800xA for DCI

Operation

System Version 5.1

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ABB

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About This Book

General

This instruction describes the operational steps related to 800xA for DCI.

Document Conventions

Microsoft Windows conventions are normally used for the standard presentation of material when entering text, key sequences, prompts, messages, menu items, screen elements, etc.

Warning, Caution, Information, and Tip Icons

This publication includes **Warning**, **Caution**, and **Information** where appropriate to point out safety related or other important information. It also includes **Tip** to point out useful hints to the reader. The corresponding symbols should be interpreted as follows:

Electrical warning icon indicates the presence of a hazard which could result in *electrical shock.*

Warning icon indicates the presence of a hazard which could result in *personal injury.*

Caution icon indicates important information or warning related to the concept discussed in the text. It might indicate the presence of a hazard which could result in *corruption of software or damage to equipment/property.*

Information icon alerts the reader to pertinent facts and conditions.

Tip icon indicates advice on, for example, how to design your project or how to use a certain function

Although **Warning** hazards are related to personal injury, and **Caution** hazards are associated with equipment or property damage, it should be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process performance leading to personal injury or death. Therefore, **fully comply** with all **Warning** and **Caution** notices.

Terminology

A complete and comprehensive list of Terms is included in *System 800xA System Guide Functional Description (3BSE038018*)*. The listing includes terms and definitions that apply to the 800xA System where the usage is different from commonly accepted industry standard definitions and definitions given in standard dictionaries such as Webster's Dictionary of Computer Terms. Terms that uniquely apply to this instruction are listed in the following table.

Term/Acronym	Description
CCL	Controlware™ Command Language – Used to create Controlware phase logic executed by the DCU.
Composer™ CTK	CTK - Configuration Tool Kit.
Conductor	Refers to Symphony™ console applications such as Conductor NT or Conductor UX products. They interface to multiple ABB systems.
Controlware	Symphony/DCI based control logic utilizing softwiring between function modules.
DCU	Distributed Control Unit (Harmony DCI Controller).
GDBA	Global Database Access (Harmony DCI).
HDCU	Harmony Distributed Control Unit (Harmony DCI Controller).

Related Documentation

A complete list of all documents applicable to the 800xA System is provided in *System 800xA Released User Documents (3BUA000263*)*. This document lists

applicable Release Notes and User Instructions. It is provided in PDF format and is included on the Release Notes/Documentation media provided with the system. *System 800xA Released User Documents (3BUA000263*)* is updated with each release and a new file is provided that contains all user documents applicable for that release with their applicable document number. Whenever a reference to a specific instruction is made, the instruction number is included in the reference.

Section 1 Introduction

Product Overview

The 800xA for DCI software product provides connectivity between the Harmony Distributed Control Unit (HDCU) controllers and the 800xA System. The Connectivity is accomplished through a pair of OPC® Data Access and Alarm & Event Servers. 800xA for DCI communicates with the Harmony DCU controllers on the DCI Control Network (CNet). Redundant communication can be provided through the ECC MUX software. Single network communication can be provided via a third-party Ethernet NIC card. 800xA for DCI also includes DCI-specific PG2 and VB6 Faceplates and graphical elements, and an interface for Harmony DCUs to 800xA Batch.

This instruction describes the operational steps related to 800xA for DCI. 800xA for DCI communicates with the HDCU controllers through third party Ethernet controllers. ECC MUX software may be used with third party Ethernet controllers to provide redundant control network connections to the HDCU controllers.

Functional Description

800xA for DCI provides a pair of OPC® Servers to transfer data between Harmony DCUs and System 800xA. The Data Access (DA) Server provides the ability to write and read data to/from the Harmony DCU. The Alarm & Event server provides access to alarm and event data from the Harmony DCUs. The 800xA for DCI Connectivity Server connects to both the DCI Control Network (CNet) and the 800xA network to transfer the data.

The 800xA for DCI package also includes DCI-specific PG2 and VB6 Faceplates and graphical elements, and an interface for Harmony DCUs to 800xA Batch.

800xA for DCI Connectivity Servers can be made redundant for increase reliability and availability.

Together these features facilitate the evolution of DCI System Six systems to System 800xA.

