FactoryFloor Glossary

action blocks Rectangular chart blocks that contain commands (instructions) to be executed in an OptoControl™ strategy. Several commands can be placed in one block. Action blocks can have many entrances, but only one exit.

access path One of three elements (server, access path, and item ID) used by an OPC-compliant client in an OPC message to identify a particular piece of data from a server. Similar to a DDE *topic*.

adapter card A printed circuit board, often installed within a computer, used to transfer data between a bus and a device.

alarm graphic A graphic that displays the state of alarms in OptoDisplay™. It can be used to acknowledge alarms and to view alarm logs.

alarm point In OptoDisplay, an OptoControl tag with a defined alarm state. The point name can be the tag name or a user-selected name.

amp or ampere Unit of current, abbreviation A.

analog Describes data that can have a continuous range of values, such as current, voltage, or pressure readings.

analog point An input or output point that can have a range of values. Voltage and current modules are examples of modules with analog points.

API (Application program interface) A set of routines in a programming library used by a software application. For example, the Pamux driver provides APIs that allow easy access to the Pamux bus. Microsoft® Windows® also provides APIs for various purposes, such as accessing serial ports and displaying message boxes.

application In a DDE message, the name of the DDE server the information is being requested from. It is one of three elements (application, topic, and item) used by a client in a DDE message to identify a particular piece of data (such as an integer, a string, an I/O point, or a range of cells in a work sheet) from a server.

application manager A dynamic object used to launch another application based on changes in process values. Each application manager has a command line, a working directory, and an associated trigger. The program file specified in the command line is launched each time the trigger condition occurs.

ASCII (American Standard Code for Information Interchange) Developed by the American National Standards Institute (ANSI), ASCII is a set of 128 characters that include letters, numbers, punctuation, and control codes, each represented by a unique number.

ASCII mode See *communication mode.*

automation A means of adding intelligence to an industrial process. Automating a process decreases the need for active human participation in the process. It also improves the performance, accuracy, and reliability of a process.

B1 A brain board used to attach up to 16 digital I/O points to an Optomux serial network.

B100 A brain board used to attach up to 16 digital I/O points to a Mistic serial network; same footprint as a B1.

B2 A brain board used to attach up to 16 analog I/O points to an Optomux serial network. Uses Opto 22 Generation 1 I/O modules only.

B200 A brain board used to attach up to 16 analog I/O points to a Mistic serial network; same footprint as a B2. Uses Opto 22 Generation 1 I/O modules only.

B3000 A brain used to connect up to 32 digital and up to 32 analog SNAP channels to a Mistic or Optomux network. Also see *SNAP-B3000-ENET.*

B4 An addressable digital brain board that can control up to 32 input or output points in distributed I/O applications. Any combination of Pamux B4 brain boards may be linked on a single Pamux bus to control up to 512 points of analog and digital I/O.

B5 An addressable digital brain board that can control up to 16 input or output points in distributed I/O applications. Any combination of Pamux B5 brain boards may be linked on a single Pamux bus to control up to 512 points of analog and digital I/O.

B6 An addressable analog brain board that can control up to 16 input or output points in distributed I/O applications. Any combination of Pamux B6 brain boards may be linked on a single Pamux bus to control up to 512 points of analog and digital I/O. The B6 includes an on-board microprocessor that continually scans all I/O points on the mounting rack, performs necessary conversions, and then updates a dual-port RAM. The host computer transfers data along the Pamux bus by reading from or writing to the dual-port RAM.

bank In a Pamux system, a group of eight digital I/O channels. A 16-channel digital I/O mounting rack with a B5 brain board has two banks. If the brain board is at address 20 and the adapter card (for example, a PCI-AC28) is at base I/O address 100, then the two banks are at I/O addresses 120

and 121. Banks and points are used together to access I/O points on a board at a particular address.

base address The starting I/O address for programmable registers, used as the reference address for all other I/O addresses.

basic trend A rectangular dynamic object in OptoDisplay that graphs the change in a variable or set of variables over time. Trends show variables on the vertical axis and time on the horizontal axis. Up to four trend lines can be displayed on any one trend chart. The maximum time span supported by each trend is 14 days. Compare to *SuperTrend*.

baud rate The clock rate for serial data transmission. A 38.4 Kbaud device can transmit or receive information at a maximum of 38,400 bits per second.

binary Data transmitted or stored as a bit pattern, rather than ASCII characters. Binary data is more compact and loads faster than ASCII data.

binary mode See *communication mode*.

bit A single binary digit (0 or 1).

bitmap An electronic file of an image. Bitmap files have a file extension of .BMP. Bitmap files can be created using almost any paint program and can be imported into an OptoDisplay project.

Boolean Logical operations involving true and false, and the operators AND, OR, and NOT. Booleans are commonly used when constructing search queries.

brain A processor that plugs into a SNAP rack next to analog, digital, and/or special-purpose I/O modules, forming an intelligent I/O unit. In addition to communicating with a host computer or controller, brains provide the local intelligence necessary to perform basic control functions such as on/off control, counting, and latching, or complex tasks such as PID control, temperature conversion, time proportional output, and emergency shutdown. SNAP brains are available in a variety of communication links and protocols, including wired or wireless LAN Ethernet, serial (Modbus, Mistic, or Optomux protocols), Pamux, ARCNET (Mistic protocol), and Profibus-DP.

brain board A processor that connects an analog or digital I/O mounting rack to a communication bus, such as the Optomux or Pamux bus. Like brains, brain boards communicate with a host computer or controller and perform both basic control functions and complex tasks locally. Brain boards and brains differ in their form: brains are in an enclosure; brain boards are not.

bus Single common cable used to connect all devices on a system. The Pamux bus is a 50-pin flat-ribbon cable. Optomux and Mistic use RS-422/485 serial busses.

byte A group of eight bits; an eight-bit binary number. For example, 10011011. Eight bits of information composed of zeros or ones, one of which may include a parity bit. Most character sets, for example ASCII or EBCDIC, use one byte per character of information such as a letter, a

number or digit, or sometimes a punctuation mark or a symbol, such as $. A byte is to a bit what a word is to a character. Sometimes a byte is called an octet.

cache In OptoServer™, a storage place for data scanned from controllers. A cache is used by the OptoServer Communication Data Server to reduce unnecessary or repetitive scanning. If requested data is already in the cache and is "fresh" enough, the server delivers it to the client immediately without having to contact the controller. Similar to a disk cache or Internet cache, it improves throughput because it's much faster to retrieve data from the cache in memory than from the controller. Caching applies to OptoDisplay, OptoControl, and other applications that use the OptoCom.dll.

