-METASYS®

Binary Output (BO) Object

Introduction

A Binary Output (BO) is the software representation of a 2-state (on/off) controlled device. The primary function of a binary output is to command Heating, Ventilation, and Air Conditioning (HVAC) and other equipment to an on or off state. A secondary function is to command external hardware to an appropriate mode, such as switching a zone control system between night and day operations. The commanded value of the BO can be viewed in operator displays, such as critical alarm and system summaries.

Examples of binary output objects include a supply fan, return fan, pump start/stop, economizer on/off, summer/winter mode select, toilet exhaust fan, and door lock.

Quick Start

This section tells you how to quickly define the BO from the Operator Workstation. Since most of the fields in the Definition window are already filled in with default values, all you need to do is fill in the fields without defaults, and make any necessary changes.

Refer to the *Control System (CS) Object Technical Bulletin (LIT-636102)* for corresponding object definitions.

Defining the BO

The BO object can be defined:

- online, using the Operator Workstation BO Object Definition window
- offline, using the Graphic Programming Language (GPL) Database Template. See the *Graphic Programming Language Programmer's Manual (FAN 631)* for instructions.
- offline, using the Data Definition Language (DDL). See the *DDL Programmer's Manual (FAN 630)* for instructions.

To define a BO object online at the workstation:

1. Go to the summary of the system in which you want to add the object.
2. Select Item from the Menu bar. Then select New from the Item menu. A dialog box for selecting object type appears.
3. Select Binary Output from the list of object types. Then, in the Hardware System and Hardware Object fields, type the system\object name of the device the BO object will be mapped to. *This must be an already defined device.* (If the device is not defined, you must define it before you define the BO. See the device's technical bulletin for more information.)

4. Click OK. The BO Object Definition window appears (as shown in Figure 1).

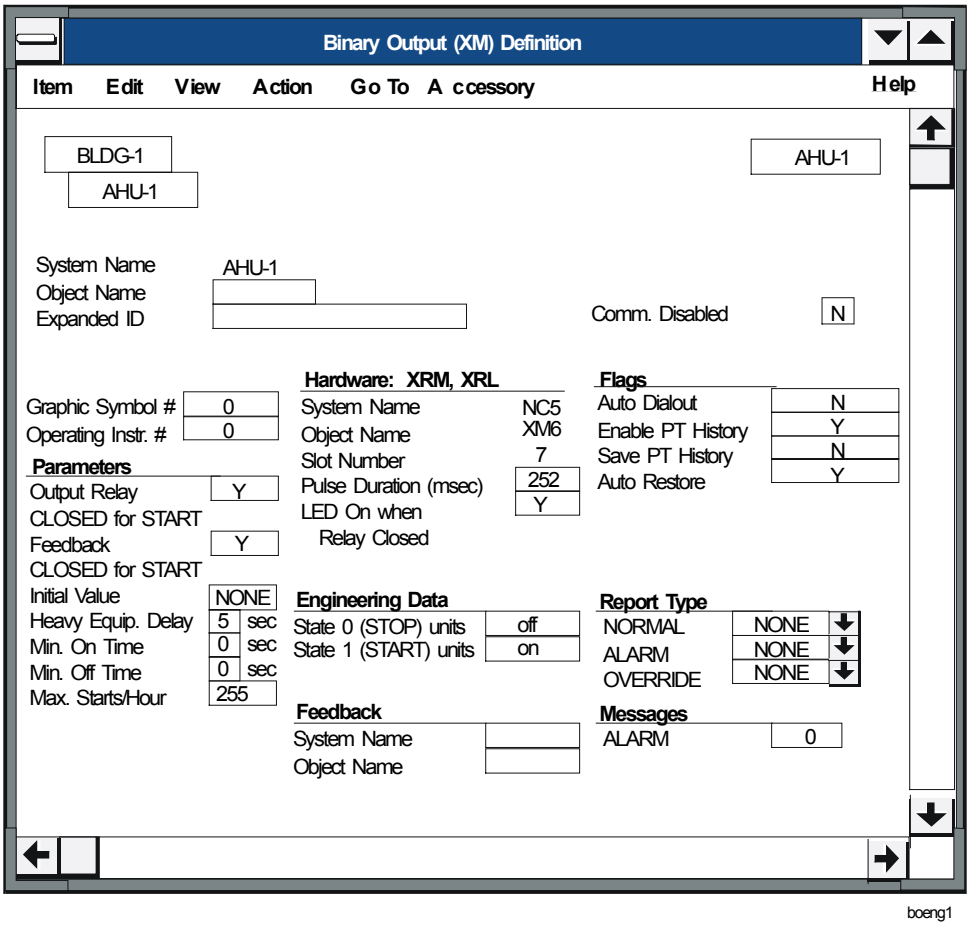

Figure 1: BO Definition Window Displaying Default Settings

Note that some of the fields are blank and some are already filled in. You must fill in the blank attribute fields (e.g., Object Name) because they do not have default settings. The attribute fields that are already filled in contain default settings, which you can either accept or change. Table 1 explains the attributes without default settings. The *BO Attribute Table* at the end of this document describes all BO object attributes. The *Operator Workstation User's Manual (FAN 634)* explains the procedures for entering and changing data.

Table 1: BO Attributes without Default Settings

Attribute Label	Description	Entry
System Name	Has to be the name of an existing system in the network, such as AHU_1 or AIR_SYS. If in GPL or DDL, you must define the System Name. When using the BO Object Definition window, the System Name contains a default setting.	8 alphanumeric characters
Object Name	The object name cannot already exist under the given System Name. This name defines the object, such as RTN_FAN (for return fan).	8 alphanumeric characters
Expanded ID (optional)	This is an expanded version of the Object Name. Appears at the Object Focus window, GPL template, and summaries. More clearly identifies the object. For example, RETURN FAN.	24 alphanumeric characters
H/W System Name	The name of the already defined system in which the hardware object resides.	8 alphanumeric characters
H/W Object Name	The name of the *already defined* hardware object (DCM, XM, DSC8500, FPU, ASC, LONWORKS® compatible device, or System 9100 controller) the object is mapped to. The Hardware Object Name must already exist for the given Hardware System Name.	8 alphanumeric characters
Feedback System Name (optional)	Must be the name of an existing system, such as AHU_2, that contains the feedback object.	8 alphanumeric characters
Feedback Object Name (optional)	Must be the name of an existing BI or BD feedback object, such as AIR_FLOW.	8 alphanumeric characters
Initial Value (optional)	The state the BO will be commanded to on system startup if no higher priority command is received.	6 alphanumeric characters (state or none)

5. To save the new BO object, select Item from the Menu bar. Then select Save. The new BO object is added to the operational database in the Network Controller (NC).

GPL Template

Default attribute settings are also available in the GPL template. Figure 2 shows the GPL Database Template for the BO object.

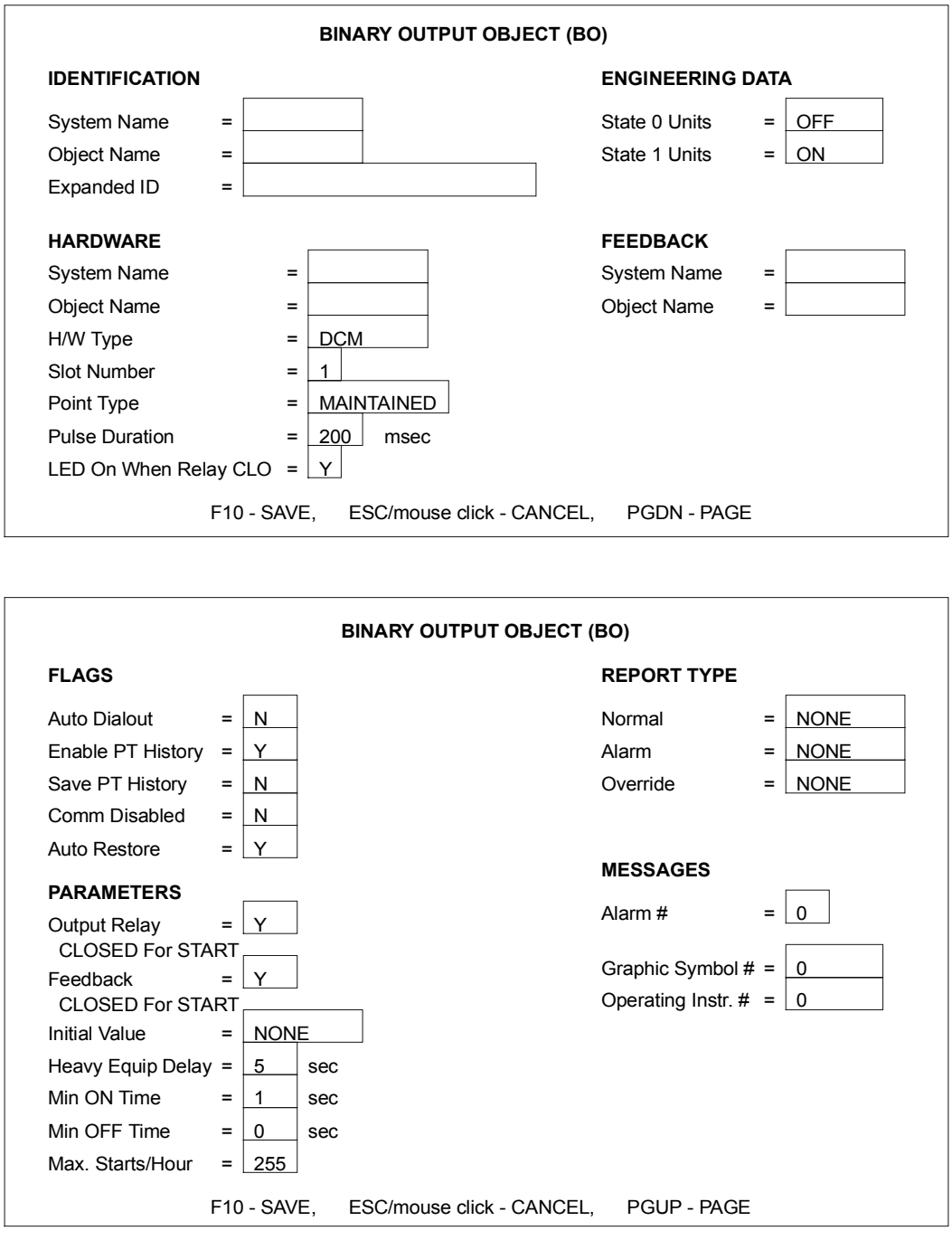

Figure 2: BO GPL Database Template Displaying Default Settings

Modifying and Monitoring the BO

Once the BO is defined, you can modify its attributes using the BO Focus window. You also use the Focus window to monitor and command the BO. You'll find information on using Focus windows in the *Operator Workstation User's Manual (FAN 634).*

You can modify the BO object:

- online, using the Operator Workstation BO Object Focus window
- offline, using Graphic Programming Language (GPL) Database Template
- offline, using Data Definition Language (DDL)

This is the end of the *Quick Start* section. If you need more information on data entry procedures, see the *Operator Workstation User's Manual (FAN 634)* and *GPL Programmer's Manual (FAN 631)*. For additional information on BO attributes, see the remainder of this document, which explains the relationship between various BO attributes from an applications perspective. In addition, you'll find an alphabetized listing of all BO attributes and commands (with descriptions and acceptable entries) at the end of this document.

Note: Refer to the *Control System (CS) Object Technical Bulletin* (*LIT-636102)* for corresponding point mapping tables.

Engineering Overview

Overview of Operation

BO software functions can be divided into four basic categories:

- **Command Processing**--When a command is sent to the BO object, the software performs a number of checks to determine if the command should be executed. These checks include command prioritization, start/stop constraints, and heavy equipment delay. If the command is executed, other software and hardware changes occur, as well. These changes will be explained in more detail later.
- **Optional Feedback Alarm Analysis**--An optional feedback object can report on the status of the binary output object. In addition, a BO change-of-state report can be generated when an operator issues an Override command or uses the Auto/Manual switch.
- **Triggers and History**--BO attribute changes can be used for other purposes, including triggering control processes and historical archiving.
- **Hardware Interface**--User-defined attribute settings determine the output type (maintained or latched), pulse duration, and other characteristics of the binary output command.

Functional Flow Diagram

Figure 3 illustrates the general operation of a BO object. The blocks represent the functions performed by the software. The Network Control Module (NCM) performs all BO software functions. Each major block (software function) is summarized after the figure, and then explained in detail throughout this document.