Section 2 Faceplates

Introduction

DCI faceplates are available as aspects of each DCI module type.

Overview

Each module faceplate has a basic faceplate. Reduced and extended faceplates are optional. Refer to the faceplate types that are listed in Table 1 to determine each supported DCI module type faceplate.

Table 1. Faceplate Types

Module Type	Reduced	Basic	Extended	Module Type	Reduced	Basic	Extended
ANI	•	•	•	PTB	—	•	—
ANO	•	•	—	CCM	—	•	•
DI	—	•	—	PMAP	—	•	—
DO	—	•	—	PBUS	—	•	•
CON	•	•	•	PSLV	—	•	—
TMR	•	•	•	AIO	•	•	•
CAL	•	•	•	AIOB	—	•	—
TOT	•	•	•	DIOB	—	•	—
DCD	•	•	•	XCON	•	•	•
BLM	—	•	•	XMSG	—	•	—
PAR	—	•	—	CIO	—	•	—
PHS	—	•	—	PTP	—	•	—

Table 1. Faceplate Types (Continued)

Module Type	Reduced	Basic	Extended	Module Type	Reduced	Basic	Extended
XFER	—	•	•	PSB	—	•	•
SEQ	•	•	•	DOB	—	•	—
DEV	—	•	—	DIB	—	•	—
DTM	—	•	—	IOB	—	•	—
SEC	—	•	—	MSET	—	•	—
PDEV	—	•	—	MSG	—	•	—
DCU	—	•	—	MSEQ	•	•	•
FBLK	—	•	•	REC	—	•	•
MSDC	•	•	•	SIM	—	•	•
PSDM	—	•	—	STAT	—	•	•
PSEC	—	•	—				

Figure 1 shows an example of the reduced, basic, and extended faceplate types.
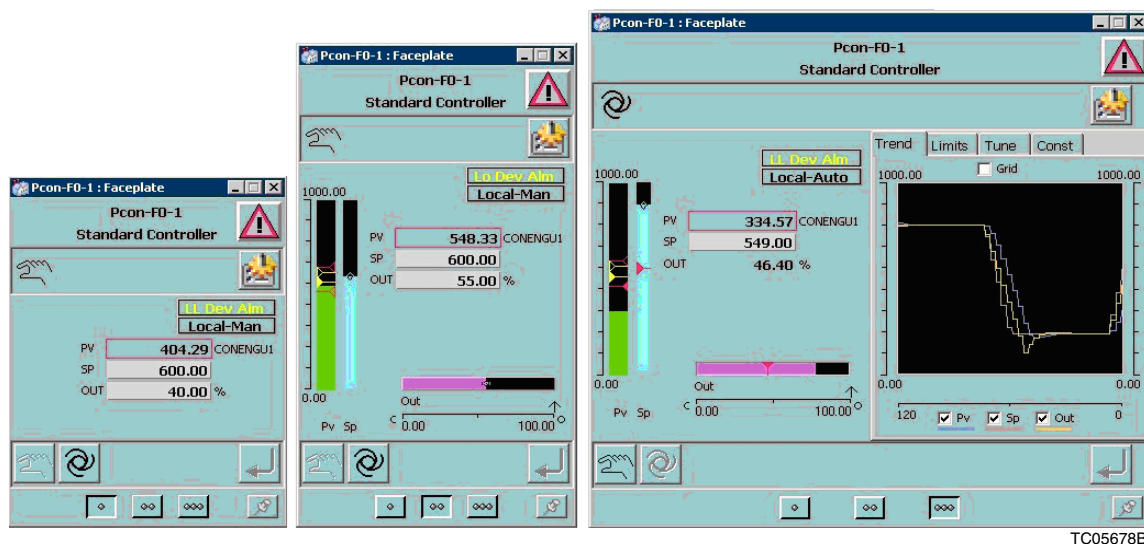

TC05678B

Figure 1. Faceplate Types

Extended Faceplate Displays

When provided, Extended faceplates provide the same level of information as Conductor Point Displays. Sequence functions require the ability to link multiple tags into a single extended faceplate display in order to display messages, CCL logic, and allow operator interaction with the sequence.

Expanded faceplates can include trend elements, displaying the trace of the process value or state for the current time during the previous four minutes of operation.