.cdb The file extension for an OptoControl strategy. CDB stands for controller database.

channel See *point*.

chart A series of instructions in the form of a flowchart in OptoControl. Sometimes called a task. Charts can include action blocks, condition blocks, OptoScript™ blocks, continue blocks, connections, and text blocks.

client A program running on a computer node that uses a service provided by a server. For example, file servers provide the service of a big hard disk. Clients use files provided by the server. DDE servers provide a source of data and can automatically inform clients when data changes. OptoServer clients include OptoDisplay and other Opto 22 applications, OPC-compliant applications, and any DDE-aware program.

color button A color button appears as a colored rectangle in dialog boxes. Its color indicates the color currently selected for the associated item in the dialog box. To change the color, select the Color button.

COM (Component object model) The core of *OLE* and *DCOM* technology; provides standard interfaces and inter-component communication, so an application can use features of another application object or operating system. Underlies much of the code developed for Windows 95 and Windows NT operating systems, either by Microsoft or by others.

communication mode The protocol used to represent the information packets exchanged between two devices, such as an Opto 22 controller and a PC. Two serial modes are available: ASCII and binary. In ASCII mode, command messages are transmitted as a series of ASCII characters. Use ASCII mode if there is a modem between the OptoServer PC and a connected controller, or if you want to view communication messages on an ASCII display terminal. In binary mode, messages are represented as binary data, which may use 9-bit bytes. Binary mode is typically used because it is a faster protocol.

compile In OptoControl, the process by which strategy instructions are interpreted into Forth language code that can be downloaded to a controller.

condition blocks Diamond-shaped chart blocks that contain questions that control the logical flow of an OptoControl strategy. Condition blocks can have many entrances, but only two exits: True and

False. More than one condition may be evaluated within a single condition block. The operators AND and OR determine whether all conditions in a block must be true to exit true (AND) or whether only one of the conditions in a block must be true to exit true (OR).

Configurator (OptoDisplay) A program from the OptoDisplay package used to configure an OptoDisplay project. The Configurator is used to draw display windows and attach graphical elements in the window to *tags*, which are data elements in a controller's OptoControl strategy.

connection Used to indicate a relationship between a graphic object in OptoDisplay and a tag name (I/O or variable) in an OptoControl strategy. The connection affects an object's dynamic attribute as tag data changes. The OptoControl program and OptoDisplay Configurator are tightly integrated to make the connection process easy by simply defining what controller strategies should be used.

In OptoControl, a line with an arrow that connects flowchart blocks and defines the logical path of a chart's execution.

constant See *literal*.

continue blocks Oval chart blocks that route the logical flow of an OptoControl strategy to an action or condition block. Continue blocks store only the name of the next block.

controller-driven dynamic attributes Connections made to a dynamic object that change the appearance of the object based on the value or state of a variable. For example, changes in tag values within a controller may cause graphics in OptoDisplay to change size, color, or shape.

conversation The exchange of *DDE* messages between a DDE *client* and *server*. A conversation is conducted through a channel. The syntax of the messages exchanged varies among DDE-aware programs, DDE link types, and the content of the data being transferred. DDE clients initiate a conversation; DDE servers respond to the DDE client request.

.csb The file extension for an OptoControl subroutine.

DCOM (Distributed component object model) Extends COM to networks; makes remote objects appear to be local. DCOM was built into Windows NT and Windows 98; it must be installed in Windows 95.

DDE (Dynamic data exchange) A standard way for Windows applications to exchange data at runtime. Using DDE, process or plant data can be put into general-purpose applications like Microsoft Excel. Programs can either be on the same PC or on different PCs in a network environment.

A DDE link is initiated by a client. Three elements in a DDE message identify the desired data: *application, topic,* and *item*. Application is the name of the DDE server. Topic refers to a category of data from the server. Item identifies a particular piece of data in the topic.

DDE-aware client A registered software program with a server that understands DDE protocol.

deadband In OptoDisplay, a range of input values for a dynamic attribute that does not affect the appearance of the associated graphic. OptoDisplay uses the deadband value entered for each dynamic attribute. A deadband value of zero allows all input values to impact the dynamic attribute. In order for a graphic to change, a value read must be: a) greater than the deadband plus the last value read, or b) less than the deadband minus the last value read. If the readings fluctuate within a certain bandwidth of the last value read, the graphic display won't change.

delimiter A special character used to separate items written to the same line within a file.

derivative A term used in a *PID loop* calculation. This term acts only on the change in slope of the input signal. Its purpose is to change the output as the input gets near the setpoint to prevent overshooting or undershooting. The derivative term can range between zero and 32,767.

digital Describes data that can assume only two values: on or off, 1 or 0, true or false. Also called discrete.

digital point An input or output point that can have only two values, one or zero (also thought of as on or off, true or false). Push buttons and LEDs are examples of digital devices.

discrete See *digital*.

DLL (Dynamic linking libraries) A type of file that acts as a repository of common routines, that is, shared code any application can access. For example, the file opcproxy.dll from the OPC Foundation is required for communication between OPC client and OPC server applications. Libraries may also be provided in static rather than dynamic form.

