Transition Tech.	44K	-
West Instr. GARDSMEN	24K	1K
West Instruments WEST	34K	13K
Westinghouse DPU	38K	2K
Westing. HPPC1500	20K	-
Westinghouse MAC4500	38K	2K
Westinghouse NLAM	12K	3K
Westinghouse PC1100	14K	2K
Westinghouse PCLAN	13K	1K
Westing. WEST_SAM	25K	N/A
Westinghouse WPC2000	14K	1K
Westronics, Inc.	19K	N/A
Wisdom Sys. 86LADDER	9K	1K
Yokogawa Y13CHART	24K	2K
Yokogawa YOGCHART	33K	12K

* '-' indicates the driver is not EMS compatible

† N/A indicates the information was not available at the time of publication

E6 Block and Variable Byte Counts

TYPE	SIZE	DESCRIPTION
I/O		
AIN	153	Analog Input
AOT	111	Analog Output
DIN	129	Digital Input
DOUT	117	Digital Output
PACKED I/O		
PAIN	544*	Packed Analog Input
PAOT	440	Packed Analog Output
PAIO	544*	Packed Analog I/O
PDIN	130*	Packed Digital Input
PDOT	230	Packed Digital Output
PDIO	230*	Packed Digital I/O
CALC		
LLAG	145	Lead Lag Algorithm
DTIM	837	Dead Timer
CHAR	279	Characterizer
FILT	145	Butterworth Filter
LOG	121	Logarithmic Function
e^x	121	Exponential Function
SIM	171	Simulation Block

*** Note:** As entered, descriptions for individual points will increase the packed block size by 31 bytes. The size will increase according to the last description filled in, even if some descriptions were skipped (e.g. if only the 3rd point is given a description, the size will increase by 3 * 31 = 93 bytes).

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TYPE	SIZE	DESCRIPTION
LOGIC		
AND	129	Logical AND
OR	129	Logical OR
NAND	129	Logical NAND
NOR	129	Logical NOR
XOR	129	Logical XOR
PUL	129	Logical Pulse
NOT	129	Logical Inverse
SLOGIC (Small Logic)		
and	68	Small AND
or	68	Small OR
xor	68	Small XOR
pul	68	Small Pulse
not	68	Small Inverse
MATH		
ADD	115	Weighted Summer
MULT	115	Multiplier
DIV	115	Divider
SIN	121	Sine Function
COS	121	Cosine Function
F(x)	420	User-Defined Equation

TYPE	SIZE	DESCRIPTION
BATCH/SCADA		

TYPE	SIZE	DESCRIPTION
RAMP	167	Dual Slope RAMP
SEQ	189	Digital Sequencer
TON	123	On Delay Timer
TOFF	123	Off Delay Timer
CNT	128	Digital Counter
MSG	220	User Message Selector
SELECTORS		
HSEL	121	High Level Selector
MSEL	121	Medium Level Selector
LSEL	121	Low Level Selector
AVG	121	Average of 2 signals
ALRM	157	Additional Alarm Block
SWCH	111	Analog switch
STAT	380	Statistical process control block
CONTROL		
PID	199	PID Control Function
PD	187	Proportional/Derivative
INTG	175	Integral Only Control
AMB	153	Auto Manual Bias
DGAP	157	Differential ON/OFF Control
TOT	175	Totalizer
TPO	197	Time proportional output block
USER		

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TYPE	SIZE	DESCRIPTION
USER	215	User Defined Algorithms
MISC		
HIST	1782	Event Historian Block
SYS	117	System Functions
DISP	220	Display Selector
TIME	123	Calendar/Clock pulse
CKPT	117	Database Save
HOST	220	File Transfer
SPC	442	SPC/SQC option

Variables which can be both read and written to (such as process, setpoint, output, setpoint state, controller mode) are bi-directional I/O. Setpoint state and controller mode are 8-bit digital words as are all STATE, MODE and ALARM STATUS variables, so they are in the category Digital Bi-directional 4-16 bits. Variables which are normally read-only (such as analog input 1, linearization channel 1, digital input 1 etc.) fall into the categories of analog input, analog output, digital input, or digital output.

E7 Database Sizing Worksheets

These worksheets are designed to help you estimate the size of a PC-30 database, in order to determine whether a given system will fit within the constraints of PC-30 memory requirements. Using these worksheets should bring you within 5 to 10K of the actual database size.

The worksheets are intended to be used in conjunction with this appendix. It is highly recommended that you read the appendix prior to using the worksheets.

Instructions for using the Database Sizing Worksheets

There are two versions of the Database Sizing Worksheets. One is intended for applications that do not make use of EMS LIM 4.0. The other is for applications that use EMS for drivers and options. Note that if the system uses multiple drivers and/or options, *EMS is strongly recommended*.

The worksheets for Non-EMS and EMS applications are located toward the back of this appendix.

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Device Drivers (non-EMS Applications)

1. For each type of device driver you use, enter the number of K bytes (e.g., 47K) in Column A. Only one type of device driver is required per system.

If any driver that you use does not appear on the list, enter the name(s) and size(s) in the space provided (Other), then enter the size in Column A.

Additional device driver sizes may be found Section E5, *Device Driver and Option Sizes*.

2. Enter the total of Lines 1A through 6A on Line 7, Column B.

This is the total memory required for device drivers.

Device Drivers (EMS Applications)

1. There are certain device drivers which do not load into EMS. Check Section E5, *Device Driver and Option Sizes* to determine whether any of the drivers you plan to use are in this category. If so, enter the name of the driver(s) and the size in K bytes in the spaces provided.

Certain drivers also have a portion which remains in RAM; this is also shown in Section E6, *List of EMS Compatible Devices*.

If all the drivers in your application are fully EMS compatible, go directly to the OPTIONS section.

2. Enter the total of Lines 1A and 3A on Line 3, Column B.

This is the total memory required for device drivers.

Options

It is highly recommended that EMS be implemented if the Networking, Remote Supervisory Station, or Report & Recipe Generator options are to be used.

Even with EMS, some options such as Networking and RSS require a certain portion of normal Runtime memory.

1. Enter the file sizes (in K bytes) of each option you want to use in Column A of Lines 8 through 12 (non-EMS) or Lines 4 through 6 (EMS). 4/23/93
2. For non-EMS applications, enter the total of Lines 8A through 12A in Column B of Line 13.

For EMS applications, enter the total of Lines 4A through 6A in Column B of Line 7.

Event-Driven Historian

1. Enter the number of variables that will be logged in history files in Column A of Line 14 (EMS: Line 8).
2. Divide the number in Line 14A (EMS: Line 8) by 20.

   This is the number of variables that can be logged into each history file, or block. The result is the total number of history blocks you will need. RG-GA3-030-005
3. Multiply the total number of history (HIST) blocks by 1.78, and enter the result in Column B of Line 15 (EMS: Line 8).

   This is the total memory requirement for history files.

PC-30 Internal Blocks

Each MICRO-SCAN, PLC Data Highway node, MOD 30 Instrument, or any other device requires a device block (DEV). Each device block takes up 120 bytes of memory.

1. Multiply the number of individual device blocks to be used by .12 and enter the result in Column A of Line 16 (EMS: Line 10).

This is the total (in K bytes) memory requirement for device blocks.

Each of the algorithms used with the PC-30 System requires some Runtime memory in the database. All the available algorithms are listed with their relative sizes on Part 2 of the Worksheet.

On Part 2 of the Worksheet:

2. Enter the quantity of each type of internal PC-30 block in the QTY column.

   For example, if you are using a Programmable Logic Controller, you will probably use Packed I/O.
3. Multiply the quantity by the size of each block, and enter the result in the SUBTOTAL column.
4. Add all the figures in the SUBTOTAL columns and enter the result in the TOTAL boxes at the bottom of the page.

On Part 1 of the Worksheet:

5. Add the TOTAL figures from Part 2, and divide by 1024.

   Enter the result in Column A of Line 17 (EMS: Line 11).