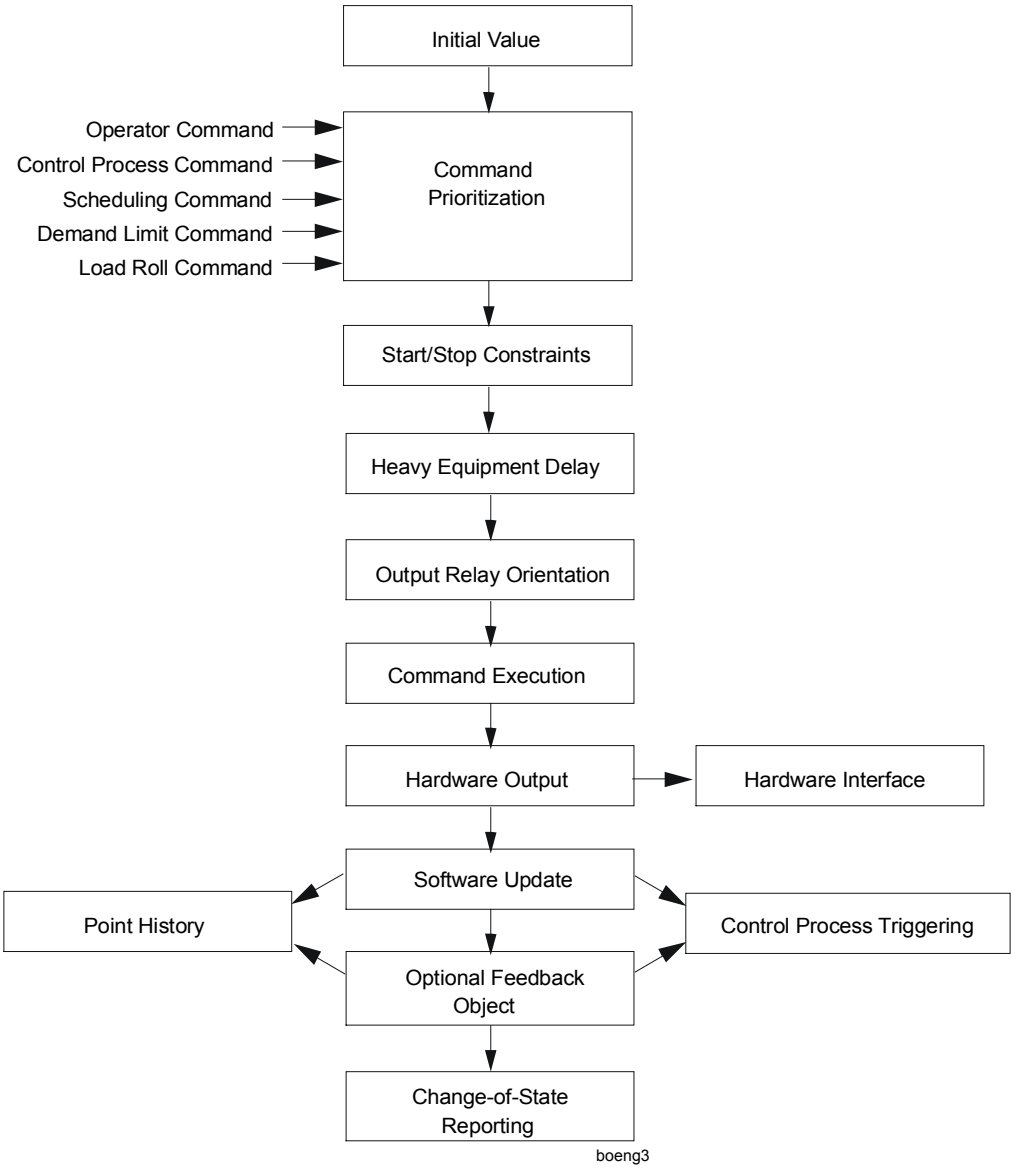

Figure 3: BO Functional Flow Diagram

Command Processing

- **Initial Value--**You may specify an initial value for the BO when defining the object. This becomes the commanded value until the BO receives its first command.
- **Command Prioritization**--A command can be sent to the BO object from an operator, control process, Multiple Command object, Scheduling, Demand Limiting, or Load Rolling. The software performs a priority check to determine the highest priority command for execution.
- **Start/Stop Constraints**--These optional user-defined settings protect binary output equipment from excessive on/off cycles. Start/Stop constraints include minimum on time, minimum off time, and maximum starts per hour. Commands must meet constraint requirements before they are executed. (For BOs mapped to Application Specific Controllers [ASCs], if the BO is locally controlled by the ASC, the protection is done by the ASC device. Otherwise, the protection is done by the NCM.)
- **Heavy Equipment Delay**--This optional user-defined setting prevents equipment damage, resulting from possible power surges when a number of loads are started at once. Simultaneous Start commands to several BOs on the same NCM are time lapsed according to specified delay periods. (0 = no delay)
- **Output Relay Orientation**--Does a BO Start command open or close the relay contacts? This setting allows you to determine output relay orientation for each BO hardware device.
- **Command Execution**--A command is issued to the BO object only after the software has checked for prioritization, Start/Stop constraints (non-ASC devices only), and heavy equipment delay.
- **Hardware Output--**When the command is issued, the binary output device changes state accordingly-the relay either opens or closes. The software uses the output relay orientation value to associate the BO commanded state with the appropriate hardware state.
- **Software Update**--The software is updated to reflect the new commanded value.

Feedback and Alarm Analysis

- **Optional Feedback Object**--A Binary Input (BI) or Binary Data (BD) object can be defined as feedback for the BO. This provides the capability of monitoring the status of the binary output. For example, a BI air flow switch can monitor air flow after a BO supply fan starts.
- **Change-of-State (COS) Reporting**--If an associated feedback object goes into alarm, this condition can be reported at Operator Workstations or printers. Operator Workstations and printers only receive the COS report if they were defined as report stations for the particular object during the database generation process.

Triggers and History

- **Control Process Triggering**--An offline condition, a change in the BO output, and other attribute changes can trigger (cause) a control process to run.
- **Point History**--Certain attributes of the binary output object may be sent to a point history file.

Hardware Interface

- **Hardware Interface**--This function defines the type of field device and the location of the field connection on the Metasys® Network.

Command Processing

Figure 4 is a flow diagram of BO object command processing. The blocks represent software functions. The dashed boxes represent the attributes that define or control the functions.

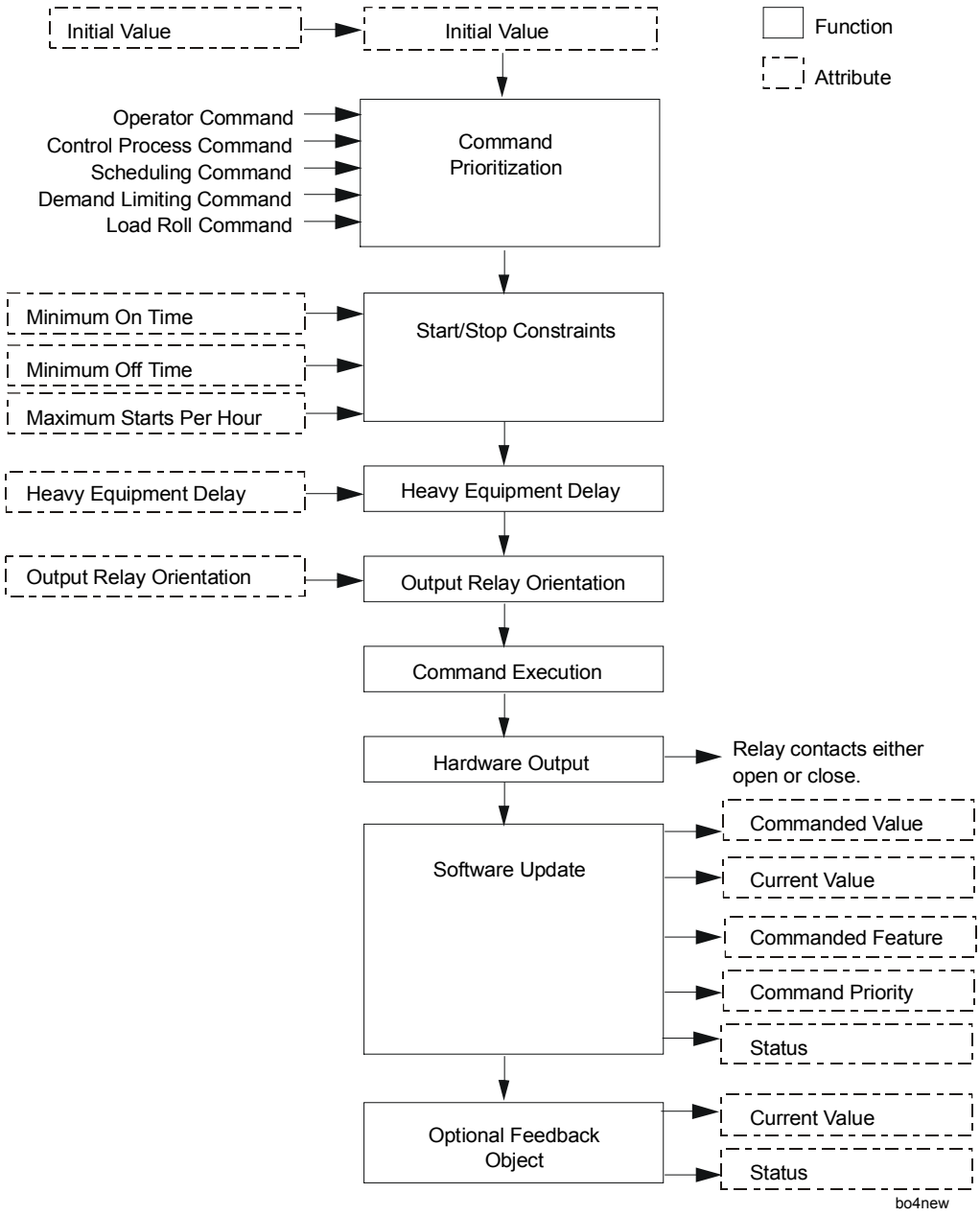

Figure 4: BO Command Processing Functional Flow

Initial Value

Note: For a locally controlled BO mapped to an N2OPEN or System 9100 controller, set the Initial Value to None when you define the BO. This will allow the N2OPEN or System 9100 controller to have local control.

When defining the BO, you can specify an initial value, such as Start or Stop, for the object. This attribute, which is assigned at Priority 8, becomes the commanded value of the BO upon system startup. It remains the commanded value until the BO receives a higher priority command.

Attributes to Set for Initial Value

One attribute affects the Initial Value:

Initial Value is specified in engineering units, such as Start, Stop, On, or Off. If you don't define an initial value for the BO, it will default to None. If initial value is not defined, upon system startup, no command is issued to the hardware until a command is sent to the object. Until a command is received, the BO Focus window will show `NONE` for Commanded Feature. For Commanded Value, the Focus window will show either `????`, if no feedback is assigned, or the feedback value, if feedback is assigned. Or, if the BO is mapped to an N2OPEN or System 9100 controller and Local Control = Yes, the BO value is read from the N2OPEN or System 9100 controller and Commanded Feature = Local Control.

Note: If the BO is mapped to an N2OPEN device and the controller's point value does not match the Metasys Commanded Value, the controlling feature is reported as local. The local feature is displayed as the current feature for any current priority. This occurs even when set to override and when defined as not eligible for Local Control.

Command Requests

A Binary Output object can be commanded in a number of ways:

- by a user from an Operator Workstation or Network Terminal
- from a Control Process
- from a Multiple Command object
- from Scheduling
- from Demand Limiting
- from Load Rolling

Refer to Table 8 at the end of this document for a detailed description of commands. Turn to the *Feature Software* tab in this manual, the *JC-BASIC Programmer's Manual (FAN 632),* and *GPL Programmer's Manual (FAN 631)* for a discussion of how features, such as Demand Limiting, send commands to objects.

Attributes Associated with Command Requests

Two attributes are associated with Command Requests:

- State 0 (Stop) Units
- State 1 (Start) Units

The BO object can be commanded to one of two physical states, corresponding to its open or closed relay contact condition.
Two engineering units, State 0 and State 1, allow you to define the State 0 and State 1 BO command names. These names, such as Stop and Start, Off and On, will appear as the BO's current state in Metasys Windows®.

State 0 (Stop) Units: Enter up to six ASCII alphanumeric characters. Examples include Off, Closed, or Stop. The default setting is Stop.

State 1 (Start) Units: Enter up to six ASCII alphanumeric characters. Examples include On, Open, or Start. The default setting is Start.

Command Prioritization

IMPORTANT: In general, BO command prioritization is the same for all BOs, regardless of which type of device [e.g., Expansion Point Module (XM), N2OPEN, Field Processing Unit (FPU), DSC8500] the BO is mapped to. However, there are some important differences with BOs mapped to an ASC or DSC8500. These differences are explained under *N2OPEN and System 9100 Controller Command Prioritization* and *DSC8500 Command Prioritization*.

The Binary Output object supports nine levels of priority in the NCM for coordinating the execution of commands requested by operators and system features. (The ninth level is for N2OPEN and System 9100 controllers only.) System features include Multiple Command (MC) objects, Demand Limiting, Load Rolling, Scheduling, and Control Processes.

When a command is sent to a BO object, a priority check is performed to determine if the command should be executed. If a number of commands are present at once, only the highest priority action is performed.

How Command Prioritization Works

Each Binary Output has its own object record. This record contains a priority table that serves three purposes:

1. It lists the priority levels of commands, as shown in Table 2.
2. It keeps track of command requests, and performs a priority check to determine which command should be executed (shown in Table 3).
3. It records which operator command or software feature currently controls the object.