DIN rail A standard bracket for mounting hardware. It consists of a single metal strip that can hold one or more devices via screws. Opto 22's products use a 35 mm, symmetric DIN rail.

download The process of copying files from one computer or processor to another, over a network or via a modem. In OptoControl, the process by which strategy information is transferred to a controller.

draw window In OptoDisplay, any window that allows graphics to be placed within it. A draw window has static attributes of position, size, and color. Its dynamic attribute is its draw window visual state.

draw window visual state In OptoDisplay, draw windows have visual states of open, closed, or iconified. An open window scans and updates objects associated with it. A closed window scans only its trends, if it was configured to do so, and does no updating. An iconified window scans all its objects but does no graphic updating.

driver A software program that provides instructions for transferring data between an application program and a peripheral device.

dynamic attribute Attributes of a dynamic graphic object that change when a project is run in OptoDisplay Runtime. Examples of dynamic attributes include color, size, position, and visibility. Dynamic attribute behavior is controlled from sampled tag values, such as controller status, that are set up during configuration.

dynamic link In OptoDisplay, the relationship established during configuration between a tag and a dynamic object such as a graphic, historic log, or trend.

dynamic objects Any configurable object that has dynamic attributes associated with it. Examples of dynamic objects include graphics, historic logs, window managers, and trends. During OptoDisplay Runtime, dynamic objects are updated with values from the scanned controllers, user interaction, or system events.

EEPROM (Electrically-erasable programmable read-only memory) See *flash EEPROM*.

Ethernet A local-area network (LAN) protocol.

Ethernet handler task In OptoControl, an invisible "chart" for handling Ethernet communication. If an M4SENET-100 adapter card is installed in the controller, an *Ethernet handler task* will always be in the task queue.

Ethernet I/O A system used to communicate to field devices (such as meters, valves, and switches) from a local or remote location over an Ethernet network. See *SNAP Ethernet I/O*.

event Incidents or occurrences of significance to the OptoDisplay operator; not always an indication of abnormal conditions. Event examples include disk full, communication problems, and so on.

event log A list of messages for all events that have occurred while a project is being executed by OptoDisplay Runtime. The list can be viewed using the Event Log Viewer by selecting View→Event Log from Runtime. Optionally, at configuration time, the event log can be configured to write the event messages to a file in addition to adding them to its list. Only one event log exists per project. An event log file extension is .msg.

event/reaction (E/R) An I/O element that consists of an event and a corresponding reaction. Each time the event occurs, its corresponding reaction is executed once. An example would be to turn on an output based on an output counter reaching a certain value. OptoControl accepts up to 256 event/reactions on each I/O unit. E/Rs are processed at the brain level. Many Opto 22 brains support E/Rs; check the brain's data sheet for information.

external value (XVAL) The actual physical value of an input or output point. Depending on whether the I/O point is enabled, this value may or may not correspond to the *internal value* (IVAL) represented in the strategy running on the controller. Used in OptoControl.

fiber optic *See optic*.

firmware Any semi-permanent software that is stored in the non-volatile memory of a hardware device. Sometimes called a kernel. Firmware often functions like an operating system. Brain firmware gives the brain the ability to perform needed functions. For example, it allows a multifunction I/O unit to measure frequency, calculate a PID loop, or communicate with a controller or host computer. Controller firmware is stored in the controller's EEPROM, usually *flash EEPROM*.

flash EEPROM A type of read-only memory that can be reprogrammed as needed to update the software. Sometimes called simply flash or EEPROM.

flat-ribbon cable See *ribbon cable*.

float A numeric value that includes a fractional component, and thus contains a decimal point. Examples are 3.14159, 1.0, and 1234.2. OptoControl uses IEEE single-precision floats with rounding errors of no more than one part per million. Float values can range from ±3.402824 x 10-38 to ±3.402824 x 1,038. Also called floating-point value.

flowchart See *chart*.

flow-through logic In OptoControl, program logic in which a chart's instructions are executed in sequential order from beginning to end. The end of the chart is an action or condition block that has no exit. Charts that must include flow-through logic are the Powerup and Interrupt charts. Subroutines must also use this type of logic. Compare to *loop logic*.

freshness A method of improving system performance. When an I/O point is accessed by OptoDisplay, a time value associated with the I/O point is tested. If the tested time value is within the specified freshness, the controller will use its internal value. In this manner, the controller saves the communications overhead needed to get the value from the I/O unit. The freshness value in OptoDisplay is configured as part of a refresh time group. For OptoDisplay and OptoServer, the possible configured freshness rate value is from 0 to 9,999 with units of milliseconds, seconds, minutes, hours, days, or months. The freshness value must be less than or equal to the scan rate.

freshness rate The age of data a controller has for I/O points. When a controller reads I/O points, the value is time stamped. If the age of data is equal to or less than the configured freshness rate, the value is reported to the OptoDisplay Runtime application. If the freshness value is greater than the configured value, the controller must read the I/O point again before reporting.

The higher the freshness value, the less frequently the controller has to scan I/O for new data. For OptoServer, the possible configured freshness rate value is from 0 to 9,999 with units of milliseconds, seconds, minutes, hours, days, or months. The freshness value must be less than or equal to the scan rate.

full-scale value The highest value specified for an analog input or output module. For a 4–20 mA input, for example, the full-scale value would be 20 mA. Note that inputs can assume values higher than the full-scale value if they feature *over-range capability*.

.gml The file extension of a Cyrano strategy. Cyrano strategies are converted to OptoControl strategies when opened in OptoControl.

G4LC32 The Opto 22 G4LC32 controller.

G4LC32ISA The Opto 22 G4LC32ISA controller.