6. Add the figures in Lines 16A and 18A (EMS: Lines 10A and 11A).

Enter the result in Column B of Line 18 (EMS: Line 12).

This is the total (in K bytes) memory requirement for PC-30 internal algorithms.

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Subtotal (non-EMS Worksheet)

Add the figures from the following lines:

7B	-	Total MOD 30 Requirement
14B	-	Total Device Driver Requirement
20B	-	Total Option Requirement
22B	-	Total History Requirement
25B	-	PC-30 Internal Block Requirement

Enter the result in Column B of Line 18.

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Subtotal (EMS Worksheet)

Add the figures from the following lines:

7B	-	Total MOD 30 Requirement
10B	-	Total Device Driver Requirement
14B	-	Total Option Requirement
16B	-	Total History Blocks
19B	-	PC-30 Internal Block Requirement

Enter the result in Column B of Line 13.

Connection Overhead

It is necessary to allow some overhead for internal connections and other system functions.

Multiply the figure in Column B of Line 19 (EMS: Line 13) by 0.08.

Enter the result in Column B of Line 20 (EMS: Line 14).

Average Display Size

The size of the average graphic display is approximately 15K. Only the display on the screen during Runtime affects Runtime memory. The other displays reside on the hard disk until they are requested by the operator or the system.

Total Estimated Runtime Database Size (non-EMS Worksheet)

Add the figures from the following lines:

18B	-	subtotal of database requirement
19B	-	connection overhead)
20B	-	average display size

Enter the result in Column B of Line 22.

This is the estimated Runtime memory requirement of your PC-30 database. **THIS MUST BE LESS THAN 150K.**

Total Estimated Runtime Database Size EMS Worksheet

Add the figures from the following lines:

13B	-	subtotal of database requirement
14B	-	connection overhead
15B	-	average display size

Enter the result in Column B of Line 16

This is the estimated Runtime memory requirement of your PC-30 database. **THIS MUST BE LESS THAN 150K.**

For more information on increasing available memory, refer to Section E1, *System Memory Allocation*.

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PC-30 DATABASE SIZING WORKSHEET			
Non EMS Applications - Part 1			
DEVICE DRIVERS			
1	MOD 30 Instrument Interface - 47K		
2	MICRO-SCAN 500/FULSCOPE ER/C Interface 39K		
3	Allen-Bradley PLC Interface - 16K		
4	MODBUS (Modicon PLC) Interface - 11K		
5	Optomux (OPTO 22) Interface - 14K		
6	Other		
7	Total Device Driver Requirement (Total Lines 1A-6A)		
OPTIONS			
8	Mouse in Runtime - 5K		
9	Networking - 71K (EMS recommended)		
10	Remote Supervisory Station - 58K (EMS recommended)		
11	Statistical Process Control - 20K		
12	Report Generator - 57K (EMS recommended)		
13	Total Option Requirement (Total lines 8A - 12A)		
EVENT-DRIVEN HISTORIAN BLOCKS			
14	Number of variables to be recorded for history		
15	Total History Blocks (Line 14A / 20) x 1.78		
PC-30 INTERNAL BLOCKS			
16	Device Blocks (Total number of device (DEV) blocks x 0.12)		
17	Other (Total from Page 2)		
18	PC-30 Block Requirement (Lines (16A + 17A)/ 1000)		
19	SUBTOTAL - DATABASE REQUIREMENT (Total lines 1B,7B,13B,15B,18B)		
20	CONNECTION OVERHEAD (Line 19B x 0.08)		
21	AVERAGE DISPLAY SIZE		15K
22	TOTAL ESTIMATED RUNTIME DATABASE SIZE (Total lines 19B,20B,21B)		

PC-30 DATABASE SIZE ESTIMATOR WORKSHEET

Non EMS Applications - Part 2: Internal PC-30 Blocks

QTY	TYPE	SIZE	SUBTOTAL
	I/O		
	AIN	153	
	AOT	111	
	DIN	129	
	DOUT	117	
	PACKED I/O		
	PAIN	544*	
	PAOT	440	
	PAIO	544*	
	PDIN	130*	
	PDOT	230	
	PDIO	230*	
	CALC		
	LLAG	145	
	DTIM	837	
	CHAR	279	
	FILT	145	
	LOG	121	
	e^x	121	
	SIM	171	
		TOTAL	

*** Note:** As entered, descriptions for individual points will increase the packed block size by 31 bytes. The size will increase according to the last description filled in, even if some descriptions were skipped (e.g. if only the 3rd point is given a description, the size will increase by 3 * 31 = 93 bytes).

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PC-30 DATABASE SIZE ESTIMATOR WORKSHEET			
Non EMS Applications - Part 2: Internal PC-30 Blocks (Cont.)			
QTY	**TYPE**	**SIZE**	**SUBTOTAL**
	MATH		
	ADD	115	
	MULT	115	
	DIV	115	
	SIN	121	
	COS	121	
	F(x)	420	
	BATCH/SCADA		
	RAMP	167	
	SEQ	189	
	TON	123	
	TOFF	123	
	CNT	128	
	MSG	220	
	LOGIC		
	AND	129	
	OR	129	
	NAND	129	
	NOR	129	
	XOR	129	
	PUL	129	
		TOTAL	

PC-30 DATABASE SIZE ESTIMATOR WORKSHEET			
Non EMS Applications - Part 2: Internal PC-30 Blocks (Cont.)			
QTY	**TYPE**	**SIZE**	**SUBTOTAL**
	CONTROL		
	PID	199	
	PD	187	
	INTG	175	
	AMB	153	
	DGAP	157	
	TOT	175	
	Small Logic		
	and	68	
	or	68	
	xor	68	
	pul	68	
	not	68	
	SELECTORS		
	HSEL	121	
	MSEL	121	
	LSEL	121	
	AVG	121	
	ALRM	157	
	SWCH	111	
		TOTAL	

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PC-30 DATABASE SIZE ESTIMATOR WORKSHEET			
Non EMS Applications - Part 2: Internal PC-30 Blocks (Cont.)			
QTY	**TYPE**	**SIZE**	**SUBTOTAL**
	MISC		
	SYS	117	
	DISP	220	
	TIME	123	
	CKPT	117	
	HOST	220	
	SPC	442	
	HIST	1782	
	USER		
	USER	215	
		TOTAL	

PC-30 DATABASE SIZING WORKSHEET

EMS Applications - Part 1

DEVICE DRIVERS			
		A	**B**
1	Non-EMS Driver		
2	Non-EMS Driver		
3	Total Device Driver Requirement (Total Lines 1A-2A)		
OPTIONS			
4	Mouse in Runtime - 5K		
5	Networking		
6	Remote Supervisory Station		
7	Total Option Requirement (Total lines 4A - 6A)		
EVENT-DRIVEN HISTORIAN BLOCKS			
8	Number of variables to be recorded for history		
9	Total History Blocks (Line 7A / 20) x 1.78		
PC-30 INTERNAL BLOCKS			
10	Device Blocks (Total number of device (DEV) blocks x 0.12)		
11	Other (Total from Page 2)		
12	PC-30 Block Requirement (Lines (10A + 11A) / 1000)		
13	DATABASE REQUIREMENT (Sum lines 1B,3B,7B,9B,12B)		
14	CONNECTION OVERHEAD (Line 13B x 0.08)		
15	AVERAGE DISPLAY SIZE		15K
16	TOTAL ESTIMATED RUNTIME DATABASE SIZE (Total lines 13B,14B,15B		

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PC-30 DATABASE SIZE ESTIMATOR WORKSHEET

EMS Applications - Part 2: Internal PC-30 Blocks

QTY	TYPE	SIZE	SUBTOTAL
	I/O		
	AIN	153	
	AOT	111	
	DIN	129	
	DOUT	117	
	PACKED I/O		
	PAIN	544*	
	PAOT	440	
	PAIO	544*	
	PDIN	130*	
	PDOT	230	
	PDIO	230*	
	CALC		
	LLAG	145	
	DTIM	837	
	CHAR	279	
	FILT	145	
	LOG	121	
	e^X	121	
	SIM	171	
		TOTAL	

*** Note:** As entered, descriptions for individual points will increase the packed block size by 31 bytes. The size will increase according to the last description filled in, even if some descriptions were skipped (e.g. if only the 3rd point is given a description, the size will increase by 3 * 31 = 93 bytes).