Table 2: BO Command Priority Levels

Priority Level	Command Source
1	MC or Control Process Start/Stop Commands MC or Control Process Release Priority Commands (reserved for manual smoke control)
2	MC or Control Process Start/Stop Commands MC or Control Process Release Priority Commands (reserved for fire applications)
3	Operator Entered Override Command Operator Entered Auto Command
4	MC or Control Process Start/Stop Commands MC or Control Process Release Priority Command
5	MC or Control Process Start/Stop Commands MC or Control Process Release Priority Command Demand Limiting Shed/Restore Commands (*a)
6	MC or Control Process Start/Stop Commands MC or Control Process Release Priority Command Load Rolling Shed/Restore Commands (*a)
7	MC or Control Process Start/Stop Commands MC or Control Process Release Priority Command Scheduling Start/Stop Commands
8	Operator Entered Start/Stop Commands (*b) Initial Value Operator Entered Release All Command (*c)
9	Local Control (*d)

*a The Demand Limiting/Load Rolling Shed command is interpreted by the BO as a Stop command. The Demand Limiting/Load Rolling Restore command operates much like the Release Priority command.

*b Operator manual command at Priority 8 releases any commands at Priorities 4-7, and then issues the Start/Stop at Priority 8 if no priority 1, 2, or 3 commands are active. Operator entered Start/Stop commands at Priority 8 are not allowed for a locally controlled BO mapped to an ASC.

*c The operator entered Release All command clears out Slots 3-7, and places what was the current highest priority command at Priority 8. For a locally controlled BO mapped to an ASC, Release All releases the BO to the control of the ASC.

*d Priority 9 local control applies only to a locally controlled BO mapped to an N2OPEN or System 9100 controller (except XT9100 and XTM).

Table 3: Example of BO Command Prioritization

	Priority Level	Command Source
	1	Manual Smoke Control
	2	Automatic Smoke Control
Operator Entered Override Command (Stop) →	**3**	Operator Entered Override Command (Stop)
	4	
Demand Limiting Command (Shed) →	**5**	Demand Limiting Command (Shed)
	6	
Scheduling Command (Start) →	**7**	Scheduling Command (Start)
Operator Entered Command (Start) →	**8**	Operator Entered Command (Start)

9	Local Control

Note: Note: The following discussion does not address Priority Level 9, which applies only to BOs with local control on N2OPEN and System 9100 controllers. See the *N2OPEN and System 9100 Controller Command Prioritization* section for more information.

As you can see from these tables, there are nine priority levels that govern the BO commanded value. When a command is sent to a Binary Output object, it is placed in the correct priority. In Table 3, four commands were sent to the BO--an operator Override Stop command, a Demand Limiting Shed command, a Scheduling Start command, and an operator entered Start command. Override is the highest priority command in the table, so a Stop command is issued to the BO device.

If a command already resides in a given priority, the old command is overwritten with the new command. For example, if another Priority 5 command (such as a control process command) is sent to the BO object shown in Table 3, the Demand Limiting command will be overwritten, as shown in Table 4.

Table 4: Example of BO Command Prioritization

Priority Level	Command Source
1	
2	
3	Operator Entered Override Command (Stop)
4	
5	Control Process Command (Start)
6	
7	Scheduling Command (Start)
8	Operator Entered State 1 Command (Start)

Control Process Command (Start) →

This process is ongoing. As commands are sent to the BO, they are immediately placed in their respective priorities. The table can hold up to nine commands at once. The command with the highest priority at a given point in time usually becomes the BO commanded value. The qualifier usually signifies that other factors also play a role in BO command prioritization. Priority checking involves the following steps:

1. The software scans the BO Priority Table to determine which command is highest priority (with 1 being highest and 9 lowest).
2. If the command is at Priorities 1, 2 or 3 (fire or override), it is always executed, regardless of timing constraints or heavy equipment delay.
3. At lower priorities (4-8), the timing constraints are checked and may delay the command being issued to the hardware.

Note: Note: Feedback is not used to determine if the command should be issued to the field.

How Release Commands Affect Prioritization

It was stated above that a current command can overwrite (replace) an old command of the same priority. This applies to the Stop, Start, and Shed commands.

Four other commands--Release All, Auto, Release Priority, and Restore--work in a different manner. These commands clear out a command or commands; they don't place a value such as Start, Stop ,or Shed in a priority table. Rather, they delete a command from a priority table so that the next highest priority command can take control. For example, in Table 5, a Release All command was sent to the BO (not involved in local control). This command cleared out Priorities 3-7, and placed the current highest priority command (Stop at Priority 3) at Priority 8 controller if no smoke control priorities are active.

Table 5: Example of BO Command Prioritization

	Priority Level	Command Source
	1	
	2	
	3	
↗	4	
Operator Entered Release All Command (Clears Priorities 3-7)	5	
→	6	
	7	
	8	Operator Entered Command (Stop)

The following commands perform release functions:

- The **Release All** command releases (clears out) Priorities 3 through 7 and places what was the highest priority command at Priority 8 controller if no smoke control priorities are active. (If a Release All command is sent to a BO involved in local control, commands at Priorities 3 through 8 are cleared, and the BO is released to the local control of the controller if no smoke control priorities are active.)
- The **Auto** command releases (clears out) the Priority 3 Override command, allowing the next priority command to take control.
- The **Release Priority** command, which is only available from Multiple Command objects and control processes, releases at the Priority Level (1, 2 and 4-7) specified in the process.

- The Restore command works much like the Release Priority command. When sent from Demand Limiting, it clears any command at Priority 5. Priority 5 holds a Demand Limiting Shed command or a Control Process Start/Stop command. When Restore is sent from Load Rolling, it clears any command at Priority 6. Priority 6 holds a Load Rolling Shed command or a Multiple Command object or Control Process Start/Stop command. After the command is cleared, the next highest priority command can take control.

N2OPEN and System 9100 Controller Command Prioritization

The following information applies to the N2OPEN and all System 9100 controllers except the XT9100 and XTM (which do not support local control).

When you configure an N2OPEN or System 9100 controller with the appropriate configuration software, you can assign its BO points to closed loop processes. If the BO object is mapped to a point involved in a closed loop process, it is considered locally controlled. When you define the BO, you specify whether it is locally controlled.

There is a ninth command priority level for BOs involved in local control. If a BO is involved in local control, and no higher priority commands have control of the object, the BO is released to the local control of the controller at Priority 9.

If a Release All command is sent to a BO involved in local control, commands at Priorities 3 through 8 are cleared, and the BO is released to the local control of the controller if no smoke control priorities are active.

For a locally controlled BO, manual start/stop commands (Priority 8) are not allowed. In addition, the Initial Value (Priority 8) of a locally controlled BO should be set to None when the object is defined. This allows the controller to control the BO when no higher priority commands are in effect.

DSC8500 Command Prioritization

The DSC8500 hardware supports only three levels of command prioritization. The following table shows how the eight priority levels are translated into three for the DSC8500.

Table 6: DSC8500 BO Command Priority Levels

Priority Level	DSC8500 Command Priority
1	1
2	
3	
4	2
5	
6	
7	3
8	

A command issued at Priority 7 or 8 (at the NCM) will release Priority 1 and 2 at the DSC8500. A command issued at Priorities 4, 5, or 6 (at the NCM) will release Priority 1 at the DSC8500. A command at the NCM cannot release Priority 3 at the DSC8500.

Start/Stop Constraints

Note: The following information applies to all BOs, except those that are locally controlled (by an N2OPEN or System 9100 controller). Start/Stop constraints for locally controlled objects are explained under the heading *Start/Stop Constraints for Locally Controlled BOs*.

Once the software has determined that a command is of the highest priority, the command is checked for Start/Stop constraints. This applies to all commands, with the exception of those issued at Priorities 2 or 3 (fire and manual override priorities). Start/Stop constraints:

- limit how often the BO is started and stopped
- can prevent or delay command execution. If a command is not executed, it is placed in the BO Priority Table for future use. When the constraints expire, the command priority table is scanned again to determine the highest priority command for execution.
- protects equipment by avoiding excessive on/off cycles that cause wear and tear

Attributes to Set for Start/Stop Constraints

Three attributes affect Stop/Start Constraints:

- Minimum On Time
- Minimum Off Time
- Maximum Starts Per Hour

Minimum On Time: Any time a BO object is started by a command, the Minimum On Time value (if defined) is examined to determine how long the object must remain on before a Stop command is allowed. This attribute has no relationship to the minimum on time used by the Demand Limiting/Load Rolling features. Enter a value from 0-255 seconds, with 0 representing no Minimum On Time. The default setting is 1.

Minimum Off Time: Whenever a BO object is stopped by a command, the Minimum Off Time value (if defined) is examined to determine how long the object must remain off before a Start command is allowed. This attribute has no relationship to the minimum off time used by the Demand Limiting/Load Rolling features. Enter a value from 0-255 seconds, with 0 representing no Minimum Off Time. The default setting is 0.

Maximum Starts Per Hour: This software setting determines how many times the BO object can start within one hour. The accumulated total of starts is reset each hour by the NCM Time-of-Day feature. Any time a start command is requested, the number of starts during the past hour is checked against the number allowed. If the limit has been reached, the request is denied and the command is discarded. A message appears stating that the command was not sent. Enter a value from 0-255. A value of 0 means unlimited starts per hour.

Start/Stop Constraints for Locally Controlled BOs

To eliminate the confusion that would result from two sets of start/stop constraints (those in the controller defined through HVAC PRO for Windows™ or the System 9100 controller's local control strategy, and those in the NC defined during object definition), only one set will be used. If a BO has not been defined for local control, the NCM start/stop constraints described in the previous section will be used. If the BO has been defined for local control, the start/stop constraints defined with HVAC PRO for Windows or the System 9100 controller's local control strategy are used, and those in the NCM are ignored.

Heavy Equipment Delay

Heavy Equipment Delay causes a delay time after a binary output device has started. A number of BO objects all on the same NCM can each be given a delay time so that each device is started only after the previous equipment's delay time has lapsed. This function prevents peak demand values from the simultaneous starting of multiple inductive loads.

For example, 20 heavy equipment BO objects can each be given a 5 second delay time. (Although the delay times in this example are the same, they can vary). If a Start command is issued to these 20 objects at once, the first Start command is executed immediately. The second Start command is issued 5 seconds later, the third Start command 5 seconds after the second command, and so on. The last Start command is sent out 95 seconds after the first command.

Note: Heavy equipment delay times are not coordinated between NCMs. Heavy equipment delay can be defined for a locally controlled BO, but is used only when the BO is switched by the NCM.

Attributes to Set for Heavy Equipment Delay

The Heavy Equip Delay attribute affects Heavy Equipment Delay:

Heavy Equip Delay specifies the number of seconds that will lapse after a Start command is issued to one BO object--before a Start command is issued to another BO object. This is explained in greater detail above. Enter a value from 0 to 255 seconds, with 0 representing no delay time. The default setting is 5.

Output Relay Orientation

When the software issues a BO command (e.g., Start, Stop, On, or Off), it must convert the binary code to a value that can be understood by the hardware. For example, the hardware needs to know if a Start command opens or closes the relay contacts.

Attributes to Set for Output Relay Orientation

The Output Relay attribute affects Output Relay Orientation:

Output Relay gives you flexibility in determining whether the Start command opens or closes the relay contacts.

- Specify Y (yes) if the output relay is closed in the State 1 (e.g., Start) condition.
- Specify N (no) if the output relay is open in the State 1 (e.g., Start) condition.

Additional hardware information is covered later in this document, under the section called *Hardware Interface*.

Command Execution

Once the software has checked for priorities, Start/Stop constraints, and heavy equipment delay, the BO Start or Stop command is executed. The command causes the hardware and software to change accordingly.

- **Hardware--**The relay contacts of the binary output device either open or close, depending on the output relay orientation.
- **Software**--A number of BO attributes update, including Commanded Value, Commanded Feature, and Command Priority. If a feedback object is assigned to the BO, the BO Status can change, as well. These attributes are explained in more detail below.

Attributes Affected by Command Execution

The following attributes are affected by command execution:

- **Commanded Value** is updated to reflect the command that was executed, such as Start or Stop. This is displayed at the BO Focus window. If the BO is locally controlled, Commanded Value will display commands issued locally (by the ASC) to the output.
- **Current Value** is the same as the Commanded Value if the BO doesn't have an associated feedback object. If feedback is assigned, the BO Focus window displays the current value of the BI or BD object. For example, the current value could equal On if a BI air flow switch detects air from a supply fan.
- **Commanded Feature** is updated to reflect the source of the commanded value. Operator, Scheduling, Control Process, Multiple Command object, Demand, Load Roll, Initial, Local Control, None, or Override is displayed in this field at the BO Focus window.

- **Command Priority** is updated to reflect the priority level of the Commanded Feature. At the BO Focus window, 1-9 is displayed in this field.
- **Status** is always Normal if the BO object doesn't have an associated feedback object. If feedback is assigned, the status (Alarm or Normal) is updated to reflect the results of BI or BD alarm analysis. Alarm analysis occurs because a new command was executed.

Figure 5 shows the Focus window of a BO object that was commanded Off by a control process.