G4LC32SX The Opto 22 G4LC32SX controller.

gain A term used in a PID loop calculation. It is the "P" in PID, since gain is the inverse of proportional band. Gain acts directly on the change in error since the last scan. The gain term in a PID can range between -32,767 and 32,767 but must not be zero. Higher gain results in increased output change.

graphic object An object such as a circle, a trend, or a bitmap, which is used in OptoDisplay.

graphics In OptoDisplay, objects such as lines, boxes, and circles, used to build a visual representation of a system or process. An operator interface is a combination of graphics that visually simulate a real-world process.

grid A visual array of points arranged in the draw window to facilitate the drawing and alignment of graphics. Grids may be turned on or off. Grids are available in both OptoControl and OptoDisplay.

grid point One of the visual alignment points represented by a single dot. A grid is composed of numerous grid points.

handle A number assigned by *DDE* to a DDE-aware *client*. This number matches the number in the log file and log window. This number is all that is known about a client. Handles are not assigned to OptoDisplay projects.

Also, a number assigned by an operating system or driver to a resource (such as an AC28 card) as a means of identifying it. The operating system or driver may assign sequential numbers to resources in order to keep track of them.

heartbeat An empty data packet sent to OptoDisplay simply to let it know OptoServer is up and running. A heartbeat is sent from OptoServer to OptoDisplay if data is not sent within a heartbeat interval. The heartbeat interval is based on the timeout value. Typically, an acknowledgment is received by OptoServer at the network level that the heartbeat was received by the OptoDisplay client. If an acknowledgment is not received, OptoServer eventually disconnects this client. A heartbeat is also used by OptoDisplay to determine whether OptoServer is running. Missed heartbeats signal OptoDisplay to switch to the backup server node.

historic log A dynamic object configured in OptoDisplay to write a selected set of data out to a file. Data is sampled at predetermined intervals and written out to files in the user-selected directory. Each historic log can have an associated Start Trigger and Stop Trigger to initiate and terminate sampling.

historical trend A graphical representation in OptoDisplay of a tag's past values. This graphical representation is displayed as a simulation of a strip chart recording. Up to 16 lines can be displayed simultaneously. Operators can scroll forward and backward to view scanned values at different times.

HMI (Human-machine interface) A software application, or user interface, that people use to interact with machines.

host task An invisible "chart" whose purpose is to communicate to OptoControl (in Debug mode) or to OptoDisplay. This chart is assigned the first 500-microsecond time slice during strategy execution.

I/O (Input/output) The transfer of data to or from a computer system involving communication devices, operator interfaces, and/or data acquisition and control interfaces.

I/O channel See *point*.

I/O module A device that provides an interface between signals received from "real-world" field devices and the logic signals used in computers and controllers. For example, a thermocouple input module can convert a millivolt signal from a thermocouple into a numeric value that can be interpreted by a host computer. A digital output module can send a signal to turn a field device (such as a motor) on or off. Some I/O modules have one point of I/O. Quad Pak and SNAP digital modules feature four points of I/O, and SNAP analog modules generally have two or four points.

I/O mounting rack A device on which I/O modules and brains or brain boards can be installed.

I/O point See *point*.

ICTD (Integrated circuit temperature detector) A probe whose current output is proportional to absolute temperature. ICTDs are highly repeatable and easy to use because they don't require resistance-measuring circuitry, high-precision voltage amplifiers, or cold-junction compensation.

IEEE Institute of Electrical and Electronics Engineers.

input point An I/O element (typically a point on a module) that brings information into a controller from a process. Examples of devices wired to input points are buttons, switches, and sensors.

integer A whole number with no fractional part. Examples of integer values are -1, 0, 1, 999, and -456. OptoControl uses 32-bit signed integers that can range from -2,147,483,648 to 2,147,483,647 for most uses; 64-bit integers are available for use with the digital-only SNAP-ENET-D64 Ethernet brain, which addresses 64 digital points on a single mounting rack.

integral A term used in a *PID loop* calculation. This term acts only on the current error and is used to reduce the error to zero. The integral term can range between zero and 32,767. The larger the integral value, the larger the output change.

internal value (IVAL) The software representation of an input or output hardware value. This value is stored in the strategy running on the controller. Depending on whether the I/O point is enabled, this value may or may not correspond to the actual *external value* (XVAL) on the hardware. The IVAL is updated to match the XVAL whenever the controller's program requires the data. Used in OptoControl.

interrupt A signal sent to a controller by an I/O unit that has just registered an event configured within an *event/reaction*. Only event/reactions configured in OptoControl to enable interrupts will trigger an interrupt. Once an interrupt is registered, the *Interrupt chart* will start running.

Interrupt chart A special chart in OptoControl that remains in a suspended state until an interrupt is registered, at which time it is started. The Interrupt chart is one of two charts included in every strategy. (The other is the *Powerup chart*.)

ioManager A utility program included in FactoryFloor; part of OptoEnetUtilities. ioManager is used to configure, manage, assign IP addresses, and load firmware to SNAP Ethernet-based I/O units and the M4-SENET100 Ethernet adapter card.

ISA (Industry Standard Architecture) A common bus architecture on the motherboard of DOS-based computers.

item One of three elements (application, topic, and item) used by a *DDE*-aware *client* in a DDE message to identify a particular piece of data (such as an integer, a string, an I/O point, or a range of cells in a work sheet) from a *server*. For example, between OptoServer and a controller, an item could be a particular I/O point. Between OptoServer and Excel, an item could be a specific cell from a spreadsheet. The syntax for the item is:

```
ControllerName[RefreshGroupName]:ItemType.ItemName[start-end].Field.BITn
```

item ID One of three elements (server, access path, and item ID) used by an *OPC*-compliant *client* in an OPC message to identify a particular piece of data from a *server*. Similar to a DDE *item*.

IVAL See *internal value*.