PC-30 DATABASE SIZE ESTIMATOR WORKSHEET

EMS Applications - Part 2: Internal PC-30 Blocks (Cont.)

QTY	TYPE	SIZE	SUBTOTAL
	MATH		
	ADD	115	
	MULT	115	
	DIV	115	
	SIN	121	
	COS	121	
	F(x)	420	
	BATCH/SCADA		
	RAMP	167	
	SEQ	189	
	TON	123	
	TOFF	123	
	CNT	128	
	MSG	220	
	LOGIC		
	AND	129	
	OR	129	
	NAND	129	
	NOR	129	
	XOR	129	
	PUL	129	
		TOTAL	

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PC-30 DATABASE SIZE ESTIMATOR WORKSHEET

EMS Applications - Part 2: Internal PC-30 Blocks (Cont.)

QTY	TYPE	SIZE	SUBTOTAL
	CONTROL		
	PID	199	
	PD	187	
	INTG	175	
	AMB	153	
	DGAP	157	
	TOT	175	
	TPO	197	
	Small Logic		
	and	68	
	or	68	
	xor	68	
	pul	68	
	not	68	
	SELECTORS		
	HSEL	121	
	MSEL	121	
	LSEL	121	
	AVG	121	
	ALRM	157	
	SWCH	111	
	STAT	380	
		TOTAL	

PC-30 DATABASE SIZE ESTIMATOR WORKSHEET			
EMS Applications - Part 2: Internal PC-30 Blocks (Cont.)			
QTY	**TYPE**	**SIZE**	**SUBTOTAL**
	MISC		
	SYS	117	
	DISP	220	
	TIME	123	
	CKPT	117	
	HOST	220	
	SPC	442	
	HIST	1782	
	USER		
	USER	215	
		TOTAL	

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Appendix F - XMS And EMS Memory

F1 Overview

Additional computer memory (XMS and/or EMS) enhances PC-30 operation. Chapter 3 mentioned that strategy size limitations can be overcome by using additional or extra XMS and/or EMS memory. If XMS and/or EMS memory is available, PC-30 automatically detects and uses it. A "basic" DOS PC has a base memory of 640 Kilobytes (K) in which most software is actually executed. Most DOS computers today have more than the 640K of base memory and can run bigger and more complex programs than computers with only base memory.

While the memory chips installed in your computer have no "type", they can be configured as either XMS or EMS memory, using various hardware and/or software system modifications.

XMS memory is a "type" that conforms to a specification from Microsoft™ Corporation (currently XMS 2.0). EMS memory is a "type" of memory that conforms to a specification devised by a group of companies and is specified completely as LIM 4.0 EMS memory (the current and standard version). Each type is distinctly different in the way computer software makes use of it. The current version of PC-30 is designed to take advantage of each type of memory whenever possible.

Both types of memory can be configured by one or several separate memory manager programs (not part of PC-30) which is/are permanently installed on the hard disk. Computers purchased with extra memory often have these programs installed and already operating. You can also add them later or change existing memory managers to better suit your requirements.

Installing and configuring extra memory is different on 286 and 386 computers. You get more memory on a 386 machine.

If you already have a computer with extra memory, you should find out how much memory you have and if it is configured as XMS, EMS or both.

This appendix is a practical guide for PC-30 users wanting to take advantage of additional computer memory and provides several suggested solutions for 386 and 286 computers (Section F3). This appendix also gives brief description of how PC-30 uses any extra memory available so you can get an idea of how extra XMS and EMS memory enhances strategy configuration and operation (Section F2). In addition, some Common Problems Experienced When Using XMS and EMS memory are discussed in Section F4. Sections F5 and F6 contain reference tables that give a current EMS compatible driver list, and a list of product vendors, respectively.

Also, refer to the section *Considerations When Developing a Strategy* in Chapter 3 and Appendix E: *Estimating Database Size* when considering the benefits of using extra computer memory.

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F2 XMS Versus EMS Memory

F2.1 XMS

XMS memory actually consists of several component memory types:

- Upper Memory
- High Memory
- Extended Memory

In a 386 computer with the proper memory manager, it is possible to configure all of these components to conform to the XMS 2.0 specification with a single piece of software.

On a 286 you can obtain similar results but not as easily. Usually, you need several separate memory management programs and possible additional hardware.

Effect on PC-30 Operation

Strategy size limits are determined by the amount of base memory available. The effect of providing extra XMS memory is to make base memory available and allow larger strategies to be used.

PC-30 detects extra XMS memory and uses it for certain files and database elements instead of base memory. Although a large functionally contiguous block of XMS memory is preferable, PC-30 recognizes and takes advantage of any XMS memory component which conforms to the XMS 2.0 specification. The degree to which XMS memory enhances operation differs in Configurator and Runtime.

How The Configurator Uses XMS

Within the Configurator, XMS memory is used in the following ways:

- Display buffer storage
- Connection buffer storage
- I/O database storage
- Strategy database storage

The amount of memory saved depends on how much of these resources are called for in a particular strategy.

How Runtime Uses XMS

Within the Runtime environment, XMS memory is used to store the following items:

- Strategy database
- Subwindow display
- Other miscellaneous usage

The amount of memory saved depends on how much of these resources are called for in a particular strategy.

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F2.2 EMS

In a 386 computer with the proper memory manager, it is possible to obtain EMS memory directly from additional memory installed in the computer. On most 286 PCs, you need to install additional hardware to obtain EMS memory. EMS memory is used only by PC-30 Runtime and, like XMS memory, makes available the limited base memory resource, allowing you to run larger strategies.

How Runtime Uses EMS

PC-30 Runtime uses EMS memory to store portions of certain options, drivers, the trend alarm and history replay data buffers.

Options and drivers are automatically loaded into EMS memory *only if the respective option/driver supports EMS operation*. Each driver and option consists of several files. For applicable options, the part which is loaded into EMS memory is the file with the .OPT extension. Similarly for applicable drivers only the .DRV portion is loaded into EMS.

Hint *At the DOS prompt with your PC-30 directory selected, type:* **`dir *.drv`**↵*. The files listed are loaded into EMS memory if they are EMS compatible. Determine which files are EMS compatible by comparing the names of the files to the names of drivers identified in the table in Section F5 of this appendix. If the driver is not on the list, use the SET_EMS program supplied with PC-30 to determine if EMS switch is set.*

Do the same for options by typing: **`dir *.opt`**↵. All the files with the .OPT extension load into EMS except the Touch Screen option (Network option users refer to the Network Option User's Manual).

F3 Solutions For Obtaining Extra XMS and EMS Memory

F3.1 For 386 Computers

The ideal platform for running PC-30 is a 386 computer equipped with extra memory and a memory manager such as QEMM-386™ or 386MAX™. This configuration provides the most capability at the lowest memory cost and allows for software re-configuration of the memory map. While this is ideal there are other configurations possible.

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For a base 386 PC:

Add memory to the computer either directly on the motherboard (if supported) or with the addition of a memory board. The following memory boards can supply additional memory:

- BocaRAM AT/PLUS from Boca Research
- AboveBoard PLUS from Intel

Use a memory manager to convert the additional memory to XMS and EMS memory. The following products are suggested:

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- QEMM-386 by Quarterdeck
- 386MAX by Qualitas

or use:

- HIMEM.SYS (MicroSoft) to obtain 64K of XMS compatible “high memory” (only).