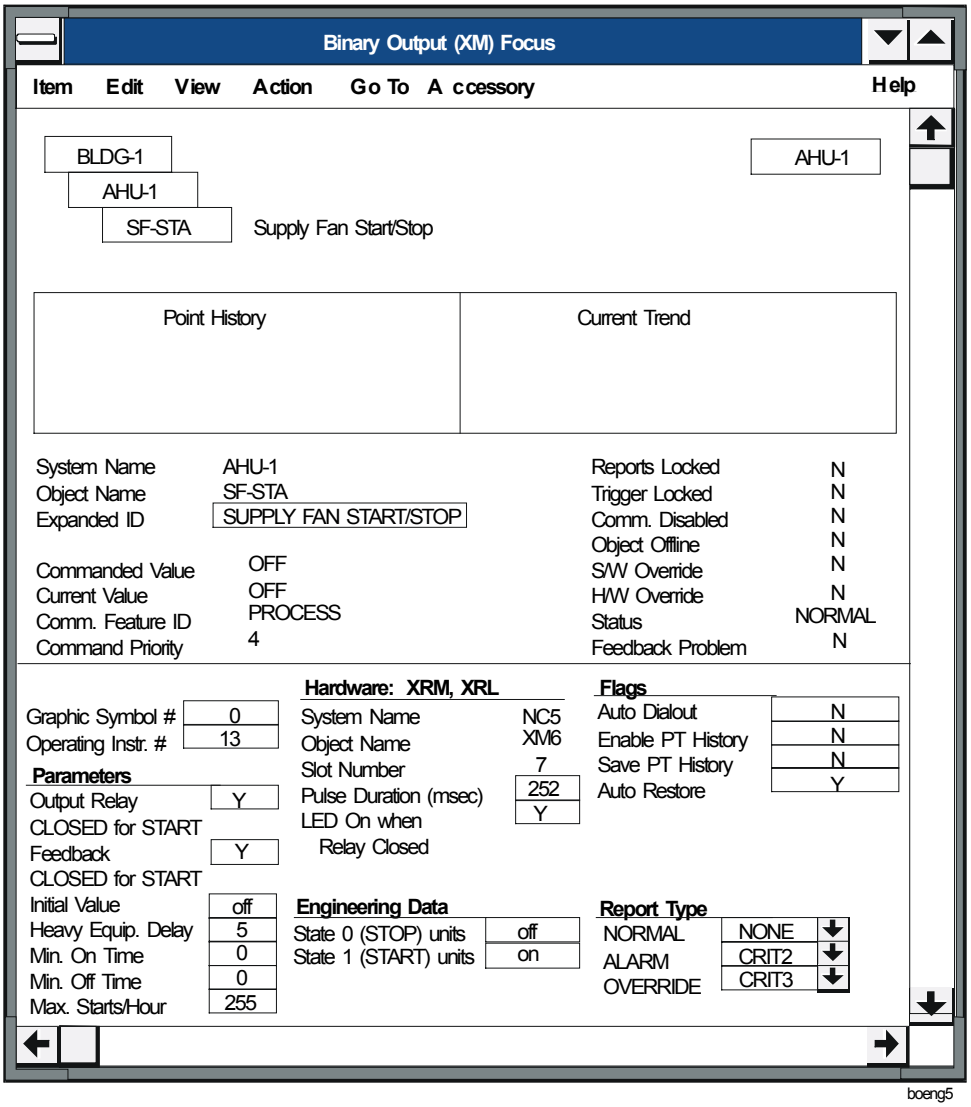

Figure 5: BO Focus Window Display

Feedback and Alarm Analysis

Figure 6 is a flow diagram of feedback and alarm analysis. The blocks represent software functions. The dashed boxes represent the attributes that define or control the functions.

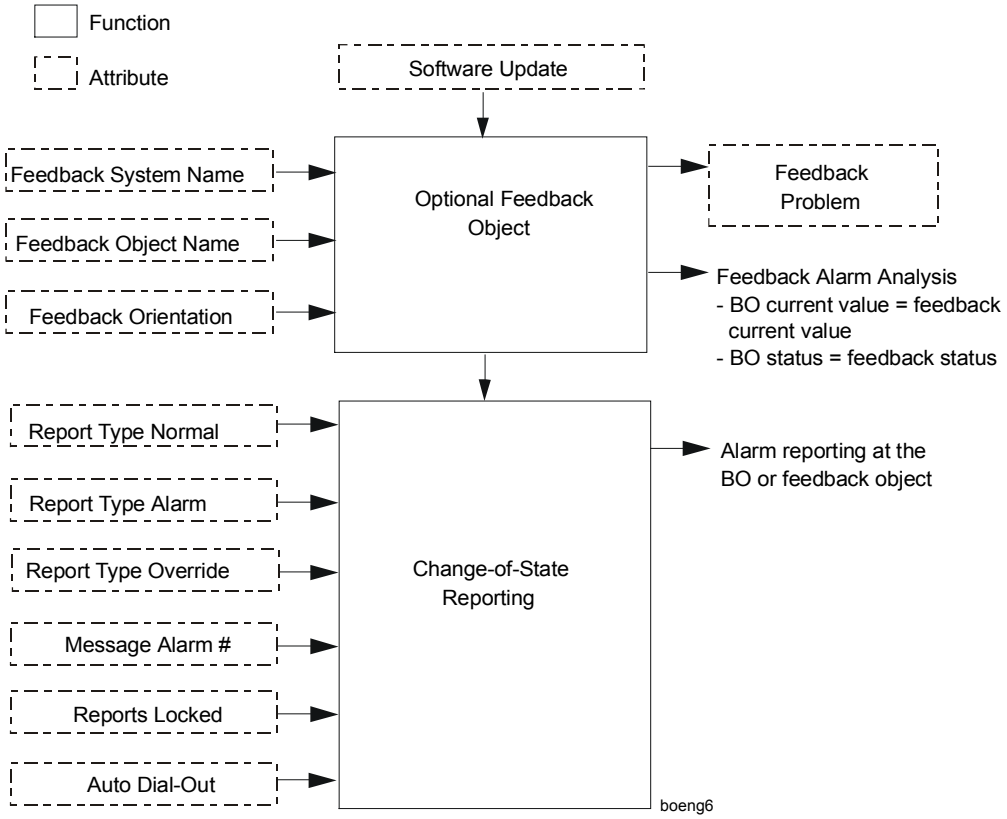

Figure 6: BO Feedback Alarm Analysis Functional Flow

Feedback Object

Binary Output objects do not perform alarm analysis. Their primary purpose is to command an output device, such as a supply fan, to an on or off state. If you want to monitor the fan for air flow, use a feedback object. For example, a Binary Input air flow switch can detect air flow in a duct after a supply fan starts. A Binary Data object works equally as well as a feedback object. A BD might be used if you want a control process to compare a number of inputs, and then send this comparison to the BO as one feedback value. You can assign feedback to a BO when defining the Binary Output object.

Attributes to Set for Feedback

Three attributes "link" the feedback object (BI or BD) with the BO:

- Feedback System Name
- Feedback Object Name
- Feedback Orientation (Closed for Start)

Feedback System Name is the system name, such as AHU1, where the BI or BD resides. Enter up to eight ASCII alphanumeric characters. There is no default setting.

Feedback Object Name is the BI or BD object name, such as AIR_FLOW. Enter up to eight ASCII alphanumeric characters. There is no default setting.

Feedback Orientation (Closed for Start) specifies whether the feedback contact is closed (Y) or open (N) when the BO is started. The default setting is Y.

The feedback object does not have to be defined for the same NCM as the BO. However, placing these objects in different NCMs will increase N1 traffic.

Feedback Alarm Analysis

As explained above, the binary output does not perform alarm analysis. Rather, alarm analysis occurs at the corresponding feedback object (BI or BD). The results of alarm analysis are then sent to the BO object. Figure 7 and the text after it describe how a feedback object performs alarm analysis on a BO.

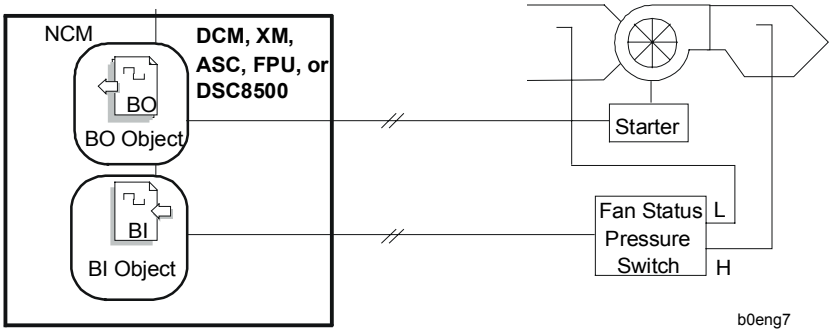

Figure 7: BI Used as Feedback for a BO

In Figure 7 there are two separate objects: a Binary Output (supply fan), and a Binary Input (air flow switch). Although these are two distinct objects, they work together to perform one function. The BO turns on the fan. The BI monitors air flow in the duct after the fan starts.

To use a BI as feedback for a BO:

1. When defining the BO, specify Feedback attributes. These attributes associate the BI air flow switch with the BO supply fan.
2. Command the Binary Output to Start the fan. When this happens, the BI receives a new Normal State value from the BO. The BO changes it to Closed (i.e., it is expected that the air flow switch will close when the fan is commanded to start).

   Note: If the normal contact condition of the feedback object cannot be modified by the BO (because the BI or BD is offline or

disabled), the Status attribute of the BO becomes unreliable. An attribute called *FBK_PROB* is set to signal that the feedback object is not operational, and a Y (yes) is displayed in the Feedback Problem field at the BO Focus window. This attribute will change to N (no) when the BI or BD object issues a report to the BO, stating that it is now reliable.

3. If an alarm delay timer is specified for the BI, the timer starts when the BO sets a new BI normal state. (If the timer wasn't started, the BI would immediately go into alarm).

   Note: If the BO is mapped to a N2OPEN or System 9100 device and the BO's Local Control attribute is set to yes, regardless of the commanding feature, the BI used as feedback will have its alarm delay activated in two situations: when the BI receives a new normal state from the BO, *and* when the BI changes state as a result of polling the hardware.

4. After the alarm delay "times out"--say, 15 seconds--the contact value of the BI is read by the software.

5. The BI performs alarm analysis on the contact value. If the contact is closed, air is flowing, and the BI status is considered normal. If the contact is open, air is not flowing, the BI goes into alarm, and the BO goes into alarm.

6. The results of BI alarm analysis are displayed in the BO Focus window. The Status field shows the normal or alarm condition of the BI air flow switch, while the Current Value field shows the actual BI contact value (e.g., On or Off).

Note: The BI feedback remains a distinct object. It can also be viewed at its own Focus window.

7. In addition, the BI status (alarm or normal) can be viewed as a BO change-of-state report.

COS Reporting

Change-of-State Reporting without Feedback

A detailed explanation of Change-of-State (COS) reporting is contained in the *Report Router/Alarm Management Technical Bulletin (LIT-636114).* A brief discussion of this topic follows.

If feedback isn't assigned to the binary output, the status of the BO is always considered normal. The BO does not generate status (alarm or normal) reports. However, it can send hardware and software override reports to operator devices.

Note: Operator devices include Operator Workstations, NCM printers, and Workstation printers.

- A software override report is sent when you've set the BO output value with the software Override command.

- A hardware override report is sent when you've set the BO output value with the Auto/Manual switch (DCM101, DCM140, XTM, and XM only).

Note: If no feedback device is assigned to the BO, value of the BO point listed on the System Summary screen is the same as the commanded value that is listed in the BO's focus window.

Change-of-State Reporting with Feedback

A feedback object, if assigned to the BO, can generate status (alarm or normal) reports for the binary output. For example, if an air flow switch doesn't detect air flow from a supply fan, the switch can send an alarm status back to the BO object. This can then be displayed as either a BO or BI/BD status report, depending on how you define the objects.

If you want the binary output to report the alarm status, set the BO's alarm reports to Crit1, Crit2, Crit3, Crit4, Follow-up, or Status; and set the BI/BD's alarm reports to None.

If you want the feedback object to send the alarm report, set the BI/BD's alarm reports to Crit1, Crit2, Crit3, Crit4, Follow-up, or Status; and set the BO's alarm report to None.

- An alarm report is sent when the feedback object's status changes to alarm.
- A normal report is sent when the feedback object's status changes to normal.

Notes: In the case of the DSC8500, the BOF LPT cannot be mapped as the feedback. Therefore, map the BI portion of the BOF (the CON LPT) to the BI that is associated with the BO that the BOF point is mapped to. Remember to enable reporting to the FMS for the CON LPT.

If a feedback device is associated to a BO object, the value of the BO point listed on the System Summary screen is the same as the current value that is listed on the associated Binary Input.

Attributes to Set for COS Reporting

Six attributes affect COS reporting:

- Report Type Normal
- Report Type Alarm
- Report Type Override
- Alarm Message #
- Reports Locked
- Auto Dial-out

Report Type Normal represents the COS report that's generated when the feedback status changes to normal. Acceptable entries for this attribute and the other report types are explained below.

Report Type Alarm represents the COS report that's generated when the feedback status changes to alarm.

Report Type Override represents the COS report that's generated when you've set the BO current contact value with the Override command Auto/Manual Switch.