Kbps (Kilobits per second) A modem or other connection's speed, measured in the number of bits transferred per second. One kilobit is 1,024 bits.

kernel See *firmware*.

ladder logic A type of graphical programming language used by most PLCs (programmable logic controllers). The name comes from the ladder-like structure of the graphical language. This language was developed as a software representation of hard-wired logic, which was done with physical relays and timers.

latch Program logic that can monitor when a control turns on or off. Latches can keep records of I/O and can be programmed to notify the user of a change.

link library A .lib file used during linking to resolve references to *APIs* in a *DLL*. Also called import library.

literal A fixed numeric or string value. Also called a constant.

loader A small software program built into flash chips which allows the downloading of a new *firmware* file. Unlike the kernel (firmware), the loader is permanently stored in a section of the flash

memory that is not erasable. When a controller is first turned on, it can either boot to the loader or to the kernel. You should set the controller to boot to the loader only when you want to download a new firmware file (kernel) to the controller. Once the download has been completed, the controller should be set to boot to kernel again.

local computer In OptoDisplay, the computer on which an OptoDisplay project runs. In addition to running the project, the local computer can be used at the same time to collect or save historical data from a *SuperTrend* object. Also see *remote computer*.

log messages Information reported by OptoServer about its communication transactions. Log messages may be displayed to the OptoServer main log window or to a file.

log window The OptoServer main window where log messages are displayed.

loop logic A type of program logic in which instructions are executed continuously. An OptoControl chart with loop logic can have several paths through which the logic may flow depending on various criteria. Compare to *flow-through logic*.

mask An integer variable or literal with one or more specific bits set. These bits define a set of bits for other actions to work on. The mask may be represented as a decimal, hexadecimal, or binary value.

Mbps (Megabits per second) Refers to the transfer rate of data.

mdslog.log The default filename of the message logging file for OptoServer. When the Logging→Log to File option is selected in OptoServer, communication messages are sent to the file as well as to the main OptoServer display window. The file is found in the OptoServer root directory. The file name and its location may be changed by using the OptoServer command Logging→Select Log File.

microsecond One one-millionth of one second, abbreviation μs.

millisecond One one-thousandth of one second, abbreviation ms or msec.

module See *I/O module*.

mounting rack See *I/O mounting rack*.

multitasking A time-slicing procedure used by OptoControl to allow several charts to run at the same time. The controller contains a multitasking kernel that allows it to run up to 32 tasks simultaneously, including any running host tasks, by assigning each task a 500-microsecond time slice.

mwdriver.dll A dynamic linking library that provides communication to controllers. Mwdriver.dll can handle up to 16 connections. An example of a connection is one in which an application with specific port settings requests a session to OptoServer. This is one connection. If another application requests three sessions to OptoServer, each over a different physical port, this second application uses up three connections to mwdriver.dll.

NetBEUI (NetBIOS Extended User Interface) A superset of *NetBIOS* that includes functions at the network and transport layers.

NetBIOS (Network Basic Input/Output System) A standard for supporting network communication at the session level that is independent of the underlying protocol layers. It serves as an application programming interface for data exchange.

node name Another term used to refer to a computer name on a network.

noise Random or extraneous electrical signals irrelevant to a system's operation. Noise can be produced by such external sources as power lines, generators, motors, transformers, and electrical storms. It can also result from internal sources, such as resistors, capacitors, and semiconductors.

numeric table In OptoDisplay, a dynamic object that shows the contents of up to four OptoControl tables containing numeric data.

ohm Unit of resistance, frequently represented by the Greek letter omega (Ω).

OLE (Object linking and embedding) Based on COM, provides integration among applications, even with diverse types of information. Introduced by Microsoft in 1992, OLE is more flexible, efficient, and robust than DDE.

OPC (OLE for process control) A standard for communication among industrial control and office applications.

OPC servers and clients Software applications that comply with the OPC specification. The same application can be a server and a client at different times or even at the same time. Servers are slaves—applications that provide data or carry out instructions. Clients are applications that request data or give instructions. Clients can request a connection to the server that is temporary (to read or write a value once) or continuous (to update a value when the data changes, called *report by exception*).

The same network can include multiple servers exchanging data with multiple clients. As long as all are OPC-compliant, the servers and clients can be from different vendors.

open protocols Protocols and standards that are not proprietary: that is, any company can make use of the architecture of the standard or protocol. For instance, TCP/IP is an open protocol, since many companies use it in their communications software, while no one company owns it.

operator-driven dynamic attributes Connections made to a dynamic object that change the value or state of a variable based on an operator's action in OptoDisplay.

optic (fiber optic) Method of communicating information. Instead of using metal wires to pass data, fine plastic or glass tubing is used to pass light from an LED at one end to an input/output module at the other end. This method is useful for avoiding *noise* (or interference) common with electric metal wire communication.

OptoControl Opto 22's flowchart-based, Microsoft Windows software package used to program Opto 22 controllers.

OptoControl strategy The control program resident in a controller. The .cdb file associated with this strategy is used by OptoDisplay Configurator and OptoServer to obtain information about the controller as well as tag names for the I/O points and variables. The same OptoControl strategy can reside on more than one controller in a system.

OptoDisplay A Microsoft Windows software package used to develop and run animated graphical representations of data from a control system and an OptoControl strategy. It has two main software applications: OptoDisplay Configurator and OptoDisplay Runtime. Configurator is the development environment used to create the operator interface, while Runtime is used to display and run the operator interface with the Opto 22 control system.

OptoDisplay project The collection of draw windows, graphical elements, attributes, and all elements defining one operator interface designed with OptoDisplay Configurator.

OptoDriver Toolkit An Opto 22 product that provides the tools necessary to build custom PC-based control and SCADA solutions using Opto 22 I/O systems. The OptoDriver Toolkit, a CD-ROM product, allows developers to write Microsoft Windows and DOS software applications that can access the Opto 22 brain, rack, and I/O combination that best fits their application. Applications can be developed using high-level languages, such as Microsoft C++ or Microsoft Visual Basic.

OptoKernel The Opto 22 firmware that must be downloaded to a controller to enable control strategies to execute.

optomds.ini A file created when you exit the OptoServer Administrator for the first time. The optomds.ini file contains controller and scan rate information about the options you entered in the OptoServer Administrator. Information in this file is read by OptoServer once when the program is initially started. If you make configuration changes in the OptoServer Administrator while OptoServer is running, you must stop and restart the OptoServer program to have these changes take effect. The optomds.ini file is created in the OptoServer root directory.