Function

DCI data is supplied to each faceplate for each DCI module type and its atoms. This data is used to populate all of the faceplates dynamic controls. The user has control over each faceplate, including acknowledging alarms, setting auto/manual mode and changing set points. The user can change the value or state of a DCU tag property that is controllable through the faceplate.

Attributes

The faceplate functions depend on the tag type. However, all faceplates have four common sections (Figure 2). These sections are as follows:
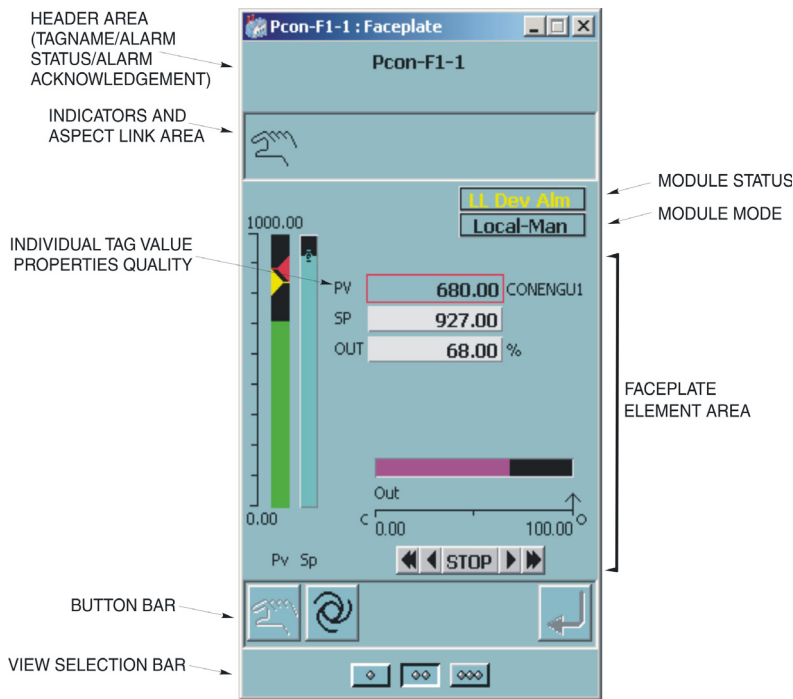
•   Header area.
•   Indicators and Aspect Links area.
•   Faceplate Element area.
•   Button area.

All faceplates have these additional functions in common:

•   Alarm status.
•   Overall OPC Tag Quality.

Some faceplates have these additional functions in common:

•   OPC Quality of Individual Tag Properties.
•   Digital Logic State Control.
•   Direct Entry Window (DEW) Control.

Figure 2. Common Faceplate Attributes

Header Area

The header of the faceplate contains the Tag name. It also contains the state of the module; locked or unlocked.

The alarm state appears on the right side of the Header bar. This is used for both displaying and acknowledging the current tags alarm state. The legend also appears in the header of the faceplate. Up to 32 characters is supported. Up to 48 characters is supported for extended faceplates.

Alarm State and Alarm Indication

All DCI faceplates include an alarm state on the right hand side of the header. This functions as the alarm indicator for the current tag. It also serves as a button, which

the user can select to acknowledge the tags overall alarm status. It is raised and enabled as a button only when there is an unacknowledged alarm or an unacknowledged return-to-normal. Otherwise, the alarm state appears flat within the header.

For each DCI tag, the alarm state indicates and displays one of six possible alarm states as shown in Table 2.

Table 2. Alarm Symbols and States

Alarm Symbol	Alarm State
	Overall alarm status of tag is normal and all previous alarm conditions have been acknowledged.
	Overall alarm status of tag is active. Alarm has been acknowledged.
	Overall alarm status of tag is normal. The previous alarm state has not been acknowledged. The button is raised to allow acknowledgement from operator.
	Overall alarm status is active. The alarm state has not been acknowledged. The button is raised to allow acknowledgement from operator.
	Overall alarm status is active. The tag alarm has been placed in the hidden state. The alarm is automatically acknowledged.

Quality Indication

There are two types of qualities that the faceplates display. First, the overall OPC tag quality is displayed in all faceplates. During normal operation of the OPC connection, this quality reflects the quality of the overall tag. If there is no OPC connection or it is severed, the faceplate shows the quality for communications failure. Refer to Table 3 for the symbol.