For example, you can have a 386 PC with a 16K network card at address D000 - D3FF and 2 Meg of memory on the motherboard. QEMM gives you between 640K and 1 Meg (RAM) (upper memory blocks (UMB)). If you want upper memory (640 - 1 Meg), HMA (high memory area (the first 64K above 1 Meg)) and EMS and exclude your network card, use the following CONFIG.SYS file:

```
DEVICE=C:\QEMM\QEMM386.SYS RAM X=D000-D3FF
FILES=55
BUFFERS=20
```

F3.2 For 286 Computers

Solutions for 286 computers are less straightforward than with 386 computers. Nevertheless similar results can be achieved.

When considering 286 memory expansion first check how much additional memory the computer motherboard can accommodate, if any. If the total extra memory you can install on the motherboard will suffice, a straightforward solution is to add the memory to the motherboard and to install an “All Charge Card.” This card plugs into the CPU socket (the CPU then plugs into the card), and provides essentially the same memory addressing capability as a 386 computer.

You can then set up upper, high and extended memory as well as obtain EMS memory using the memory manager software supplied with the card.

If you do not have enough on-board extra memory, you can still use the All Charge Card, but you need to add a memory expansion card to gain the extra physical memory needed. If an extra memory card is installed, the All Charge Card may not be necessary.

Note The All Charge Card from All Computers Inc. has been tested and found to operate satisfactorily. However, mechanical constraints in mounting the card may be encountered. Be sure to check with the All Charge Card manufacturer that you have the proper amount of space available for mounting the card before you purchase it.

Note The two memory expansion boards referred to earlier provide different amounts of *upper memory*. While the AboveBoard PLUS can provide more, the BocaRAM AT/PLUS is generally less expensive.

While you may opt for the solution that most benefits PC-30 performance, you should also consider how much upper memory is *actually available* in the system.

While upper memory is the most beneficial component of an XMS memory expansion, the amount available depends on what other system resources such as displays, network cards, etc., use the upper memory addressing space.

☞ If this space is already used it cannot be re-allocated without disabling the other devices using it.

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If you choose to use either card, you need to use individual memory management programs (supplied with the card or obtained separately). To obtain *upper memory*, you can use QRAM from Quadram and to obtain *high memory* you can use Microsoft HIMEM.SYS. To obtain *EMS memory*, use the EMS driver provided with the board.

For example, you can have a 286 PC with 640K on the motherboard, a network address of D000-D3FF, and a 2 Meg BOCA Card. If you want upper memory, a high memory area, and EMS, use the following CONFIG.SYS file:

```
DEVICE=C:\BOCA\BRPEMM.SYS
DEVICE=C:\QRAM\QRAM.SYS X=D000-D3FF
DEVICE=C:\QRAM\QEXT.SYS
FILES=55
BUFFERS=20
```

☞ Remember that the total amount of all types of extra memory you can obtain is the amount of extra physical memory you have on the board. Also remember that a machine with 2 Megabytes of memory uses 640K of that for base memory therefore extra memory only = 1,348K.

A list of the manufacturers for all of the products referred to is provided in Section F6.

IMPORTANT The products suggested herein have been tested and found to work satisfactorily. There is no guarantee or other assurance, either stated or implied, that such products work under all or any circumstances.

F4 Common Problems When Using XMS and EMS Memory

Upper Memory Fragmentation: When adding memory mapped boards (such as network boards) try to maximize the amount of contiguous free address space. This allows for the creation of large blocks of Upper Memory.

QRAM Operation: QRAM provides only Upper Memory when used with a EMS board which is LIM 4.0 *hardware* compatible.

IMPORTANT There are some LIM 4.0 EMS boards designed for an earlier version of EMS and are being shipped with a LIM 4.0 emulator (for example some versions of the Everex EV-159 board). QRAM does not work with such boards.

QEMM Installation: Many 80386 computers implement a SHADOW RAM system which QEMM-386 has trouble operating with unless the “NOSH” installation parameter is specified when installing QEMM or QRAM.

Note Plug-in adapter board memory locations need to be excluded from the memory manager’s use. Refer to the EXCLUDE statement in the memory manager documentation.

EMS Usage Interference: Some disk caching and virtual disk software can be configured to use EMS memory. This can interfere with the use of EMS by PC-30 since more than one program is switching EMS memory pages. The result is an inop-

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erative system. When running PC-30, remove other active users of EMS when PC-30 is active.

XMS Usage Interference: Many users of Extended Memory are not compliant with the XMS 2.0 standard. The result of using such programs in an XMS system is that the same memory is allocated to multiple users. When running PC-30 remove other users of Extended Memory which do not conform to the XMS 2.0 standard.

F5 List of EMS Compatible Device Drivers

The following list contains EMS-compatible device drivers.

PLC's

ABB Kent Taylor MP90
AEG Modicon MODASCII
AEG Modicon MODBUS
Allen Bradley PLC2
Allen Bradley PLC5
Allen Bradley SLC500
Cegelec GEM80
Daniels Instruments MODASCII
Eagle Signal Controls EAGLE
Festo FESTO
Fuji Electric FUJIPLC
GE Fanuc GENIUS
GE Fanuc PCIM
GE Fanuc PLC
GE Fanuc SNP
Mitsubishi Electric ASERIES
Omron Electronics OMRON
Reliance Electric AUTOMAX
Reliance Electric RELIANCE
Reliance Electric RELMAX
Siemens Automation SIEMENS
Siemens Automation SINECL1
Square D SYMAX
Square D SYMAX422
Texas Instruments TI305
Texas Instruments TICVU
Texas Instruments TIPLC
Texas Instruments TIWAY
Toshiba TOS
Westinghouse NLAM
Westinghouse PC1100
Westinghouse PCLAN
Westinghouse WPC2000
Wisdom Systems86LADDER

Loop Controllers

Advanced Engineering ADVCTL
Barber-Colman CIMAC
Barber-Colman COLMANK
Barber-Colman MAQP
Eurotherm EUROTHRM
Fuji Electric PYHPNA
LFE LFEPUP
Moore Products MOORE
Omron Electronics OMRNE5AX
Powers Process POWERS
Powers Process POWERSII
West Instruments GARDSMEN
West Instruments WEST

Remote I/O Processors

Action Instruments ACTION
Analog Devices ADI6B
Analog Devices MAC1050
Analog Devices MAC1060
Applied Digital Controls ADC
DGH DGH
Dutec DUTEC
Grayhill PROMUX
Measurement Systems DATASCANK
Measurement Tech. MTI
Moore Industries CAM
OPTO 22 CYR200
OPTO 22 OPTOMUX
Westinghouse WEST_SAM

Distributed Systems

ABB Kent-Taylor 200R
ABB Kent-Taylor ICN
ABB Kent-Taylor MOD30
Andover Controls ANDOVER
Bristol Babcock BRISTOL
Chemap CHEMAP
Emerson Industrial EMERSON
Fisher & Porter DCI
Honeywell HONEYWEL
Honeywell S9000
K-Tron International K10S
K-Tron International VERTECH
Leeds & Northrup MICROMAX
Maple Systems ODET
Siemens Automation SIEM4700
Westinghouse DPU
Westinghouse MAC4500
Westronics, Inc. WESTRNCS
Yokogawa Y13CHART
Yokogawa YOGCHART

Plug-In I/O Boards

ADAC Corporation ADAC-G2

Bus Extender Systems

Metrabyte WRKHORSE

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Note This list represents only device drivers that were EMS compatible at the time of publication. If a driver does not appear on this list, it may still be EMS compatible. Check the driver documentation and if still in doubt, call technical support.

You can use the SET_EMS utility to check if the driver is EMS compatible. The SET_EMS utility is provided with PC-30.