Optomux A serial (RS-422/485) protocol allowing up to 4,096 I/O points to be connected to a computer used with the B1, B2, and B3000 brain boards.

OptoScript A procedural language similar to C, Pascal, or BASIC, which is used within OptoControl flowcharts to simplify some common programming tasks such as string handling, mathematical computations, and control loops. OptoScript code is contained within OptoScript blocks.

OptoScript blocks Hexagonal chart blocks that contain OptoScript code to be executed in an OptoControl strategy. OptoScript blocks can have many entrances, but only one exit.

OptoServer An Opto 22 server application used to acquire information from any number of networked controllers for use by Opto 22, OPC 1.0-compliant, and DDE-aware applications.

OptoServer Administrator One of three programs that make up the OptoServer software package. Communication parameters such as port type, I/O address, baud rate, and timeouts, as well as scan/refresh times, are configured with the OptoServer Administrator.

OptoSniff An Opto 22 utility application used to display communications between Opto 22 applications and Opto 22 controllers.

OptoTerm An Opto 22 utility application used to check communication between Opto 22 applications and Opto 22 controllers. Also used to update controller firmware and download files to controllers.

OptoVersion An Opto 22 utility application used to check the versions of all Opto 22 software installed on a computer.

output point An I/O element (typically a point on a module) wired to hardware that receives information from the controller to control various components of a process. For example, lights, motors, and valves are devices that may be wired to output points.

over-range capability The ability of an analog input module to register values above the specified full-scale value. For example, a 0–10 VDC input module may actually register voltages up to 11 VDC. Above this value, the signal is considered off-scale high.

overrun Also called a scanner overrun notification. A message indicating that the internal OptoDisplay scanner is unable to scan all of the I/O data requests at the rate configured by the user. An overrun can occur if too many points have been configured at too fast a scan rate. An overrun can also occur if the controller takes too long to provide the data at the configured rate.

Pamux A high-speed, high-density distributed I/O system that accommodates both digital and analog brain boards and I/O modules. Pamux supports up to 32 stations containing up to 512 I/O points. A Pamux bus can extend up to 500 feet from a host computer or other programming device. Pamux is ideal for low-noise environments requiring high speed, such as robotics and numerical control.

PID loop An I/O element used to drive an analog input toward a particular value (called the setpoint) and to keep the input very close to that value. Temperature control is a typical application for a PID. PIDs include a gain term (abbreviated P for proportional, which is the inverse of gain), an integral term (I), and a derivative term (D).

point A single input/output data access location. An I/O point can accept either input data (read from a field device) or output data (to be transmitted to a field device). Some I/O modules have one point of I/O. Quad Pak and SNAP digital modules feature four points of I/O, and SNAP analog modules generally have two or four points. Also called a channel.

pointer A type of data you can store in an OptoControl variable. A pointer does not store a value; it stores the memory address of a variable or another OptoControl item, such as a chart, an I/O point, or a PID loop.

port A communication connection on a computer or controlling device through which a process gains access to a network or bus.

Powerup chart The first chart started in any OptoControl strategy. This is the only chart started automatically at powerup or runtime. The Powerup chart is one of two charts included in every strategy. (The other is the *Interrupt chart*.)

priority In OptoControl, the number of consecutive time slices a task can use. All tasks have a priority of one by default.

project In OptoDisplay, a collection of one or more draw windows containing dynamic objects that represent a control system or process.

Quad Pak module An I/O module with four points of discrete I/O in one package.

radian A natural unit of angular measurement equal to 57.29578 degrees of arc. Note that 2π radians = 360 degrees and $2\pi f$ = angular frequency in radians per second (represented by the Greek letter omega, ω), where f = frequency in Hz.

real-time trend In OptoDisplay, a graphical representation of a tag's value as it changes over time. This graphical representation is displayed as a simulation of a strip chart recording. Up to 16 lines can be displayed simultaneously.

recipe Used to download or upload data to an OptoControl program. Recipes allow an operator to make broad changes to program variables for the purpose of tailoring the OptoControl strategy to specific runs or product types. Data is stored in ASCII files, which can be edited with any text editor or word processor that can save the data in ASCII format. Recipes are uploaded or downloaded to the controller in OptoDisplay by toggling a graphic with a recipe dynamic attribute, or by configuring a trigger-based recipe event.

recipe download A recipe action that causes a recipe file to be sent by the OptoDisplay project to the controller.

recipe format file A file resembling a recipe file which contains the data desired for a recipe upload.

recipe upload A recipe action that causes the controller to send information about a recipe to the OptoDisplay project.

re-enable A communication port property used by the OptoServer node (computer) to specify the time interval to wait before checking for a controller response. This property frees up the computer's CPU for other tasks during this waiting period. The OptoServer default re-enable time is 30 seconds.

refresh time Refers to the *scan time* and *freshness* values for data read by OptoControl or OptoServer from a controller. The scan time is how often the software reads the controller's I/O data. The freshness value is the maximum age the data read from the controller can be.

refresh time group A refresh time group defines a pre-configured refresh rate and freshness time applicable to one or more scanned tags. Up to seven separate refresh time groups can be configured within an OptoDisplay project.

remote computer In OptoDisplay, a computer that is connected over a network to a PC running an OptoDisplay project. If it is running the same OptoDisplay project, the networked computer can be used to save historical data from a *SuperTrend* object. Also see *local computer*.

report by exception The basis by which OptoServer notifies its clients that data has changed. Data is reported only if it has changed from the last time it was reported to the client.

resolution The smallest increment of a signal that can be detected by a system. For example, 12-bit resolution describes data accurate to the 12th bit, which implies a possible change of one part in 4,096 or 0.0244 percent.

retries A communication port property that sets the number of times OptoControl or OptoServer tries to communicate with a controller after its first attempt, before timing out. The range for this parameter is from one to nine. The default is one retry.

ribbon cable A flat cable in which the conductors are arranged side by side. Also called flat-ribbon cable.

rollover period In OptoDisplay, the period of time a log or file receives data before that data is written to a new log or file. Rollover periods may be months, days, or hours. File naming conventions are adjusted accordingly.