Second, each analog tag property value for all faceplates that possess them, has an individual quality code associated with it. If the value is undeterminable due to a total failure of the OPC connection, then the symbol @ for OPC quality code 24 is shown, and the value is zeroed out. Otherwise, the last known value is kept in the field, alongside the symbol for the current quality state of that field.

Overall field qualities are displayed for the following possible states as shown in Table 3.

Table 3. Quality Indicators

Quality Symbol	Description
X	Device failed or not connected.

Faceplate Element Area

The faceplate element area contains the graphical and numerical representations of the tag being monitored presented in various states and modes. Graphical items found in this area include dynamic bars, static scales, dynamic values, Boolean state indicators, quality indicators and alarm markers. The color of these items indicates alarms, type of input or output, and digital state. Numerical values found here are process variables, set points, control outputs, and high and low alarm limits. The scale and range values are derived from the high and low range limits defined for the tag.

Anything appearing in the element area depends on the type of tag being displayed.

All operator actions and input done from the element area of the faceplates is a two step operation, requiring confirmation of operator input using the **Apply** button.

Button Area

Various control buttons are available in the Button bar (Manual, Auto, Internal, External, Wait, SKIP, etc.). All tag types with controllable fields or buttons in the Element Area have a button bar as well as an **Apply** button to the right (or in the lower right) of the Button bar. This button is enabled only when a control action on the faceplate (such as a DEW value change) is in progress, allowing the user to

select this button to apply the control change. Otherwise, the **Apply** button is disabled by having a grayed out look.

Control buttons are available depending on the tag type. A tool tip for each button is visible when the cursor is positioned over it. This tool tip describes the function of each button.

All operator actions done from the button bar of the faceplates are a one step operation, with the resulting action initiated immediately upon selecting the button.

Selecting a button on a faceplate that is not in focus brings it into focus and initiates the corresponding action.

View Selection Bar

Faceplates are represented with three different displays:

- Reduced.
- Normal.
- Extended.

There are three buttons in the View Selection bar, which appear at the very bottom of every faceplate. Selecting the one-dot button shows the reduced faceplate. Selecting the two-dot button shows the normal faceplate. Selecting the three-dot button shows the extended faceplate, which shows the information contained in a Conductor Point Display for each tag type that possesses one.

Some tag types have all three faceplate types. Others do not have the reduced size. The reduced faceplate button is disabled for these. For those tag types that do not have Conductor Point Displays, the extended faceplate button is disabled.

Digital Logic State Control

Some digital states can be changed by the operator by selecting either the 0 state or 1 state fields within the faceplate element for that tag.

Green (default color) indicates that a particular logic state has been chosen, at which point the **Apply** button is enabled. Select the **Apply** button to verify that the chosen state is to be entered and the change sent to the corresponding point in the control system. The operation is aborted if there is no user verification within 30 seconds or if the ESC key is selected. When the feedback of the new state of the digital signal in the control system reaches the Operator Workplace, the field of the new state is

highlighted yellow (default color) and the field of the de-energized complement state is highlighted cyan (default color).

Alarm Colors

A state of alarm is shown as a small red circle on the faceplate. A closed alarm is shown as a white rectangle box. An open alarm is shown as a black rectangle box.

Direct Entry Window (DEW) Control

In some analog tag types, dynamic bars and dynamic values allow user input through a feature known as the DEW.

User input Dynamic Bars have a drag handle, a small circle visible at the current value level. For bars and fields that are DEW editable, the user can select the bar or dynamic value, which causes a DEW to appear and the **Apply** button in the Button bar to be enabled. The user then has 30 seconds to do one of the following before verifying the change with the **Apply** button:

• Select the bar and drag its drag handle up or down.
• Manually type in the value in the direct entry window.
• Select the spin buttons (up and down) to ramp the value.

The operation is aborted if the ESC key is pressed or if there is no user verification within 30 seconds, at which time the DEW disappears, the **Apply** button is disabled, and the current value of the field is left alone. Otherwise, if the **Apply** button is selected or the ENTER key is pressed, the new value is put into the DCU controller, changing the value of this field to the selected value.