F6 Memory Product Vendor List

QEMM-386, QRAM
Quarterdeck Office Systems
150 Pico Blvd.
Santa Monica, CA 90405
213-392-9851

386MAX
Qualitas, Inc.
7101 Wisconsin Ave. Suite 1386
Bethesda, MD 20814
301-469-8844

BocaRAM AT/PLUS
Boca Research Inc.
6401 Congress Ave.
Boca Raton, FL 33487
407-997-6227

AboveBoard PLUS
Intel Personal Computer Enhancement Operation
5200 N.E. Elam Young Parkway
Hillsboro, Oregon 97124
503-629-7354 / 800-538-3373

All Charge Card
All Computers Inc.
Toronto, Ont. CANADA
416-960-5426 / 800-387-2744

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Appendix G - Analog I/O Scaling

The basic function of PC-30 Analog I/O blocks (AIN, PAIN, AOUT, PAOT, PAIO) is to convert raw signal values to floating point values and vice versa. The raw number can be scaled to connect into a floating point number in terms of some engineering units that make sense to the user. Scaling is determined by how you set block configuration window parameter values.

In this appendix, the various ways in which Analog I/O blocks can be used for scaling are illustrated.

G1 Analog Input Scaling

Scaling is performed only in the AIN input of AIN blocks if the signal type is Ain-word (an integer with 16 bits or less). Floating point or long integer signals are not scaled.

Intelligent I/O model drivers do not use AIN blocks. The scaling is done by the Block Processor portion of the driver. Like I/O blocks, the block processor runs asynchronously from the rest of the driver in the high priority Control Task.

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The following explanation of scaling is focused on PLC model drivers that use AIN blocks. To apply it to an Intelligent I/O model device, keep in mind the Hi Range and Low Range as well as the Raw Ranges. You can find these parameters in the Override Defaults menu of the I/O point in question. There is no Instrument High or Low Range. Refer to Chapter 5: *I/O Device Configuration* for an explanation of the various types of I/O devices.

G1.1 Scaling

The raw number the device driver reads from the device is scaled proportionately. This is based on a ratio between the raw range (configured in the device block menus or sometimes internal to the device driver) and the ranges configured in the AIN block.

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There are two ranges configured in the Ain block:

- Instrumentation range (Instrument High Range and Instrument Low Range)
- Engineering Units Range (High Range and Low Range)

If the Instrument High Range and Instrument Low Range are left at the default valves of zero, they are ignored. The Engineering Units Range is used for the proportional scaling.

If the Instrument Ranges are set to non-zero numbers, they are used for the scaling, and the Engineering Units ranges are used for a sub-range. This sub-range causes the output value to be clamped to the Hi range if the value goes above the Hi range, or clamped to the Low Range if the value goes below the Low Range. Figure G.1 shows the analog input scaling logic.

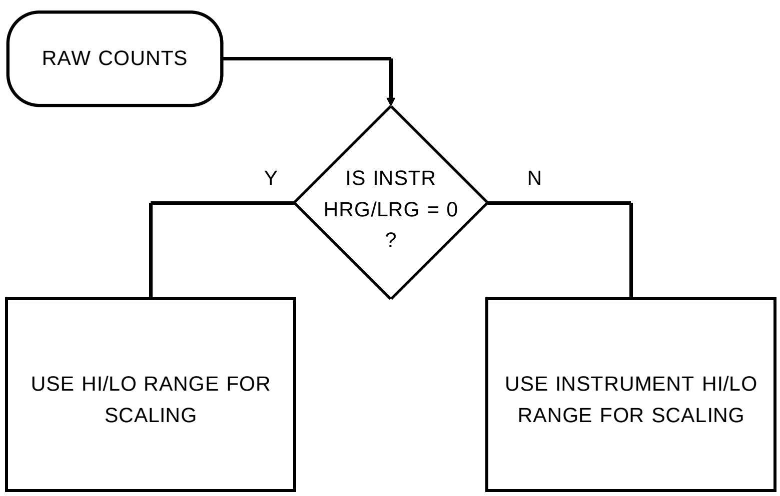

Figure G.1 *Flow diagram illustrating analog input scaling logic*

Both ranges are useful in situations where the incoming signal has a wide possible (or theoretically possible) range, but it is only a small sub-range that is of interest to the user. The Instrument Ranges are then configured so that the number coming in is scaled properly, and the excess is cut off by the High Range. This is most useful for trend and history graphs since the scale of the Y axis on those graphs is based on the Engineering Units range.

In simple situations where ranges are not needed, the two ranges can either be set to the same values, or the Instrument Ranges can be left at the default of zero, so they are ignored and only the Engineering range is used.

Note If you do not use scaling, you should set the Engineering ranges to match the Raw range configured in the Device block.

If you need to use two ranges because the numbers you want to input and scale are a sub-range of the full possible range, read the next section. If you want to scale the full range or bring in the number unscaled, you can set up the ranges as described in the previous two paragraphs and ignore the remainder of this section. Figure G.2 shows AIN algorithm configuration menu where you define block scaling parameters.

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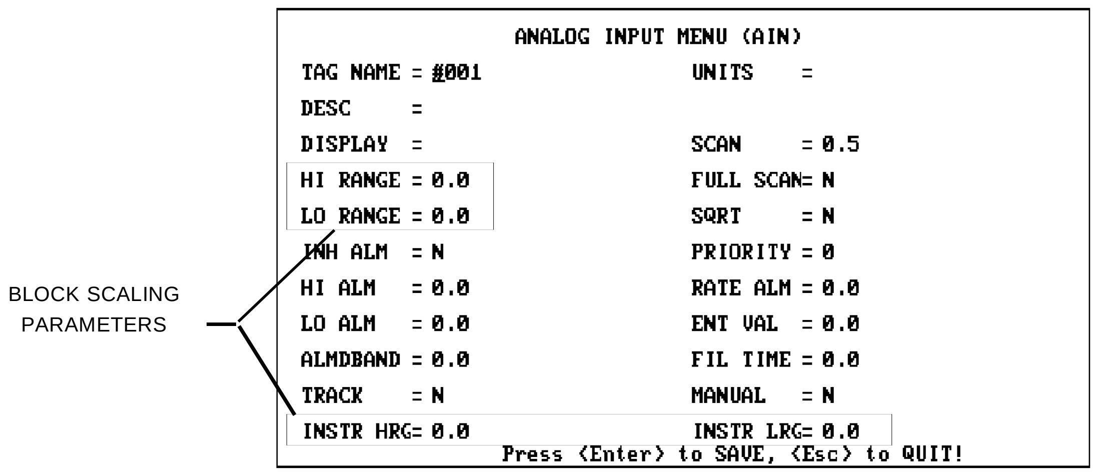

Figure G.2 *AIN algorithm configuration menu*

G1.2 Calculating Range Settings

This section describes the formulas you can use to determine what ranges to enter into the AIN block to properly scale your numbers. First, you need to know the following items:

- The Raw Range
- The Engineering Range to which you want to scale
- The usable raw range (the Raw numbers that correspond to the Engineering Range)

Raw Range

You should set this range to the actual full raw range of the signal or register in your device. Determine this from your hardware documentation. Most PLC model drivers have a choice in the main menu labeled Device Configuration or something similar which displays a menu with the following choices:

- AIN raw range:
- AIN raw count 0:
- AOUT raw range:
- AOUT raw count 0:

The first two choices for Analog input scaling are discussed only.

The default values that come up in the device block are usually correct, typically being 65535 and 0 (the range for a 16-bit unsigned integer). **Note that the AIN Raw Range is not a Hi Range.** The AIN raw range is the span between the High Raw Range and Low Raw Range, and the AIN count 0 is the Raw Low Range.

If the AIN count 0 is 0, then the Raw High Range is the same as the AIN raw range. If the AIN Raw Count 0 is -32768, and the Raw Range is set to 65535, the actual High Raw Range will be 32767 (-32768 + 65535) - this is a typical range used for signed 16-bit numbers).

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The Engineering Range

This is the range to which the usable raw range is scaled. It is defined by the Hi Range and Low Range values. If you want your engineering units output to be between 2 and 30 milliamperes, enter 2 and 30 for your Low Range and Hi Range in the block.

In some situations, the Engineering Range will be a sub-range of the Instrument Range.