ROM (Read-only memory) Non-volatile memory, which means that the information stored there is not erased when power is turned off. Hence, it is often used to store *firmware* that controls a processor at a basic level.

RTD (Resistance temperature detector) A metallic probe used to measure temperature based on its thermal coefficient of resistivity.

running Being executed. Describes the state of an OptoControl chart that's neither stopped nor suspended.

Runtime (OptoDisplay) A program from the OptoDisplay package used to run an OptoDisplay project.

scan group A collection of tags that are scanned at a particular rate. The scan rate defines how often controller variables are scanned to refresh OptoDisplay tags. Every OptoDisplay tag belongs to a scan group. There are seven possible scan groups, with configurable refresh times ranging from milliseconds to months. Communication loads can be optimized by changing the refresh times of a scan group.

scanner overrun notification

See *overrun*.

scan time

The time interval between controller I/O readings by OptoDisplay or OptoServer. Typical scan times are one second or less for time-critical data, and 60 seconds for data that changes less frequently, such as outdoor air temperature. The scan time does not determine the frequency with which OptoDisplay or OptoServer sends data to clients. Unchanging data since the last scan is not reported to a client. The scan time is from zero to 9,999, with units of time in milliseconds, seconds, minutes, hours, days, or months.

scripting

See *OptoScript*.

serial communication module

An Opto 22 SNAP I/O module that provides two high-speed, isolated channels of serial data on the same I/O mounting rack with digital and analog modules. Used on a SNAP Ethernet-based I/O unit to provide a convenient connection to printers, chart recorders, barcode readers, and other serial devices at any location, serial communication modules are available in RS-232 and RS-485/422 models.

server

An application that supplies data requested by *client* applications that are connected with the server, typically over a local area network. OptoServer is a server that provides data to clients from a controller on the network. Examples of clients include DDE-aware, OPC-compliant, and Opto 22 applications such as OptoDisplay.

Also, one of three elements (server, access path, and item ID) used by an OPC-compliant client in an OPC message to identify a particular piece of data from a server. Similar to DDE *application*.

share

Automatically created by OptoServer to allow clients access to OptoServer across a network. Each node has resources (such as disks or files) that can be made available for access by others on the network. Resources that can be shared are file directories or DDE Application/Topic pairs. Shares may be password protected to control reading or writing privileges.

sizing handles

Small, solid black boxes that appear around a selected graphic or group of graphics. They can be used to change the size of the selected graphics in OptoControl and OptoDisplay.

SNAP-B3000-ENET brain

A compact, flexible, high-performance processor for many applications, including industrial control and data acquisition. The SNAP-B3000-ENET brain is designed to remotely interface with a mix of analog and digital SNAP input/output (I/O) modules, and special-purpose modules such as serial communication and PID modules.

SNAP-ENET-D64 brain

A compact, flexible, high-performance processor for many applications, including industrial control and data acquisition. The SNAP-ENET-D64 brain is a digital-only processor that controls up to 64 points of digital I/O on one compact Opto 22 mounting rack.

SNAP-ENET-RTC brain A compact, flexible, high-performance processor for many applications, including industrial control and data acquisition. The SNAP-ENET-RTC brain provides the same functions as a SNAP-B3000-ENET brain, but also contains a real-time clock with battery backup.

SNAP-ENET-S64 brain A low-cost, high-quality Ethernet-based brain for simple monitoring, control, and data acquisition using a wired Ethernet network. Ideal for high-density commercial and industrial applications. The SNAP-ENET-S64 brain offers simple digital and serial capabilities, plus full analog features, on a16-module rack

SNAP Ethernet I/O A compact Opto 22 system consisting of a SNAP Ethernet brain, I/O modules, a mounting rack, and an Ethernet connection. Because SNAP Ethernet I/O uses standard Ethernet TCP/IP technologies, you can monitor and control analog, digital, and serial inputs and outputs anywhere.

SNAP I/O A system made up of compact, modular components that are designed to work together. SNAP components include high-density AC and DC digital I/O modules, intelligent analog I/O modules, I/O mounting racks, and a common I/O processor (brain). Components simply snap in place.

SNAP Simple I/O An Ethernet-based I/O unit consisting of a brain, I/O modules, and a mounting rack. SNAP Simple I/O provides simple digital, serial, and full analog functions.

snap on A characteristic that causes points of a graphic to be placed only on *grid points*. Snap on is used to make the drawing and alignment of graphics easier. The snap option is very useful when object sizes and alignments need to be consistent. Snap on is sometimes referred to as magnetism. Snap on is available in OptoDisplay, but is not the default.

snap off A characteristic that means a graphic will not be placed at the nearest grid point when it is moved in the draw window; it can be placed anywhere. Snap off is the default in OptoDisplay.

SNAP-WLAN-FH-ADS brain A compact, flexible, high-performance processor for many applications, including industrial control and data acquisition. The SNAP-WLAN-FH-ADS brain provides the same functions as a SNAP-B3000-ENET brain, but communicates via wireless LAN.

static objects Graphics in OptoDisplay that do not have a dynamic connection. Changes in a controller do not affect a static object. Static objects are used to make a process graphic more familiar to the operator.

stopped Inactive; not being executed. Describes the state of an OptoControl chart that is neither running nor suspended.

strategy A set of instructions that directs an automation process. Strategies can be designed as one or multiple flowcharts within OptoControl. A strategy is sometimes referred to as a control program or application.

string A sequence of ASCII characters grouped together. These characters can include standard alphanumeric characters as well as control codes and extended characters.

subroutine A chart that can be created and saved independently of a strategy. Subroutines can be included in any number of strategies and can be referenced just like any command in OptoControl.