For each of the three report types above you can specify one of the following:

- None (default setting)
- Crit1
- Crit2
- Crit3
- Crit4
- Follow-up
- Status

Your settings for Report type determine the priority and destination of change-of-state reports. Crit (critical) reports are displayed in dialog boxes (pop-up windows) at Operator Workstations and in Critical Summaries (with Crit1 having the highest priority). All COS reports may be sent to files at the Operator Workstation. These files may be viewed and printed. If you specify None, the COS will not generate a report. See the *Report Router/Alarm Management Technical Bulletin (LIT-636114)* for complete information on report priorities and destinations.

Alarm Message # is a user-defined reference number that identifies the particular text to be included with an alarm COS report. The text is displayed in the dialog box of a critical alarm report. Acceptable entries include 0-255. The default, 0, doesn't associate an alarm message with an alarm COS.

Reports Locked specifies whether or not (Y or N) the object sends COS reports to operator devices. You can stop and start reports using the Lock Reports and Unlock Reports commands. The Reports Locked attribute merely signifies which command is currently in effect.

Auto Dial-out specifies whether or not (Y or N) critical reports (Crit1-Crit4) force a dial-out to a remote Operator Workstation. Set this attribute to Y to enable Auto Dial-out, and N to disable Auto Dial-out. The default setting is N.

Triggers and History

Figure 8 is a flow diagram of BO control process triggering and historical data gathering/archiving. The blocks represent software functions. The dashed boxes represent the attributes that define or control the functions.

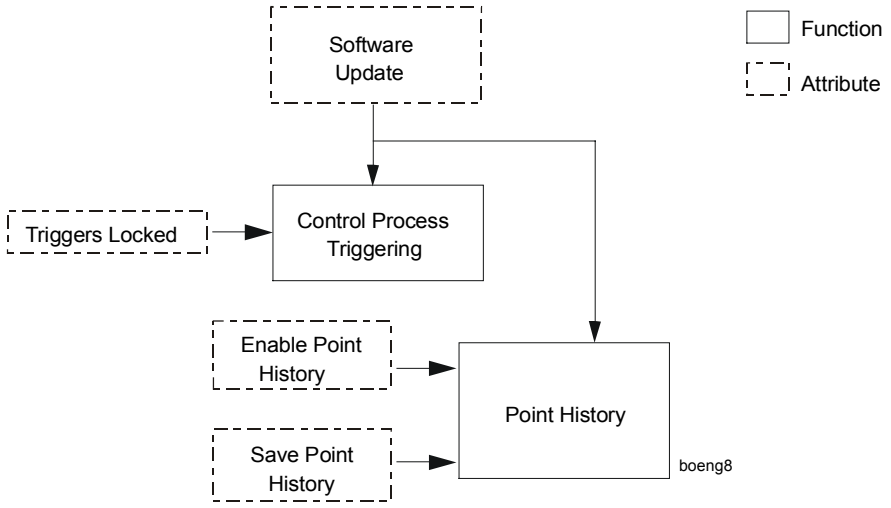

Figure 8: BO Triggers and History Functional Flow

Control Process Triggering

Certain attributes of the Binary Output object can trigger a control process. This means that when the value of a BO triggering attribute changes, the change can cause a control process to run.

BO Attributes that Trigger a Control Process

The following BO attributes can cause a control process to run:

- Current Commanded Value
- Feedback Value
- Offline
- DISCONCT (Disconnected)
- Status
- Normal Status
- Alarm Status
- H/W Override (Auto/Manual Switch)
- State 0
- State 1

Any of these attributes may be referenced within a control process. For example, when the commanded value of a supply fan changes to Start, this can trigger a control process to turn on the associated return and exhaust fans. For further information on triggers, refer to the *JC-BASIC Programmer's Manual (FAN 632)* or the *GPL Programmer's Manual (FAN 631)*.

Trigger Locked specifies whether or not (Y or N) the object can trigger a control process. Triggers can be stopped and started using the Lock Triggers and Unlock Triggers commands. The Trigger Locked attribute signifies which command is currently in effect.

Point History

The Point History feature samples, displays, and archives certain attributes associated with the BO object. Samples are temporarily stored in a point history record at the Network Control Module where the BO is defined. This record is automatically added when the object is added, and deleted when the object is deleted. The record is of a fixed size. It will hold the last ten history samples for a specific BO object. Once filled, the oldest data is replaced with the newest samples. Information in this record can be automatically saved to files at an Operator Workstation for long-term storage.

The following attribute samples are taken for a BO whenever one of these values changes. The time and date of each change is also saved.

- Commanded Value
- Command Feature
- Commanded Priority
- Status
- S/W Override
- H/W Override
- Offline
- Comm. Disabled

Attributes to Set for Point History

Two attributes affect Point History:

- Enable Point History
- Save Point History

Enable Point History: If you specify Y (yes) for this attribute, historical information is automatically collected at the NCM for this Binary Output object. This begins as soon as the object is defined. The default for this attribute is Y--enable point history. If N (no) is selected, samples are not gathered.

Save Point History: If you specify Y (yes) for this attribute, historical information for the BO is sent from the NCM to an archive file on an Operator Workstation (if a PC file is defined as a report destination). If No--the default--is selected, the information is only buffered at the NCM (and will be overwritten with new data when the file fills up).

Hardware Interface

The BO can map to the following hardware devices: DCM, DCM140, XM, N2OPEN (AHU, UNT, VAV, VMA, MIG, PHX, VND), System 9100 controllers (LCP, DX9100, DX91ECH, DC9100, DR9100, TC9100, XT9100, XTM), LONWORKS compatible devices (LONTCU, LONTCUA, LONVMA, LONVMAA), FPU, and DSC8500.

Note: LONWORKS compatible devices LONTCUA and LONVMAA apply to American sites only. All other sites use LONTCU and LONVMA. Refer to the *LONWORKS Compatible Devices Supported by NCM350 Technical Bulletin (LIT-6360195).*

Mapping means:

- The binary output device is connected to a specific place on a specific controller.
- This place is referenced in software so that the BO object knows where to: (1) receive input signals, and (2) issue output commands.

Figure 9 is a flow diagram of BO hardware interface. The blocks represent software functions. The dashed boxes represent the attributes that define or control the functions.

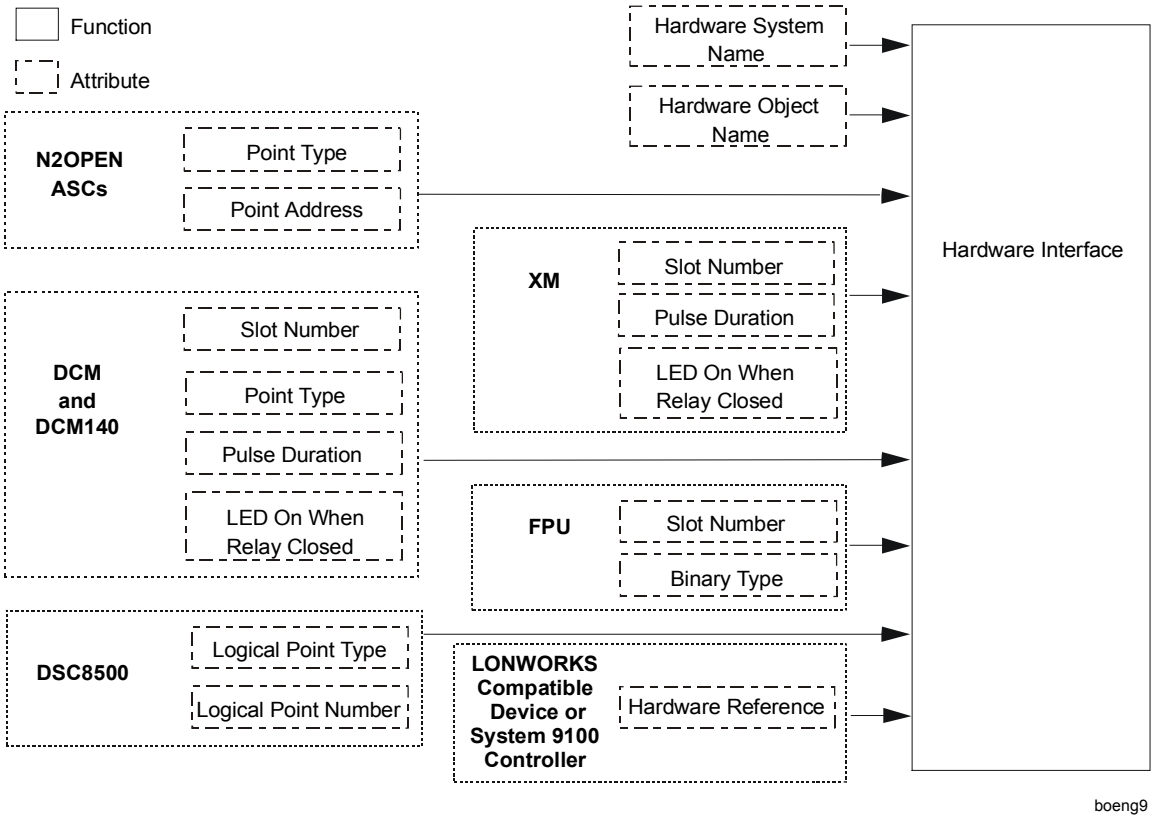

Figure 9: Binary Output Hardware Interface

This section explains the attributes you'll use to establish the hardware interface between the BO and the appropriate device.

The following two attributes, Hardware System and Hardware Object, are common to all devices:

Hardware System Name must be of an existing system, such as AHUWEST. It might represent the control panel or Network Control Module that's handling the BO.

Hardware Object Name is the name of the hardware device (e.g., the name of the XM, DCM, or N2OPEN ASC) that the object is mapped to. *This object must be already defined*. If it is not defined, define it before you define the BO.

The remaining hardware interface attributes depend on which type of device you specify for the Hardware Object. For example, if you specify a DCM, the Slot Number attribute is applicable. If you specify a DSC8500, Logical Point Type and Logical Point Number attributes are applicable.

Mapping to a DCM and DCM140

A BO maps to any one of the ten universal outputs on the Digital Control Module (DCM101 and DCM140).

Note: For the BO object, the DCM101 and DCM140 operate the same. In this section, "DCM" indicates both DCM101 and DCM140.

The DCM converts the binary command from the NCM to a 2-state output. The DCM then issues this output to the BO hardware.

An Output Function Module (FM) provides the interface between the binary output and DCM. See the *Control Modules* and *Function Modules* sections of this manual for additional DCM and FM information.

Attributes Linking the DCM and the BO Object

Besides the Hardware System and Object names, four attributes link the BO and the DCM:

- Point Type
- Slot Number
- Pulse Duration
- LED On When Relay Closed

Point Type identifies the type of contact. Enter *maintained* for an electrically maintained output (ORE and OSV Function Modules). Enter *latched* for a latched output (ORM and ORL Function Modules). The default is maintained.

Slot Number identifies the function module slot (1 through 10) where the BO device is connected. The BO is actually wired to a terminal on the terminal strips. This terminal is electrically connected to a specific FM slot. Enter a value from 1 to 10. The default is 1.

Pulse Duration indicates the length of time the output is pulsed for State 0 and State 1 commands (e.g., Start/Stop commands). Acceptable entries for the DCM include 20-5100 msec in multiples of 20 msec. The default setting for the DCM is 200 msec.

LED On When Relay Closed determines if the input LED (of the DCM) is on or off after a State 1 (e.g., Start) command is issued. Enter Y (yes) if you want the LED on when the State 1 command is issued. Enter N (no) if you want the LED off when the State 1 command is issued. The default setting is Y (yes).

Mapping to an XM

A BO maps to any of the following:

- XRM Point Multiplex Module (supports eight Momentary relays)
- XRL Point Multiplex Module (supports eight Magnetically Latched relays)
- XRE Point Multiplex Module (supports eight Electrically Maintained relays)

  Note: An XRE is defined as an XRL.

The Expansion Module (XMs) converts the binary command from an NCM to a 2-state output. The XM then issues this output to the BO hardware.

In general, BO devices connect directly to XMs without using Function Modules (FMs). For exceptions, and for hardware information, see the *Control Modules* and *Function Modules* sections of this manual.

Attributes Linking the BO and XM

Besides Hardware System and object names, three attributes link the BO and XM:

- Slot Number
- Pulse Duration
- LED On when Relay Closed

Slot Number represents the input address (terminal strip location) where the BO is connected. The XRL, XRE, and XRM have Slot Numbers 1-8. The default setting is 1.

Pulse Duration indicates the length of time the output is pulsed for State 0 and State 1 commands (e.g., Start/Stop commands). Acceptable entries for the XM are 12-3060 msec in multiples of 12 msec. The default setting for the XM is 252 msec. (Pulse Duration does not apply to a BO mapped to an XRE.)

LED On when Relay Closed determines if the input LED (of the XM) turns on or off after a State 1 (e.g., Start) command is issued. Y signifies that the LED will be on after a State 1 command is issued, and N signifies that the LED will be off after a State 1 command is issued. The default setting is Y.

Mapping to N2OPEN ASCs

BO objects can map to the following N2OPEN application specific controllers: AHU, UNT, VAV, VMA, MIG, PHX, and VND.

Attributes Linking the BO Object and the N2OPEN ASC

Besides the Hardware System and Object Names, three attributes link the BO object and the ASC:

- Point Type
- Point Address
- Local Control

Point Type identifies the type of point in the controller that the BO will be mapped to. It must be a Binary Output (BO) or Binary Data (BD) point.