The Usable Raw Range

This range consists of the Raw numbers that correspond to the Engineering Range. For example, if your output in engineering units is to be in the range from 2 to 30 milliamperes, you need to determine what raw values correspond to 2 and 30. This is the actual raw number that the device sends to PC-30 when the result should be 2 and 30 milliamperes. These numbers are not entered into any of the PC-30 menus, but are needed for the calculations.

In many cases, the full raw range is usable, and these numbers are actually the same as the Raw Ranges. In other cases, the usable raw range may be a sub-range of the full Raw Range. An example of this situation might be where the full raw range of the number that the Device's internal registers can hold is 0 to 65535 (a full 16 bits), but the thermocouple being used may only have a range of -50 to 200 which might correspond to raw values of 3200 and 50,000.

If you do not know what the raw usable values are, you can determine these values by performing the following steps:

1. Connect an AIN block to a register/signal you can change.
2. Set the Instrument and Engineering Ranges to match the Raw Range.
3. Go into RUNTIME and bring up the Tag Details Sub-window (F2) for the AIN block you just configured.
4. Change the value to the register/signal on the device to match the low and high ranges you will be using (the engineering ranges) and write down what values the output reads. These values are the usable raw values.

There is one complication to the above method. Any 16-bit pattern can be interpreted as either a signed or unsigned integer. Depending on how bit 16 of the word is interpreted (as a sign bit or as a most significant bit), the number can be represented as being between -32768 and +32767 (signed) or between 0 and 65535 (unsigned). The hardware page of the AIN sub-window always interprets the number as signed. If you are dealing with numbers you want interpreted as unsigned, numbers higher than 32767 appear as negative numbers. These negative numbers can be converted to the correct positive number (which must be used in the Instrument formulas for correct results) with this equation:

negative signed raw number + 65536 = positive unsigned raw number

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For example:

-1 signed equals 65535 unsigned.

-32768 signed equals 32768 unsigned.

-15000 signed equals 50536 unsigned.

Numbers between 0 and 32767 need no conversion since they are then same whether interpreted as signed or unsigned.

The following diagram may clarify how these various ranges relate:

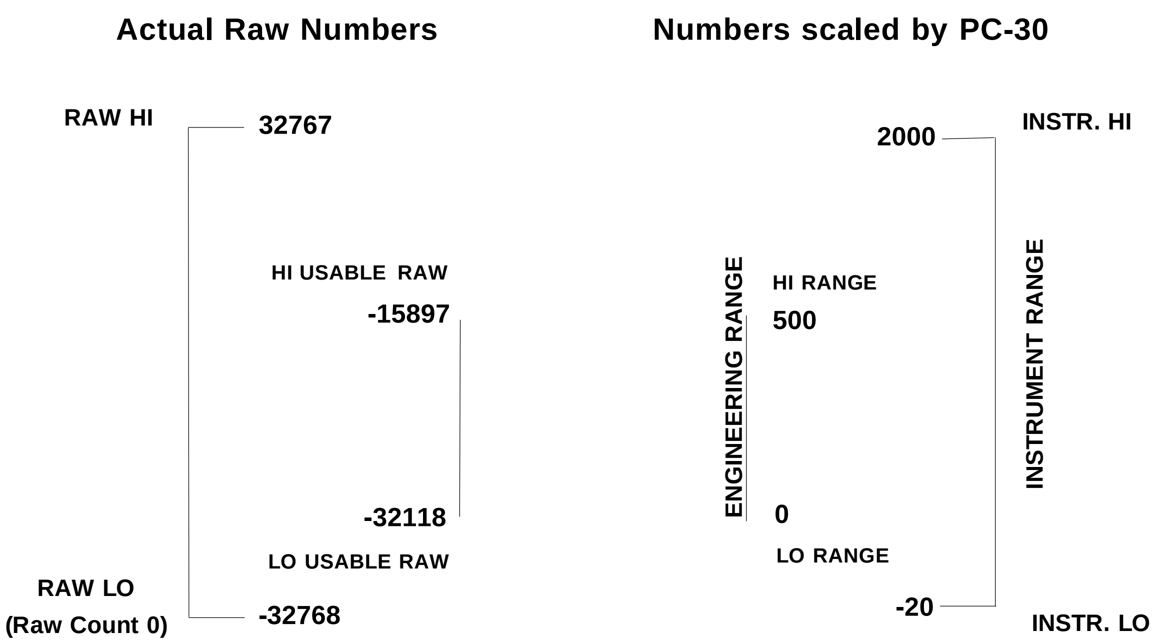

Figure G.3 *Relationship of ranges*

Formulas for Calculating the Instrument Ranges

The following formulas are used for calculating instrument ranges:

$$\text{Instrument Low Range} = \text{Low Range} - \left[(\text{Low Usable Raw} - \text{Low Raw})^* \left(\frac{\text{High Range} - \text{Low Range}}{\text{Hi Usable Raw} - \text{Low Usable}}\right)\right]$$

$$\text{Instrument Hi Range} = \text{Instrument Low Range} + \left[(\text{Hi Raw} - \text{Low Raw})^* \left(\frac{\text{High Range} - \text{Low Range}}{\text{Hi Usable Raw} - \text{Low Usable}}\right)\right]$$

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Examples

A: To Bring the Raw Number in Unscaled

To bring in a raw number unscaled requires no sub-range. There are two ways to set it up. Either way you get the same result.

1. Set All Ranges the Same (1 to 1 scaling, sub-range same as full range).

   Raw Range: 65535 Instr Hi Range: 65535 Hi Range: 65535
   Raw Count 0: 0 Instr Lo Range: 0 Lo Range: 0
   Output = Raw Value

2. Leave Instrument Ranges at 0, Set Engineering Ranges to Match Raw Range (1 to 1 scaling, Instrument Range ignored, Engineering Range is full range, no sub-range).

   Raw Range: 65535 Instr Hi Range: 65535 Hi Range: 65535
   Raw Count 0: 0 Instr Lo Range: 0 Lo Range: 0
   Output = Raw Value

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Raw Value	Output of AIN Block
0	0
35000	35000
65535	65535

B: Scale the Number, no Sub-Range Used.

There are two ways to set it up, each producing the same result.

1. Set Instrument and Engineering Ranges the Same (proportional scaling, sub-range same as full range).

Raw Range: 65535	Instr Hi Range: 5000	Hi Range: 5000
Raw Count 0: 0	Instr Lo Range: -100	Lo Range: -100

$$\text{Output} = (\text{Raw value} - \text{Raw Count 0})^* \left(\frac{\text{Instrument Range}}{\text{Raw Range}}\right) + \text{Instrument Lo Range}$$

2. Leave Instrument Ranges at 0, (proportional scaling, Instrument Range ignored, Engineering Range is full range, no sub-range).

Raw Range: 65535	Instr Hi Range: 0	Hi Range: 5000
Raw Count 0: -32768	Instr Lo Range: 0	Lo Range: -100

$$\text{Output} = (\text{Raw value} - \text{Raw Count 0})^* \left(\frac{\text{Engineering Range}}{\text{Raw Range}}\right) + \text{Instrument Lo Range}$$

Raw Value	Output of AIN Block
-32768	-100.00
0	2450.03
12000	3383.88
32767	5000.00

C: Scale the Number, Use a Sub-Range

There is only one way set up the number.

The Instrument Ranges are used for the full range, and the Engineering Ranges are used for the sub-range (proportional scaling to full range, sub-range clamps extremes of full range).

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Raw Range: 65535	Instr Hi Range: 5000	Hi Range: 1000
Raw Count 0: 0	Instr Lo Range: -100	Lo Range: 0

$$\text{Output} = (\text{Raw value} - \text{Raw Count 0}) * \left(\frac{\text{Instrument Range}}{\text{Raw Range}}\right) + \text{Instrument Lo Range}$$

(Output is then clamped to Hi Range if above is Hi Range, or clamped to Lo Range if below Low Range.)