SuperTrend A rectangular dynamic object in OptoDisplay that graphs the change in a variable or set of variables over time. Trends show variables on the vertical axis and time on the horizontal axis. SuperTrends show real-time, historical, or combined trends, and include 16 trend pens, point markers, and log file rollover. In historical modes, you can scroll through data and see point information. Zooming is preset on the x-axis and variable for each pen on the y-axis. Compare to *basic trend*.

suspended Temporarily paused. Describes the state of an OptoControl chart that is neither running nor stopped.

Symbol Factory In OptoDisplay, a built-in library of graphics designed for industrial automation, which you can use in creating an *HMI*.

table A one-dimensional array representing several numeric, string, or pointer values, each referenced by an index number. A table of length 20 can store 20 elements at indices zero through 19.

tag A symbolic name used to identify a piece of data such as an I/O point, alarm, variable, or system condition. For example, a connection from a graphic in OptoDisplay can be made to an I/O point in an OptoControl strategy. The I/O point is referred to as a "tag" in OptoDisplay.

tag name The name of a piece of data in a controller as configured in an OptoControl strategy.

task See *chart*.

task queue The list of charts (tasks) to run concurrently in the OptoControl strategy. Up to 32 tasks (including the *host task* and the *Ethernet handler task*) can be included in the queue.

TERM1 A terminator board for the Pamux bus. The final Pamux brain board on the bus must be terminated with a TERM1 or TERM2 terminator board.

TERM2 A terminator board for the Pamux bus, identical to the TERM1 in size and function. However, the TERM2 offers lower line impedance than the TERM1. This may prove useful when using a cable that differs from recommended specifications.

thermocouple A temperature sensor that includes a junction of two different metals. Temperature can be derived from the voltage produced at the contact point of the metals.

throughput On a controller, the time its microprocessor takes to complete transactions (commands). Throughput is greatly affected by how fast the controller can read and write I/O from its attached I/O units.

timeout Sets the time between each communication attempt from OptoControl or OptoServer to a controller. The number of communication retries after the initial attempt is set by the *retries* parameter.

timer In OptoControl, a numeric quantity representing elapsed time in units of seconds with resolution in milliseconds. Down timers continuously count down to zero, and up timers continuously count up from zero. Timer range is from 0.001 to 4.611686 x 10^{15} seconds.

time slice A fixed unit of CPU time. OptoControl uses a time slice of 500 microseconds (one-half millisecond).

toolbox A set of drawing tools used to create graphics in OptoDisplay. The toolbox may be moved anywhere in the drawing area to facilitate drawing.

topic Identifies a category of data from OptoServer. It is one of three elements (application, topic, and item) used by a *client* in a *DDE* message to identify a particular piece of data (such as an integer, a string, an I/O point, a range of cells in a work sheet, etc.) from a *server*. For OptoServer, the topic is generally OPTO_MDS_0. For Excel, the topic corresponds to the spreadsheet's file name.

trend See *basic trend*, *SuperTrend*, and *XY plot*.

trend pen A dynamic object used by trends in OptoDisplay. The value of its tag provides the data for the line graphs in the trends.

trigger In OptoDisplay, a trigger is configured with a tag and a condition to which that tag is compared. The condition comprises a value and a mathematical relationship. The specified tag is sampled and compared against this specified condition. Triggers are edge sensitive and only activate with a positive transition from a non-triggered state. Triggers are often used to start and stop sampling of other tags associated with dynamic attributes of a dynamic object in OptoDisplay.

UCA4 A general-purpose adapter card used to connect any TTL device to the Pamux bus. Its purpose is to allow a user to build a custom interface to a Pamux system.

under-range capability The ability of an analog input module to register values below the specified zero-scale value. For example, a 0–10 VDC input module may actually register voltages down to -0.25 VDC. Below this value, the signal is considered off-scale low.

variable A quantity that can assume any of a set of values in OptoControl. The name of a variable remains fixed during strategy execution, but its value can change. There are six types of variables: numeric, string, pointer, numeric table, string table, and pointer table. The difference between them is the type of data they store.

visual state In OptoDisplay, the appearance of a window. It can be open, closed, or iconified. An open draw window requires regular scanning of a controller to update its tag-connected graphics. An iconified window scans a controller for new data, but doesn't update its graphics. A closed window optionally scans any trends it may have, but does not update displays.

volts Measure of electrical potential, abbreviated V. Voltage is always expressed as the potential difference in available energy between two points. One volt is the force required to produce a current of one ampere through a resistance or impedance of one ohm.

watchdog A fail-safe mechanism that can be used to set I/O points to a "safe" state if communication with the controller is lost. A watchdog timeout can be specified for an I/O unit. If no communications are received from the controller within this time span, then the output points on the I/O unit will be set to their configured watchdog state. Watchdogs are configured in OptoControl.

watch window In OptoControl, a window you can create to monitor one or more strategy elements (I/O units, digital and analog points, event/reactions, variables, and so on) while debugging the strategy.

window manager In OptoDisplay, a draw window combined with a trigger allowing dynamic control of another draw window's visual state. Specifically, it is a dynamic object used to activate, deactivate, or iconify one or more windows based on changes in process variables or operator actions. Each window manager has an associated trigger and list of draw windows and their visual state transitions. Up to 1000 window managers per project are allowed.

.wth File extension for a *watch window* file.

XVAL See *external value*.

XY plot A rectangular dynamic object in OptoDisplay that graphs data from two numeric *tables* in an OptoControl strategy. The XY plot uses the numeric data in one table for x-axis values and data in the other table for y-axis values. Compare with *basic trend* and *SuperTrend*.

zero-scale value The lowest value specified for an analog input or output module. For a 4–20 mA input, for example, the zero-scale value would be 4 mA. Note that inputs can assume values lower than the zero-scale value if they feature *under-range capability*.