Point Address specifies the address of the BO or BD point in the controller that the BO will map to. The range depends on the type of ASC the BO is mapped to:

	BO	**BD**
• AHU:	1 to 10	193 to 256
• UNT:	1 to 14	65 to 256
• VAV:	1 to 14	65 to 256
• VMA:	1 to 5	65 to 256
• MIG:	1 to 256	1 to 256
• PHX:	1 to 14	65 to 256
• VND:	1 to 256	1 to 256

IMPORTANT:	If you are mapping a CS object attribute and a standard object to the same hardware reference (the hardware reference is the combination of the point type and point address), make sure the Override and Adjust flags are set to No (False) for the CS object attribute. This is to ensure that there is only one command path to the hardware reference.

Local Control specifies whether or not the point the BO is mapped to is involved in local control in the N2OPEN ASC. Enter Yes if the point is involved in a local control strategy at the ASC, or enter No if it is not involved in local control. If Yes, make sure you enter None for Initial Value.

Mapping to a System 9100 Controller

BO objects can map to System 9100 application specific controllers (LCP, DX9100, DX91ECH, DC9100, DR9100, TC9100, XT9100, XTM).

Note: A BO can map to a System 9100 controller that is connected to a Fire or Access NCM200. However, a BO cannot map to a System 9100 controller connected to a Fire NCM101. A System 9100 NCM101 does not support the TC9100. The Echelon® Bus version of the DX controller (DX91ECH) must be connected to an NCM300 or NCM350.

Attributes Linking the BO Object and the System 9100 Controller

Besides the Hardware System and Object Names, the following attributes link the BO object and the System 9100 controller:

- Hardware Device Type
- Hardware Reference
- Local Control (not supported on XT9100 and XTM)

Hardware Device Type identifies the type of System 9100 controller the BO is mapped to. The options are LCP, DX9100, DX91ECH, DC9100, DR9100, TC9100, XT9100, and XTM.

Hardware Reference specifies the address of the point in the controller the BO is mapped to. The range depends on the System 9100 controller type.

Valid System 9100 **device types** and **hardware references** for BOs are:

- LCP/DC9100 DO3-8, STUP, SOFF, DCO1-4
- DX9100 DO3-8, STUP, SOFF, DCO1-32, XT1-8DO1-8
- DX91ECH DO3-8, STUP, SOFF, DCO1-32, XT1-8DO1-8
- DR9100 DO3-7, STUP, SOFF
- TC9100 DO1-7, STUP, SOFF
- XT9100 1DO1-8 and 2DO1-8
- XTM 1DO1-8 and 2DO1-8

IMPORTANT:	If you are mapping a CS object attribute and a standard object to the same hardware reference, make sure the Override and Adjust flags are set to No (False) for the CS object attribute. This is to ensure that there is only one command path to the hardware reference.

Local Control specifies whether or not the point the BO is mapped to is involved in local control in the System 9100 controller. Enter Yes if the point is involved in a local control strategy at the controller. Enter No if it is not involved in local control. If Yes, make sure you enter None for Initial Value.

Local Control is not supported on the XT9100 or XTM device. On the other System 9100 controllers, Local Control is supported only on the digital outputs, as listed below.

- LCP/DC9100 DO3-8
- DX9100 DO3-8
- DX91ECH DO3-8
- DR9100 DO3-7
- TC9100 DO1-7

Mapping to LCP Controllers

The following restriction applies to the standard and Lighting NCM101. All other NCM types support BO local control.

> **WARNING:** Do not direct map a BO object to an LCP digital output that is part of a control process in the LCP. BO objects mapped to LCPs do not support local control.

The consequences of mapping a BO to an LCP digital output that is also involved in a control sequence could cause costly damage to equipment for the following reason: if this BO is commanded by a feature or operator, you cannot release control of the BO/digital output back to the LCP because a Release command is not valid for a BO mapped to an LCP.

There are two ways to release the digital output:

1. Map a CS object attribute to the same digital output and send a release command to the CS object attribute.
2. Delete the BO and cycle power on the LCP.

Mapping to a LONWORKS Compatible Device

BO objects can map to a LONWORKS device.

Note: LONWORKS compatible devices must be connected to an NCM350 configured as a LONNCM.

Attributes Linking the BO Object and the LONWORKS Compatible Device

Besides the Hardware System and Object Names, two attributes link the BO object and the LONWORKS compatible device:

- Hardware Device Type
- Hardware Reference

Hardware Device Type identifies the type of LONWORKS compatible controller the BO is mapped to. At present, device types include LONTCU, LONTCUA, LONVMA, and LONVMAA.

Note: LONWORKS compatible devices LONTCUA and LONVMAA apply to American sites only. All other sites use LONTCU and LONVMA. Refer to the *LONWORKS Compatible Devices Supported by NCM350 Technical Bulletin (LIT-6360195)* for more information.

Hardware Reference specifies the address of the point in the controller the BO is mapped to. The range depends on the type of LONWORKS compatible device.

Valid LONWORKS compatible device hardware references are:

*xx*BO*xxx*, *xx*BP*xxx*, and *xx*BU*xxx* to *xx*BZ*xxx*

Note: The *x*s are placeholders for specific addressing numbers and characters; see the device's technical bulletin for details.

IMPORTANT:	If you are mapping a CS object attribute and a standard object to the same hardware reference, make sure the Override and Adjust flags are set to No (False) for the CS object attribute. This is to ensure that there is only one command path to the hardware reference.

Mapping to an FPU

BO objects can map to an FPU.

Attributes Linking the BO Object and the FPU

Besides the Hardware System and Object Names, two attributes link the BO and FPU:

- Slot Number
- Binary Type

Slot Number identifies the input address on the FPU where the field device is connected. The range is 1-16.

Binary Type specifies the type of contact in the FPU. The Binary Type can be SST101 or SST102.

Mapping to a DSC8500

BO objects can map to a DSC8500.

Note: When using CAL1 to define a DSC8500 point that *will* be mapped to a Metasys object, *enable* status reports to the FMS for the point. Conversely, if the point will *not* be mapped to a Metasys object, *disable* status reports to the FMS for the point. You'll find more information in the *CAL1 Language Technical Manual*.

Attributes Linking the BO Object and the DSC8500

Besides the Hardware System and Object Names, two attributes link the BO object and the DSC8500.

- Logical Point Type
- Logical Point Number

Logical Point Type identifies the type of point in the DSC8500 the BO will be mapped to. For the BO, the LPT can be MOM, MAN, BSP (5-7), BDP, and BOF.

Logical Point Number identifies the input address on the DSC8500 where the field device is connected. The range is 1-255.

Auto Restore

The Auto Restore function causes the BO to automatically revert back to its last commanded condition when:

- The NCM goes through a warm start. A warm start implies that the NCM lost power, kept its memory, and then restarted when power resumed.
- The BO goes back online. For example, the N2 Bus between the NEU and NCU may have been severed, causing the BO to go offline. After the bus is reinstated, the BO goes back online.

Note: If the BO has not received a command yet, and Initial Value is None, Auto Restore will have no effect.

Attributes to Set for Auto Restore

The Auto Restore attribute affects the Auto Restore function:

Auto Restore specifies whether or not (Y or N) the BO acts as an auto restore object. The default setting is Y.

Note: If the BO has not received a command yet, and Initial Value is None, Auto Restore will have no effect.

How Auto Restore Works

When a BO is defined as an auto restore object, the last command is reissued under the following conditions:

- If the auto restore operation is triggered by an NCM warm start, commands are not issued until after all weekly scheduled commands are updated via the Fast Clock feature. Refer to the *Scheduling Technical Bulletin* for further details.
- If mapping to a locally controlled output, a release will be sent to the BO if no command is present in the NCM for the BO.

IMPORTANT: For LONWORKS compatible devices, pay special attention to the configuration of the Auto Restore attribute. Consider that other devices or tools on the LONWORKS network may also be allowed to change the value of the referenced network variable, and that the Auto Restore feature may not be compatible with the overall control strategy for the device or the network. Auto Restore is required most often for input network parameters because the device will normally lose the last commanded value during a power failure. Configuration parameters (properties) that can be mapped to Metasys software are stored in EEPROM and will not be lost on power failure, and Auto Restore may be unnecessary and even undesirable. The implementation of Auto Restore is application specific for each LONWORKS network and device.

Unreliable and Communication Status

Unreliable Status

The BO may become "unreliable" due to an offline condition (communication break) or faulty hardware. When the BO object is unreliable, the H/W Override attribute also becomes unreliable.

Note: If a CAL1 download is performed after an NC download, BO without feedback shows a status of Unreliable until a command is sent to the BO.

If feedback is defined for the Binary Output object, the following BO attributes are considered unreliable when the feedback object is unreliable:

- Current Value
- Status
- Display ASCII Representation Value *
- Normal Status *
- Alarm Status *

* These attributes are "hidden." They do not appear as fields at the BO Object Focus window or NT display. However, you might use them in control process programming. Keep in mind that if these attributes become unreliable, they can affect the results of the control process. See Table 7 at the end of this document for additional information on these attributes.

You can determine if a BO is unreliable by looking at its focus window or any summary containing information about the object. If the HOA attribute is unreliable, the H/W Override field will display **????** (question marks) rather than a value. When feedback is unreliable, the BO Current Value and Status attributes will display **????** rather than a value in the BO Focus window and on summaries. Figure 10 shows a Focus window for a BO object that is offline and unreliable.

Communication Status

The Comm. Status field in the object focus window is used for both online/offline status and disconnect status. (Disconnect status applies to NDM applications only).

An object is considered offline when there is a communications break between the controller the object is mapped to and the NCM or NDM the controller is connected to. If an object is offline, `OFFLINE` will appear in the Comm. Status field of the object's focus window. Figure 10 shows a Focus window for a Binary Output object that is offline and unreliable. In addition, an offline object will appear in the Offline summary.

If it is an NDM application, and the remote NDM is disconnected from the local NDM, `DISCONCT` will appear in the Comm. Status field. If the NDMs are connected, either `ONLINE` or `OFFLINE` will appear in the field, depending on whether the controller the object is mapped to is online.

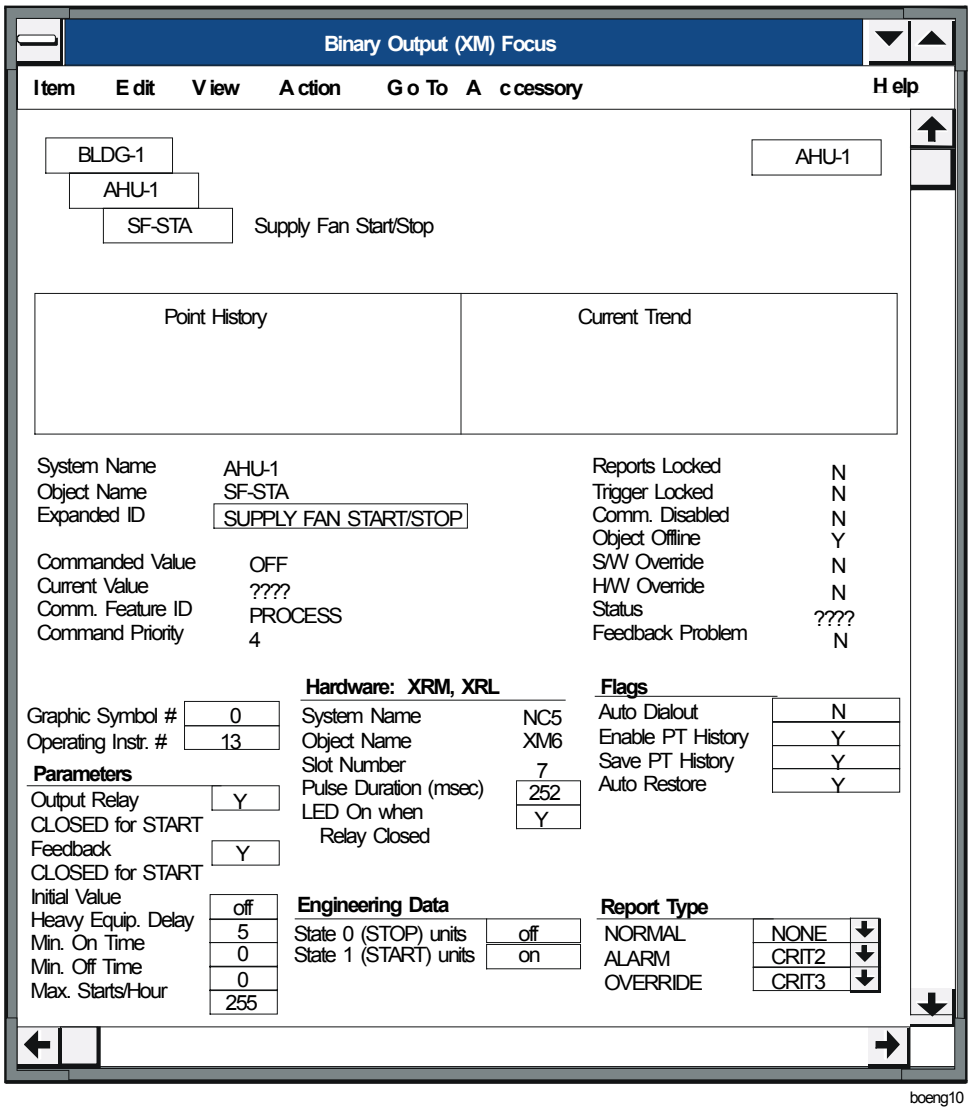

Figure 10: Offline BO with Unreliable Feedback

Reference Tables

BO Attribute Table

The following table lists the attributes of the Binary Output object. This page contains a description of terms used in the table.