Analog Functions

ANI (Analog Input Module)

Analog input faceplates are representations of 800xA for DCI analog input tags. An ANI module reports the current analog value, range, alarm levels, engineering units, filter constants, pulse rate, alarm status and quality that are presented in these faceplates.

ANO (Analog Output)

Analog output faceplates are representations of 800xA for DCI analog output tags. An ANO module reports the current input value, input range, engineering units, percent output, target manual output, alarm status and quality that are presented in these faceplates.

Discrete Functions

DI/DIB (Discrete Input)

Discrete input and discrete input block faceplates are representations of 800xA for DCI discrete (or digital) input tags. A DI module reports the current discrete value, alarm status, and quality that are presented in these faceplates and the DIB module reports the current discrete value for 16 DI modules.

DO/DOB (Discrete Output)

Discrete output and discrete output block faceplates are representations of 800xA for DCI discrete (or digital) output tags. A DO module reports the current discrete value, input states for diving the output, alarm status, and quality that are presented in these faceplates and the DOB module reports the current discrete value for 8 DO modules.

Loop Control and Calculation Functions

CON (Analog Controller)

A Control faceplate represents the 800xA for DCI loop control. The same functions that can be performed and the same values that can be displayed on a loop controller physically located in the plant are performed and displayed on the operator workspace using this. The CON module faceplate presents a detailed online display of a single process loop. An 800xA for DCI CON tag is required to acquire process values from a CON module in a DCU controller. The tag is also required to direct control. The CON module function index determines the operations that can be performed from the operator workspace. This includes operations such as setpoint source (local, remote, or supervisory) and mode (manual or automatic) that are changeable from the operator workspace. A CON module reports the process value, setpoint value, output value, target setpoint, target output, alarm levels, range,

engineering units, mode, control direction, tuning parameters, ratio constants, alarm status and quality displayed in a CON faceplate.

CAL (Calculation)

Calculation faceplates are representations of 800xA for DCI calculation tags. Each CAL module performs one of many available arithmetic functions including addition, subtraction, multiplication, division, flow compensation, value selection, square root extraction, log, power, lead and lag filters, and trig functions. The CAL module takes up to four analog signals from modules, performs arithmetic operations on the signals, and stores the results as engineering units in output. A CAL module reports the calculated value, range, engineering units, alarm levels, calculation constants, alarm status and quality that are presented in these faceplates.

Timer/Counter and Totalizer Functions

TMR (Timer/Counter)

Timer faceplates are representations of 800xA for DCI timer and counter tags. This modules operations consist of two functions: a timer and a counter. The timer counts the time interval specified by the scan file index (SCF) atom. The time interval is expressed in seconds (0.1 sec., 1.0 sec., 100 sec.), in minutes (1 min., 1.00 min., or 2000 min.), or in hours and minutes (1:03, 20:59, 1000:27). A counter simply counts the occurrence of events. A countdown timer is also provided. A TMR module reports the current and setpoint value, range, engineering units, alarm status and quality that are presented in these faceplates.

TOT (Totalizer)

Totalizer faceplates are representations of 800xA for DCI totalizer tags. Depending on the function index, this module adds up or subtracts down an analog or pulse input value. A TOT module reports the current and setpoint value, engineering units, range, alarm status, and quality that are presented in these faceplates.

Discrete Control and Boolean Functions

MSDC (Multi-state Device Control)

The MSDC faceplate represents a multi-state device control in a controller. The MSDC module outputs are used to set the device to the desired state. The module reports the current output, feedback, and interlock states, override status, alarm status and quality used for display in the faceplate.

DCD (Discrete Control Device)

The DCD faceplate represents a device driver function block in an 800xA for DCI controller. The DCD module provides up to 2 On or Off signals (On = one, Off = zero) for controlling a process device. A DCD tag is required to both monitor and change the outputs provided by the module from the operator workspace. The DCD module reports the current states, two feedback states, interlock state, override status, mode, time delay constants, device state legends, alarm status, and quality used for display in the faceplate.