Raw Value	Output of AIN Block	
0	0	scaled to -100, but is clamped to subrange
1285	0	
7710	500	
14135	1000	
65535	200	scaled to 5000, but is clamped to subrange

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$$\text{Output} = (\text{Raw value} - \text{Raw Count 0}) * \left(\frac{\text{Instrument Range}}{\text{Raw Range}}\right) + \text{Instrument Lo Range}$$

G2 Analog Output Scaling

Analog output blocks generally transfer measurement values from a strategy to a device (via a device block). The output block serves as a matching device between the strategy and the real world device. Output blocks convert floating point values into a numerical format acceptable to the device. As with analog input devices, scaling is optional.

For *output blocks* scaling is determined by the block configuration window parameters RAW RNG and RAW LO (Figure G.4).

Output blocks can be set to (a) autoscale (match the strategy AOUT RAW RANGE and AOUT RAW ZERO to the device block range and zero), (b) scale manually as illustrated in the examples that follow.

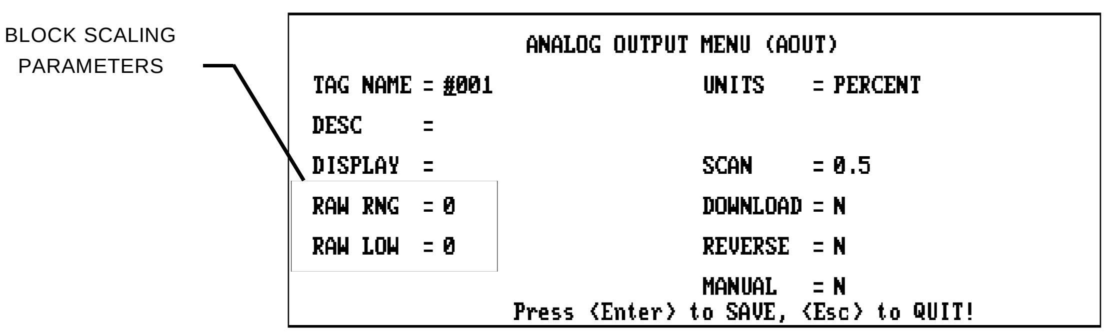

Figure G.4 *AOUT algorithm configuration menu*

The method of performing scaling for output blocks depends on the RAW RANGE and RAW LOW settings as summarized in Figure G.5.

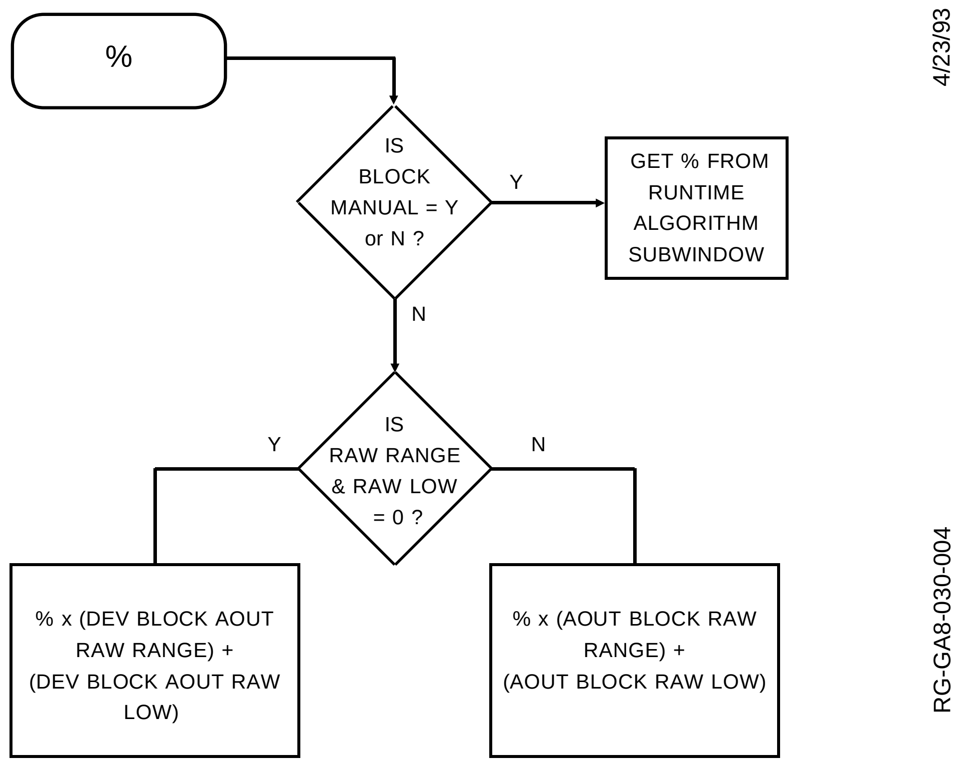

Figure G.5 *Flow diagram illustrating analog output scaling/conversion logic*

G2.1 Fixed Scaling

If you do not specify values for the block configuration window, RAW RNG and RAW LOW parameters and *do* set MANUAL = Y. The AOUT block outputs the % of the device block's AOUT RAW RANGE as entered in the Runtime AOUT Algorithm subwindow (Figure G.6).

For example if the Device Block AOUT RAW RANGE = 65535 and the PERCENT set into the Runtime AOUT subwindow is 50, the AOUT output is 32767.

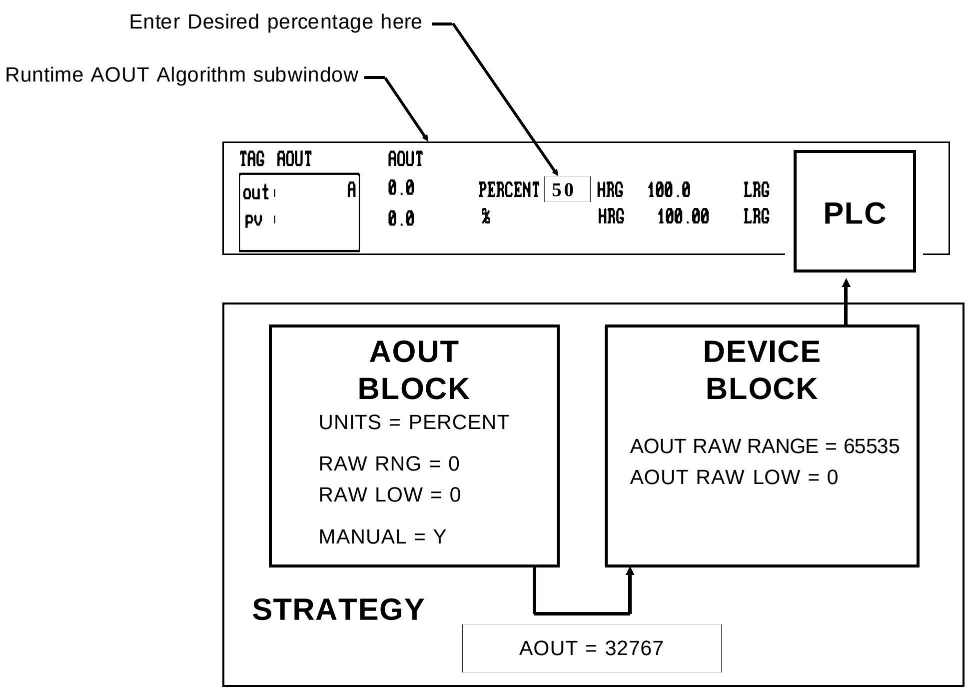

Figure G.6 *Setting an AOUT block for fixed scaling*

G2.2 Autoscaling

If you do not specify values for the block configuration window RAW RNG and RAW LOW parameters and set MANUAL = N, an output block will automatically match the upstream block (the source) to the downstream block (usually the device block) as follows:

1. For each measurement an AOUT or PAOT block computes the percentage (%) full scale of the sending block the measurement represents.

2. Using this percentage value, the block sends a value to the receiving block which represents that % of the receiving block's RAW RANGE plus the offset (RAW LOW).