S/W Name — Column Heading. (Software name) The name of each attribute as it is recognized by the Metasys software.

PMI Label — Column Heading. The name of each attribute field as it is appears in the Metasys windows and dialog boxes.

Description — Column Heading. A definition of each attribute.

Type/Range — Column Heading. The type of characters used and the definition limits for defining each attribute. (Integer has a set range of numbers that can be used. Boolean calls for either a 0 or a 1. String can be a mixture of numbers and text.

- String — ASCII alphanumeric characters, such as System/Object name
- Boolean — 0 or 1, with 0 and 1 representing “logical states,” such as true and false
- Integer — Whole numbers from -32767 to +32767, such as 22
- Floating point — Values that contain decimal points, such as 67.5

Code/Default Value — Column Heading. The default value for each attribute (in brackets) if a default value exists. The meaning of each value may also be given. The Code/Default Value column shows numbers and ASCII text. The numbers are used when defining the object in DDL, and the ASCII text is used when defining the object online or through GPL.

For example: 0 = N = unlatched
where:
0 is used in DDL
N is used in GPL and online

- [ ] — Default. The value in brackets appears in the attribute field when you first enter the Object Definition window. This remains the attribute value until you change it.

Usage — Column Heading. Lists possible uses for each attribute. The following eight items are uses listed within the Usage column:

- Definable — Means that you can set a value for the attribute, using Data Definition Language (DDL), Graphic Programming Language (GPL), or online Object Definition window.
- Writable — Means you can modify the attribute, using the Object Focus window or GPL Template.
- Object Default — A timesaving function used in JC-BASIC programming. Allows you to omit the attribute name when writing the logic. When omitted, the attribute name is assumed by the program.
- JC-B Writable — Means a JC-BASIC process can modify (write to) an attribute.
- Triggerable — Means the attribute can cause (trigger) a control process.
- Range Check — Means the software verifies that JC-BASIC has correctly written to (modified) the attribute.
- GPL Menu — Means the attribute is available in the GPL process Connection menu.
- PMI — Means the attribute value is shown in the Object Focus window.

Table 7: BO Attribute Table

Attribute		Description	Type/ Range	Code/ [Default Value]	Usage
Software Name	**PMI Label**				
ALARM	Alarm Status	Flag indicating whether or not (true or false) the status of the object is alarm. If true, the Object Focus window displays a status of Alarm. If false, the Focus window displays a status of Normal.	Boolean/ 0 or 1	0 = false 1 = true	GPL Menu, Triggerable
ALR_MSG	Alarm Message #	User-defined reference number that identifies the particular text to be included with an alarm COS report. The text is displayed in the dialog box of a critical alarm report.	integer/ 0 to 255	[0 = none]	JC-B Writable Definable, Range Check, Writable
ALR_RPT	Report Type Alarm	Type of COS report that is generated when the status changes to alarm.	integer/ 0 to 6	[0 = no report] 1 = critical 1 2 = critical 2 3 = critical 3 4 = critical 5 5 = followup 6 = status	JC-B Writable Definable, Range Check, Writable
CMD_ACTN	Output Relay Closed for Start	Flag indicating the action for the output relay at a State 1 command, e.g., Y (yes) = output relay contacts are closed for start.	Boolean/ 0 or 1	0 = Y = closed at start 1 = N = open at start	Definable, Writable
CMD_DISP	Commanded Value Display	The ASCII representation of the commanded value. Used for PMI display.	string/ 8 char. max.		PMI display
CMD_PRI	Command Priority	The priority level of the Commanded Feature. The Commanded Feature is responsible for the object's current value or Commanded Value.	integer/ 1 to 9	[8]	
CNTL_FEA	Controlling Feature	Name of the feature currently controlling the load, either Demand Limiting or Load Rolling. If neither, NONE is displayed.	Boolean/ 0 or 1	0 = Demand Limiting 1 = Load Rolling	PMI
COS_DEL	Feedback Alarm Delay Status	Flag indicating whether or not (Y or N) the alarm delay function is currently in use. Only applicable if a feedback object is defined for the BO.	Boolean/ 0 or 1	0 = n = inactive 1 = y = active	Triggerable
DIAL_UP	Auto Dial-out	Flag indicating whether or not (Y or N) critical reports (Crit1-Crit4) force a dial-up to a remote Operator Workstation.	Boolean/ 0 to 1	[0 = no] 1 = yes	JC-B Writable, Definable, Writable
Continued on next page . . .					

Attribute (Cont.)		Description	Type/ Range	Code/ [Default Value]	Usage
Software Name	PMI Label				
DISCONCT	Comm. Status	Flag indicating whether there is a communication break between the local NDM and the remote NDM polling the object. Applies only to NDM applications. The Comm. Status field in the object focus window is used for both disconnect status and online and offline status. If the remote NDM is disconnected from the local NDM, `DISCONCT` will appear in the field. If the NDMs are connected, either `ONLINE` or `OFFLINE` will appear in the field, depending on whether the controller the object is mapped to is online.	Boolean/ 0 or 1	0=connected 1=disconnected	GPL Menu, Triggerable
DISPLAY	ASCII Represen-tation Value	The object's Current or Commanded Value converted to ASCII text for PMI display (at the workstation or NT).	string/ 8 char. max.		PMI Display
DSC_LPN	Logical Point Number	DSC8500 only. The number from 1 to 255 of the LPT that maps to the BO. (For example, there are 255 possible MOM point types, and the system must know which of the 255 of the LPT is mapped to the BO.)	integer/ 1 to 255	[1]	Definable
DSC_LPT	Logical Point Type	DSC8500 only. The valid type of DSC8500 point. (Only some LPTs can be mapped to a BO.) For the BO, the valid LPT are: MOM, MAN, BSP (5-7), and BOF.	integer/ 0, 2, 11, 13, 15	0 = BSP 2 = BDP [11 = MOM] 13 = MAN 15 = BOF	Definable
EARLY_TM	Early Start Time	The earliest scheduled start time for this BO object.	time		GPL Menu
FB_ACTN	Feedback Closed for Start	Flag indicating what the normal state of the feedback object will be set to when the start command is issued, e.g., Y (yes) = output relay contacts are closed for start.	Boolean/ 0 or 1	0 = Y = closed at start 1 = N = open at start	Definable, Writable
FB_OBJECT	Feedback Object Name	Name of the object whose Normal State is mapped to the BO Feedback attribute.	string/ 8 char. max.		Definable
FBK_PROB	Feedback Problem	Flag indicating whether or not (Y or N) there is a problem (object offline or unreliable) with the Feedback Object.	Boolean/ 0 or 1	[0 = no] 1 = yes	
FB_SET	Feedback Assignment	Flag indicating whether or not (Y or N) the object controls the Normal State of another object, the feedback object.	Boolean/ 0 or 1	[0 = no] 1 = yes	

Continued on next page . . .

Attribute (Cont.)		Description	Type/ Range	Code/ [Default Value]	Usage
Software Name	**PMI Label**				
FEATURE	Commanded Feature	The source of the object's Current Value or Current Commanded Value. Sources are listed in the Code/Default column to the right. Initial = Initial Value attribute, and Shared = sampled attribute.	integer	1 = Operator 2 = Scheduling 3 = Process 4 = Demand 5 = Load Roll [6 = Initial] 8 = Override 17 = Local Control 18 = NONE 19 = Multiple Command Object	
FEEDBACK	Feedback Value	Current value of Binary Input feedback object.	Boolean/ 0 or 1	0 = open/state 0 1 = closed/state 1	Triggerable
GRAPHIC	Graphic Symbol #	Number of the graphic symbol used to represent the object in drawings. A value of 0 means no graphic will be displayed.	integer/ 0 to 32767	[0 = none]	JC-B Writable, Definable, Writable, Range Check
HE_DELAY	Heavy Equipment Delay	The delay time in seconds. After a start issued by this object, no other object on the same NCM with a Heavy Equip. Delay will issue a start during this delay period.	integer/ 0 to 255	n = delay in sec. [5]	JC-B Writable, Definable, Range Check, Writable
HISTORY	Enable PT History	Flag indicating whether or not (Y or N) historical information is automatically collected at the NCM for the object. This collection begins as soon as the object is defined.	Boolean/ 0 or 1	0 = no [1 = yes]	Definable, Writable
HOA	Hardware Override	Flag indicating whether or not (Y or N) a hardware switch has overridden object's commanded value.	Boolean/ 0 or 1	[0 = no/auto] 1 = yes/manual	GPL Manual, Triggerable
HR_PADDR	Hardware Reference: Point Address	N2OPEN ASC only. The number of the BO or BD point in the Application Specific Controller that the BO is mapped to.	integer/ 1 to 256	[1] BO AHU: 1 to 10 UNT/VAV: 1 to 8 VMA: 1 to 5 MIG/VND: 1 to 256 PHX: 1 to 14 BD: AHU: 193 to 256 UNT/VAV: 65 to 256 VMA: 65 to 256 MIG/VND: 1 to 256 PHX: 65 to 256	Definable

Continued on next page . . .

Attribute (Cont.)		Description	Type/ Range	Code/ [Default Value]	Usage
Software Name	**PMI Label**				
HR_PTYPE	Hardware Reference: Point Type	N2OPEN ASC only. The type of point in the Application Specific Controller the BO is mapped to. Must be a BO or BD point.	string	[BO]	Definable
HW_OBJCT	Hardware Object Name	Name of the device the BO object is mapped to. This object must be already defined.	string/ 8 char. max.		Definable
HW_SYSTEM	Hardware System Name	Name of the system containing the device the BO object is mapped to. This system must be already defined.	string/ 8 char. max.		Definable
INITIAL	Initial Value	A Commanded Value with a Priority 8. Initial Value provides a command source when no other sources are present.	integer 0-2	[0 = none] 1 = state 0 = stop 2 = state 1 = start	Definable, Writable
INSTRUCT	Operating Instruction #	Number of the operating instruction used to explain the object. A value of 0 means no instruction will be displayed.	Integer/ 0 to 32767	[0 = none]	JC-B Writable, Definable, Writable, Range Check
LATE_TM	Latest Stop Time	The latest scheduled stop time for the BO object.	time		GPL Menu
LED_STAT	LED On when Relay Closed	DCM, DCM140, XM only. Flag indicating whether or not the input LED is on (y) or off (n) when the input relay is closed. Does not apply when the object is connected to an IBN Function Module. (The IBN has its own two LEDs.)	integer/ 0 to 1	0 = n = open contract [1 = y = closed contract]	Definable, Writable
LMIN_OFF	Minimum Shed Time	Time period, in minutes, that this load will be off, once it is shed by Demand Limiting. Minimum Shed Time is used only if it is required by Comfort Override.	integer/ 0 to 255	n = time in min. [0]	JC-B Writable, Definable, Writable
LMIN_ON	Minimum Release Time	Time period, in minutes, that this load will be left released by Demand Limiting, once it has been restored.	integer/ 0 to 255	n = time in min [1]	JC-B Writable, Definable, Writable
LOAD_PRI	Load Priority	The Load Priority is the priority (1 to 4) with which the load is to be shed. Shed candidates for Load Rolling must be Priority 3. Shed candidates for Demand Limiting can be any priority from 1 to 4.	integer/ 1 to 4	1 = highest priority; these loads shed only as last resort to meet DL target. 4 = lowest priority; these loads shed first by DL.	Definable

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Attribute (Cont.)		Description	Type/ Range	Code/ [Default Value]	
Software Name	PMI Label				
LOC_CNTL	N.A.	Flag indicating whether the BO is currently controlled by the hardware.	Boolean/ 0 or 1		Triggerable
LOC_ELIG	Local Control	Flag indicating whether or not (Y or N) the BO is defined as locally controlled by the ASC.	Boolean/ 0 or 1	[0 = No] 1 = Yes	Definable
LOCK	Load Locked	Flag indicating whether or not (Y or N) the load controlled by the object is temporarily inhibited from being a Demand Limiting shed candidate.	Boolean/ 0 or 1	[0 = unlock] 1 = lock	Definable
LSTATUS	Load Status	Flag indicating whether the load controlled by this object is currently shed (under Demand Limiting feature), or released.	Boolean/ 0 or 1	0 = released 1 = shed	
MAX_OFF	Maximum Shed Time	The time period, in minutes, that this load will normally be off, once it is shed by Demand Limiting. An alternate setting, Minimum Shed Time is used only if required by Comfort Override.	Integer/ 1 to 255	n = time in min [60]	JC-B Writable, Definable, Writable
MAX_STA	Maximum Starts/Hour	The maximum number of State 1 commands that this object can issue in any hour. The count is reset every hour. A value of 0 means unlimited starts per hour.	Integer/ 0 to 255	[255]	JC-B Writable, Definable, Writable
MIN_OFF	Minimum Off Time	The time period, in seconds, that this object must stay off, once it is turned off. This period protects the load from damaging short cycle commands.	integer/ 1 to 255	0 = no minimum n = time in sec. [0]	JC-B Writable, Definable, Range Check, Writable
MIN_ON	Minimum On Time	The time period, in seconds, that this object must stay on, once it is turned on. This period protects the load from damaging short cycle commands.	integer/ 1 to 255	0 = no minimum n = time in sec. [1]	JC-B Writable, Definable, Range Check, Writable
NAME	Expanded ID	Optional expanded version of the object's name that helps to further identify the object. For example, AHU Temperature Control for AHUTEMP. It appears in the Focus window, GPL template, and summaries.	string/ 24 char. max.		Definable, Writable
NORMAL	Normal Status	Flag indicating whether or not (true or false) the status of the object is normal. If true, the object's Focus window displays a status of Normal.	Boolean/ 0 or 1	0 = false 1 = true	GPL Menu, Triggerable