BLM (Boolean Logic Module)

The BLM faceplate represents a Boolean logic function block in an 800xA for DCI controller. The BLM module provides up to 8 Boolean operations.   Each operation can take inputs from field signals or from internal module results and generate output results for use by other operations in the same or different BLM or by other Controlware modules. A BLM tag is required to both monitor and change the outputs provided by the module from the operator workspace. The BLM module reports the current input and output states of each operation, the operation type, override values, input pointers and their values, mode, alarm status, and quality used for display in the faceplate.

PSDM (PCU Status Display)

The PSDM faceplate represents a 16 value status display in a controller. It displays a list of up to 16 digital atoms and their statuses and alarm states. It also provides a means of setting the state of those atoms.

Hardware Characterization Functions

PBUS (Profibus Board)

The PBUS faceplate provides status information about the physical PBUS board mounted in a Harmony DCU frame. The PBUS module reports the run mode, backup mode, slot number, suspend switch position, board type, network slave device names and their quality status, and alarm status used for display in the faceplate.

PSLV (Profibus Slave)

The PSLV faceplate identifies a physical Profibus slave device station and any hardware modules that make up the slave station. The PSLV module lists up to 16 physical device station names and their status, and alarm status used for display in the faceplate.

IOB (Input/Output Board)

The IOB faceplate provides status information about the physical I/O board mounted in a Harmony DCU frame. The IOB module reports the run mode, backup mode, slot number, suspend switch position, board type, and alarm status used for display in the faceplate.

CIO (Communications Input/Output Board)

The CIO faceplate provides status information about the physical Communications I/O board mounted in a Harmony DCU frame. The CIO module reports the run mode, backup mode, slot number, suspend switch position, board type, and alarm status used for display in the faceplate.

DCU (Distributed Control Unit)

The DCU faceplate provides status information about the Harmony DCU. The DCU module reports the time it was last downloaded with a database, the name of the database last downloaded, the current percent CPU load utilization, and alarm status used for display in the faceplate.

PSB (Power Supply Board)

The PSB faceplate provides status information about the power supply boards that are mounted in the Harmony DCU frame. The PSB module reports backplane voltages and currents, fan speed state, battery status, battery voltages, battery current, reference voltages, fan RPM, internal temperature, fault status, and alarm status used for display in the faceplate.

SIM (Simulation)

The SIM faceplate represents an analog or digital hardware panel and provides a way to simulate test inputs and to display test results without affecting the configuration of the DCU controller. The faceplate allows the modules inputs and outputs to be selectively routed to simulate closed loop operations.

Sequence Control Functions

PAR (Parameter)

The PAR faceplate represents a parameter storage function block in an 800xA for DCI controller. The PAR module reports up to 16 values and names associated to each value, and alarm status used for display in the faceplate.

PHS (Phase)

The PHS faceplate represents a phase operation function block in an 800xA for DCI controller. The PHS module reports the phase ID, the Controlware Command Language (CCL) file currently associated to the phase module, and the pseudo device names and types used by the CCL file for display in the faceplate.

PTB (Pointer Table)

The PTB faceplate represents a table of pointers function block in an 800xA for DCI controller. The PTB module reports up to 16 pointer values and pointer names for specified attributes, and alarm status used for display in the faceplate.

CCM (Custom Control)

The CCM faceplate represents a flexible customized operation function block in an 800xA for DCI controller. The CCM can be used in situations where standard Controlware modules cannot meet the control needs of a process. The CCM module

reports the operating mode, a step number, values of input signal attachments, storage registers, flags, constants, message indication, and output attachments that are available for use by CCL programs that are executed by the CCM and are used for display in the faceplate. It also identifies and links to CCL files and PTB, PAR and DEV Controlware modules that can source data into it.

SEC (Security)

The SEC faceplate identifies the results of a bit wise comparison of 16 desired states versus actual states in an 800xA for DCI controller. The SEC is used for sequential operations where different steps or phases have different expected states for the same operational equipment. The SEC module reports 16 value names, their desired and actual states, the activation state for security, and alarm status that is used for display in the faceplate.

PSEC (PCU Security)

The PSEC module represents a table of expected input and output states. The faceplate displays the current status of the inputs and outputs, alarm indications showing any violations to the expected states and provides the ability to manually inhibit the alarms for each input and output pair being checked.