If the input from the upstream block is from a data entry, *upstream block* MANUAL = Y must be set. For the AOUT block MANUAL = N must be set in all cases. This is illustrated in Figure G.7.

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$$\% = \frac{MEAS - LO\_RANGE}{HI\_RANGE - LO\_RANGE} = \frac{24346}{65535} = 0.3715\ (37.15\%)$$

$$AOUT = (\%\ x\ device\ RAW\ RANGE) + RAW\ LO = (.3715 \times 1024) + 0 = 380$$

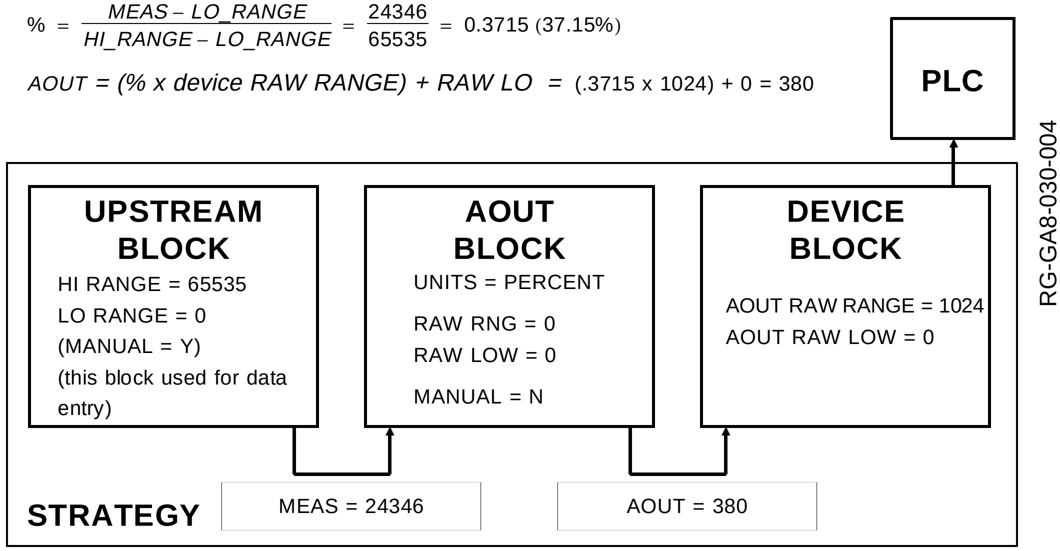

Figure G.7 *Setting an AOUT block for autoscaling*

G2.3

Output Scaling Only

Set the AOUT block to MANUAL = N and enter the desired range value into the configuration window RAW RNG and the desired low value into the Configuration menu RAW LOW). The input is a percentage. For example, if RAW RNG = 14336 and RAW LOW = -2048:

This is illustrated in Figure G.8.

$$\% = \frac{MEAS - LO\_RANGE}{HI\_RANGE - LO\_RANGE} = \frac{24346}{65535} = 0.3715\ (37.15\%)$$

$$AOUT = (\%\ x\ device\ RAW\ RANGE) + RAW\ LO = (.3715 \times 1024) + 0 = 380$$

App-G Scaling

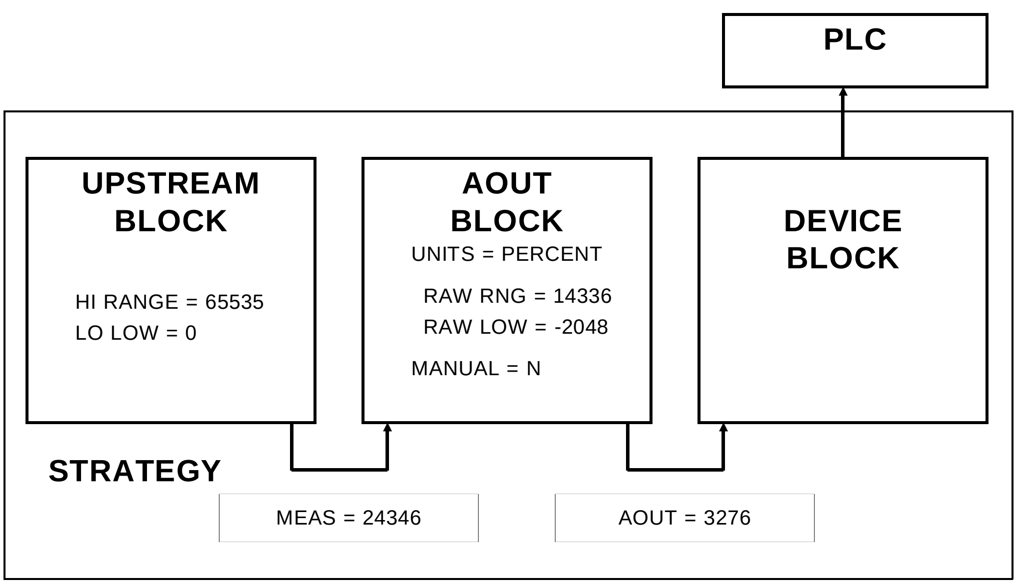

Figure G.8 *Setting an AOUT block for scaling*

G2.4 Scaling And Units Conversion

To override the RAW LO and RAW RANGE values specified in the device block, substitute new RAW LO and RAW RANGE values in the AOUT block Configuration menu. The upstream block's HI RANGE and LO RANGE should correspond to the values entered in the AOUT block.

For example, if the HI RANGE = 400 and the LO RANGE = -100 and this corresponds to a RAW LO = 0 with RAW RNG =2000, then the output signal is 1200 for a measured value of 200.

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This is illustrated in Figure G.9.

$$\% = \frac{MEAS - LO\_RANGE}{HI\_RANGE - LO\_RANGE} = \frac{200 - (-100)}{400 - (-100)} = \frac{300}{500} = .6 \ (60\%)$$

AOUT = (0.6 x AOUT RAW RANGE) +
AOUT RAW LOW = (.6 x 2000) + 0 = 1200

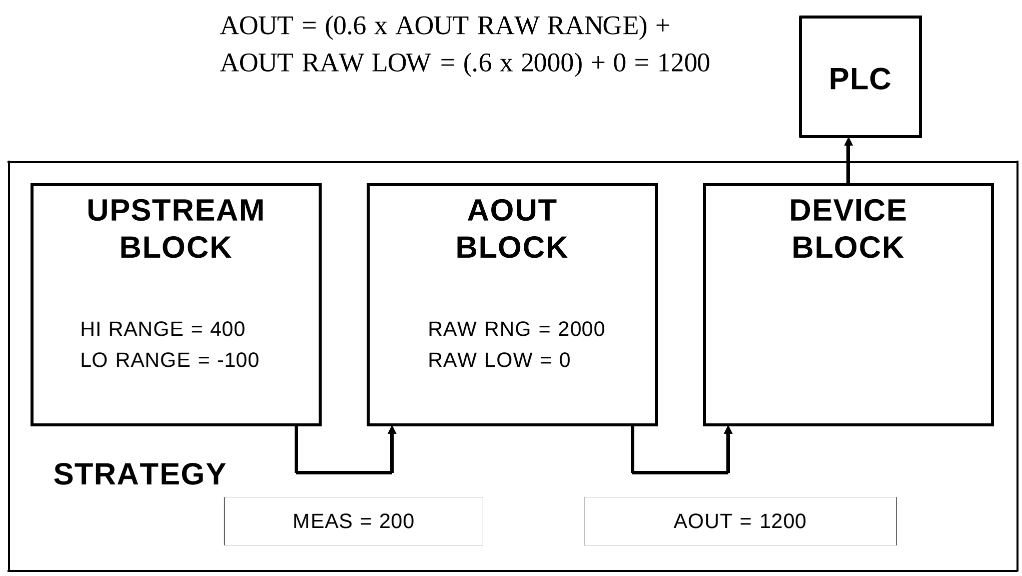

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Figure G.9 *Setting an AOUT block for scaling and units conversion*

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