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Attribute (Cont.)		Description	Type/ Range	Code/ [Default Value]	Usage
Software Name	**PMI Label**				
NOR_RPT	Report Type Normal	The type of COS report that is generated when the status of the object changes to Normal.	integer/ 0 to 6	[0 = no report] 1 = critical 1 2 = critical 2 3 = critical 3 4 = critical 5 5 = followup 6 = status	JC-B Writable, Definable, Range Check, Writable
OBJECT	Object Name	Name of the object, such as AHU-1. This name must be unique in the system.	string/ 8 char. max.		Definable
OFFLINE	Comm. Status	Specifies whether the object is offline or online. An object is considered offline when there is a communications break between the controller the object is mapped to and the NCM or NDM the controller is connected to. The Comm. Status field in the object focus window is used for both disconnect status and online and offline status. If the local and remote NDMs are disconnected, `DISCONCT` will appear in the field. If the NDMs are connected, either `ONLINE` or `OFFLINE` will appear in the field, depending on whether the controller the object is mapped to is online.	Boolean/ 0 or 1	0=online 1=offline	GPL Menu, Triggerable
OVERRIDE	Software Override	Flag indicating whether or not (Y or N) the object is currently overridden.	Boolean/ 0 or 1	[0 = no/auto] 1 = yes/manual	
OV_OBJCT	Comfort Override Object Name	The name of the object whose COS status can cause the Demand Limiting feature to release this load at the Minimum Shed Time.	string/ 8 char. max.		Definable
OVR_RPT	Report Type Override	Type of report that will be generated when the BO object first goes into an overridden state, or when the object is released from an overridden state with the Auto command.	integer	[0 = none] 1 = crit1 2 = crit2 3 = crit3 4 = crit4 5 = followup 6 = status	JC-B Writable, Writable, Definable, Range Check
OV_SYSTM	Comfort Override System Name	The name of the system containing the Comfort Override Object used by the Demand Limiting feature.	string/ 8 char. max.		Definable

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Attribute (Cont.)		Description	Type/ Range	Code/ [Default Value]	Usage
Software Name	**PMI Label**				
PREFIX	"*" Condition	NT only. Flag indicating whether the object is offline, overridden, trigger locked, report locked, disabled, or has a feedback problem. The * appears before the BO object name.	Boolean/ 0 or 1	[0 = no] 1 = yes	PMI
PT_TYPE	Point Type	DCM, DCM140, XM only. The kind of input required or output provided by the associated field device.	integer/ 0 to 2	[0 = maintained] 1 = latched	Definable
PULSE	Pulse Duration	DCM, DCM140, XM only. The length of time, in 12 or 20 msec increments, that the output to a latching field device will be pulsed for State 0 and State 1 commands. DCM, DCM140: uses 20 msec increments (20 to 5100). XM: uses 12 msec increments (12 to 3060).	integer/ DCM, DCM140: 20 to 5100 XM: 12 to 3600	DCM, DCM140: nx20 = time in msec. [10 = 200 msec.] XM: nx12 = time in msec. [21 = 252 msec.]	Definable, Writable
RATE	Load Rating	The savings realized when the load controlled by this object is shed by the Demand Limiting feature.	float pt.		Definable
REL_LEFT	Release Time Left	Used by the DL/LR feature to count down the time until shedding is allowed.	integer/ 0 to 255		
REPORT	Reports Locked	Flag indicating whether or not (Y or N) the object sends COS reports to operator devices. Use the Lock and Unlock Reports commands to start and stop report sending for the object. The Report attribute merely signifies which command is in effect.	Boolean/ 0 or 1	[0 = n = not locked] 1 = y = locked	
RESTORE	Auto Restore	Flag indicating whether or not (Y or N) an object will revert to its last commanded condition when communication is resumed (after a failure), or when the NCM is restarted.	Boolean/ 0 or 1	0 = no [1 = yes]	JC-B Writable, Definable, Writable
SAVE_HIS	Save Point History	Flag indicating whether or not (Y or N) historical information for the object is automatically sent from the NCM to an archive file on an Operator Workstation. If N is selected, the information is only buffered at the NCM and will be overwritten with new data when the buffer is full.	Boolean	[0 = no] 1 = yes	Definable, Writable

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Attribute (Cont.)		Description	Type/ Range	Code/ [Default Value]	Usage
Software Name	**PMI Label**				
SB_SYSTM	Feedback System Name	Name of the system containing the feedback object.	string/ 8 char. max.		Definable
SCAN	Comm Disabled	Flag indicating whether (Y or N) communications are disabled between the object and its controller. When the object is disabled, it cannot trigger processes, send COS reports to operator devices, or accept any commands (except Enable). Use Comm Enable and Comm Disable commands to start and stop communications. The Scan attribute merely signifies which is in effect.	Boolean/ 0 or 1	[0 = n = enabled] 1 = y = disabled	Definable
SEQUENCE	Hardware Reference	System 9100 controller and LONWORKS compatible device. The type and number of the point in the System 9100 controller. The hardware reference is changed internally into a sequence number, which specifies the point in the controller the BO is mapped to.	string/ 7 char. max.		
SHD_LEFT	Shed Time Left	Used by the DL/LR feature to count down the time until the load will be released.	integer/ 0 to 255		
SLOT	Slot #	• For the DCM, DCM140, and XM, the Function Module slot where the field device is connected. Note: Electronic field devices are actually wired to terminal blocks (TBFs), which are electrically connected to a specific FM slot. • For the FPU, input address where SST card is physically located in the FPU.	integer/ DCM DCM140: 1 to 10 XRL/XRE and XRM: 1 to 8 FPU: 1 to 16	DCM, DCM140: n = FM slot # [1] XRL/XRE, and XRM: n = FM slot # [1] FPU: n = slot #	Definable
SST_TYPE	Binary Type	FPU only. The type of start/stop card that exists physically in the FPU.	integer/ 3 or 4	[3 = SST101] 4 = SST102	Definable
Continued on next page . . .					

Attribute (Cont.)		Description	Type/ Range	Code/ [Default Value]	Usage
Software Name	**PMI Label**				
STATDISP	Status Prefix	Prefix specifying the current status of the object e.g., offline, overridden, trigger locked, report locked, disabled, or feedback problem. The prefix appears before the object name in summaries. No prefix indicates normal status.	integer/ 0 to 17	[0=blank, normal] 2=RPT, reports locked 3=TRG, triggers locked 9=ALM, alarm 10=SWO,s/w override 11=HWO, h/w override 12=XT, XT bus error 13=DIS, comm disabled 15=UNR, unreliable 16=OFF, offline 17=DCT, disconnect	PMI, Triggerable
STATE_0	Current Command State 0	Flag indicating whether or not (true or false) the object is commanded to State 0.	Boolean/ 0 or 1	0 = false [1 = true]	Triggerable
STATE_1	Current Command State 1	Flag indicating whether or not (true or false) the object is commanded to State 1.	Boolean/ 0 or 1	[0 = false] 1 = true	Triggerable
STATUS	Status	The result of alarm analysis.	integer/ 0 to 6	0 = normal 2 = alarm	Triggerable
SYSTEM	System Name	System in which the object belongs. The system must already exist in the network.	string/ 8 char. max.	When you are defining an object, the PMI defaults to the current system.	Definable
TRIGGER	Triggers Locked	Flag indicating whether (Y or N) triggers are currently locked for the CS object. When triggers are locked, the offline state of the CS object, and its binary attributes cannot trigger control processes. Use the Lock and Unlock Triggers commands to start and stop triggers. The triggers attribute merely indicates which command is in effect.	Boolean/ 0 or 1	[0 = n = unlocked] 1 = y = locked	
UNIT_0	Status Units State 0	ASCII alphanumeric characters that represent the open contact condition. For example, Off or Stop.	string/ 6 char. max.	[OFF]	Definable, Writable

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Attribute (Cont.)		Description	Type/ Range	Code/ [Default Value]	Usage
Software Name	**PMI Label**				
UNIT_1	Status Units State 1	ASCII alphanumeric characters that represent the closed contact condition. For example, On or Start.	string/ 6 char. max.	[ON]	Definable, Writable
VALUE	Current Value	The current value of the hardware. This value is displayed at the Operator Workstation in Object Focus windows and object summaries, and on the NT screen. For example, the Current Value field could display On, Off, Open, or Closed.	Boolean/ 0 or 1	0 = state 0/ open 1 = state 1/ closed	Object Default, GPL Menu, Triggerable

BO Command Table

Commands to the BO object are placed in the priority table but not executed when the object is offline or when communications are disabled. Offline means there is a physical communication break between the BO and its associated controller. Disabled communications means an operator suppressed communications, using the Disable command.

Offline: All commands are accepted and placed in the priority table. When the object comes back online, if Auto Restore is defined for the object, the stored commands are issued.

Disabled: If the object is disabled, only the Enable command is allowed.

Table 8: BO Command Table

Command		Description	Parameters	Source		
Software Name	**PMI Label**			**Process/ MC [Priority]**	**PMI [Priority]**	**Feature [Priority]**
AUTO	Auto	Releases the Override command, allowing the next lowest priority command to take control of the object. Auto is an abbreviation for automatic mode of operation.	None	N.A.	OWS [3] NT [3]	N.A.
DISABLE	Comm. Disable	Stops the object from triggering control processes, sending COS reports, and accepting commands (except Enable).	None	N.A.	OWS NT	N.A.
Continued on next page . . .						

Command (Cont.)		Description	Parameters	Source		
Software Name	**PMI Label**			**Process/ MC [Priority]**	**PMI [Priority]**	**Feature [Priority]**
ENABLE	Comm. Enable	Allows the object to trigger control processes, send COS reports, and accept commands.	None	N.A.	OWS NT	N.A.
LOC_REP	Lock Reports	Stops the object from sending COS reports to operator devices. The override conditions of the attributes are 'saved' and checked when reports are unlocked to determine whether a COS report should be sent.	None	GPL JC-BASIC MC	OWS	Scheduling
LOC_TRIG	Lock Triggers	Prevents the object's triggerable attributes from triggering control processes.	None	GPL JC-BASIC MC	OWS	Scheduling
OVERRIDE	Override	Lets the operator replace the current value of the object with a user-defined value. This is a manual command, only available to operators at the workstation or NT.	Value	N.A.	OWS [3] NT [3]	N.A.
REL_ALL	Release All	Releases any Priority 3-7 commands contained in the object priority table. Moves current highest priority command into Priority 8.	None	N.A.	OWS [8]	N.A.
REL_PRI	Release Priority	Releases a command from the object command priority table. The command that is released is based on the priority level specified in the control process. For example, if Release Priority is issued at Priority 7, it will release a Scheduling feature command. This allows lower priority commands to take control.	Priorities	GPL, JC-BASIC, MC [2, and 4 to 7]	N.A.	Scheduling [7]
Continued on next page . . .						

Command (Cont.)		Description	Parameters	Source		
Software Name	PMI Label			Process/ MC [Priority]	PMI [Priority]	Feature [Priority]
RESTORE	Restore	Releases (deletes) a command from the object priority table (similar to the REL_PRI command). • Issued from Demand Limiting (DL), releases either Priority 5 shed command or Priority 5 control process command. • Issued from Load Rolling (LR), releases either Priority 6 shed command or Priority 6 control process command.	None	N.A.	N.A.	DL [5] LR [6]
SET_BO	State 0/ State 1	Sets the current value of the BO to the state corresponding to the user-defined units, such as On or Off. When issued from the PMI, Priorities 4 to 7 are released and the command is issued at Priority 8.	State 0 State Eng. Units Priority (C.P. only)	GPL, JC-BASIC, MC [2, and 4 TO 7]	OWS [8] NT [8]	Scheduling [7]
SHED	Shed	Acts like a State 0 (stop) command. Shed is issued by Demand Limiting (DL) and Load Rolling (LR) features to shed loads.	None	N.A.	N.A.	DL [5] LR [6]
UNL_REP	Unlock Reports	Allows the object to send COS reports to operator devices. The current states of the unlocked attributes are compared to the states when reports were locked to see if a COS report should be sent.	None	GPL JC-BASIC MC	OWS	Scheduling
UNL_TRIG	Unlock Triggers	Allows the triggerable attributes of the object to trigger control processes. Unlocking triggers will cause all triggerable attributes to report.	None	GPL JC-BASIC MC	OWS	Scheduling

Notes

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