DEV (Device)

The DEV faceplate represents a table of actual device names against a table of pseudo device names. The use of pseudo device names allows a phase CCL file to be written once using the pseudo device names so that it can be used for multiple trains of identical equipment. During phase execution, the selected pseudo device module will pull in the actual device data from the DEV module. The DEV module reports up to 16 pointer names for actual devices and 16 identically ordered names of an associated pseudo device module, and alarm status used for display in the faceplate.

PDEV (Pseudo Device)

The PDEV faceplate represents a table of pseudo device names against a table of Controlware module types. The use of pseudo device names allows a phase CCL file to be written once using the pseudo device names so that it can be used for multiple trains of identical equipment. During phase execution, the selected pseudo device module will pull in the actual device data from the DEV module. The PDEV module reports up to 16 pseudo device names and 16 identically ordered

Controlware module type identifiers, and alarm status used for display in the faceplate.

DTM (Discrete Device Test Module)

The DTM faceplate identifies multiple Discrete Control Devices used for fault state checking in an 800xA for DCI controller. The DTM is used for sequential operations where different steps or phases have different expected states for the same operational equipment. The DTM module reports 16 DCD names, the activation state for performing the test, and alarm status that is used for display in the faceplate.

MSEQ (Mini-Sequence)

The MSEQ faceplate represents a sequential operation function block in an 800xA for DCI controller that is designed for use with 800xA Batch Management. The MSEQ can be used for processes that have multiple operations linked together in an ordered manner that follow a pre-defined, yet alterable, sequence. The MSEQ module reports the operating mode, the phase name in execution, the selected phase name to run, the phase number, the step number in execution, the selected step number to run, the batch unit mode, hold state cause, storage registers, flags, constants, and message indication that are available for use by CCL programs that are executed by the MSEQ via PHS triggering and are used for display in the faceplate. It also identifies and links to PHS names selected for the sequence, to CCL files running in the current selected PHS, to PAR modules that source and hold recipe data or batch results, to PTB and DEV modules that can source data into it, and to DTM and SEC modules that monitor the sequence run state.

SEQ (Sequence)

The SEQ faceplate represents a sequential operation function block in an 800xA for DCI controller. The SEQ can be used for processes that have multiple operations linked together in an ordered manner that follow a pre-defined sequence. The SEQ module reports the operating mode, the phase name in execution, the selected phase name to run, the phase number, the step number in execution, the selected step number to run, hold state cause, storage registers, flags, constants, and message indication that are available for use by CCL programs that are executed by the SEQ via PHS triggering and are used for display in the faceplate. It also identifies and links to PHS names selected for the sequence, to CCL files running in the current selected PHS, to PAR modules that source and hold recipe data or batch results, to

PTB and DEV modules that can source data into it, and to DTM and SEC modules that monitor the sequence run state.

STAT (State)

The STAT faceplate represents a state table. The modules function is to write a pre-configured set of values to a set of DCU atoms whenever the modules State is changed. It used primarily in conjunction with Batch Management and allows settings for up to 64 different States. The faceplate displays the current and selected state values and a method for the operator to manually request a State change.

Data Exchange Functions

PTP (Peer-to-Peer)

The PTP faceplate represents a request for sending or transmitting data from one 800xA for DCI controller to another. The PTP module reports the source or destination value name, the value in 3 formats (general, float, and count), operational mode, and alarm status used for display in the faceplate.

MSG (Message)

The MSG faceplate represents a message issued from an 800xA for DCI controller to the system. The MSG module reports the message type and the message text, operational mode for manually triggering the message, and alarm status used for display in the faceplate.

XMSG (External Message)

The XMSG faceplate represents a message issued from a Micro DCI loop controller to an 800xA for DCI controller via a CIO board. The XMSG module reports the message text used for display in the faceplate.

REC (Record)

The REC faceplate represents a display of multiple records of data collected from a set of Controlware module atoms through SEQ and CCM operations.

XFER (Transfer)

The XFER faceplate represents a data transfer function block within an 800xA for DCI controller. The XFER module reports up to 16 input values and tag names associated to each value, the status of each transfer, the enabling state of each transfer, the output tag name associated to each transfer, and alarm status used for display in the faceplate.

PMAP (Profibus Mapping)

The PMAP faceplate represents mapping of Profibus data packs from a Profibus device to Controlware stored values in an 800xA for DCI controller. The PMAP module provides up to 16 stored values that can be set to different data types such as integer, double integer, string, etc. The PMAP module reports the 16 values, the data types of each value, the quality of each value, and alarm status used for display in the faceplate.

XCON (External Control)

The XCON faceplate represents a PID controller in a Micro DCI loop controller via a CIO board. The XCON module allows plant operators to monitor and control MICRO-DCI controllers from an 800xA for DCI operator station. Each XCON module provides space for storing the major PID control parameters associated with one loop of a MICRO-DCI controller in a CIO database module used for display in the faceplate.

AIOB (Analog Input Output Block)

The AIOB faceplate represents a group of 16 analog values sourced from a CIO board.

DIOB (Discrete Input Output Block)

The DIOB faceplate represents a group of 16 discrete values sourced from a CIO board.

Logic Partitioning Functions

MSET (Module Set)

The MSET faceplate represents a definition for associating a logical grouping of Controlware modules in an 800xA for DCI controller. Entering the MSET number into the MSET atom of each Controlware module makes the logical grouping. The MSET allows single commands for locking, unlocking, or changing security access levels to be invoked across all modules in the group at once. The MSET module reports the lock state, the security levels for 3 data access types, the batch name currently in use, and alarm status are used for display in the faceplate.

FBLK (Function Block)

The FBLK faceplate represents a Function Block consisting of one or more Controlware modules or other Function Blocks. The FBLK module is used for the support of DCU configurations created using the Composer CTK software. The faceplate displays the value of up to 16 atoms that are associated with the FBLK module.

Section 3 Alarms

Introduction

This section provides a brief description of alarm management features of 800xA for DCI. Refer to the *System 800xA Operations (3BSE036904*)* and the *System 800xA Operations Operator Workplace Configuration (3BSE030322*)* instructions for more information.

Alarms

Alarms generated by the DCU can be accessed through an OPC Alarm and Event (A/E) Server (Operator Messages, Process Alarms, System Events, including Batch IDs). Alarms can be acknowledged from consoles anywhere in the system, providing that the user has the appropriate security. Acknowledge information is passed between the consoles as required.

Alarms can be inhibited in the DCU so that the tag no longer appears in the event or alarm summaries. The ability to assign unique priorities to each tag and then filter on it is accomplished in the Event system. Priorities are set in the Controlware II module.

Alarm Priorities

All DCI Alarm and Event messages have a priority provided in the range from 1-16 (highest to lowest). The 16 priorities are evenly distributed across the 1,000 OPC Severity Levels as shown in Table 4.

Table 4. DCI Alarm Priority Mapping

DCI Priorities	OPC Severity
16 (lowest)	1

Table 4. DCI Alarm Priority Mapping (Continued)

DCI Priorities	OPC Severity
15	66
14	133
13	200
12	266
11	333
10	400
9	466
8	533
7	600
6	666
5	733
4	800
3	866
2	933
1 (highest)	1000

Alarm Synchronization With Existing Consoles

A console can be configured to participate in global alarm event functionality with existing consoles. The DCU controller maintains the acknowledgement bit and therefore all consoles are synchronized. The online addition, deletion, and renaming of tags in the controller and their event points are accounted for in the system.

Alarm Grouping

Tags can be grouped by logical areas for alarming purposes. This grouping is supported during import of tags and with later reorganizing of tags. This is implemented in the 800xA System Aspect structures.

Alarm System Overview

Alarms and events are generated by DCUs in the system. All client applications can be configured to be sensitive to a group of alarms and events defined by an alarm and event filter and applied to the event stream in the system.

Alarms and Events

An event is the notification of some occurrence that is considered significant but does not require an operator acknowledgement. The event can either be related to a specific condition (the transition into high alarm of a tag and the respective return to normal) or no condition related events (an operator action). An event indicates states or state changes. An alarm is considered an event that indicates an abnormal condition that does require an operator acknowledgement.

DCI Alarm Review

The DCI A&E Default Alarm Review is an Alarm and Event List aspect located in the Library Structure under **Alarm & Event Configuration > DCI A&E Default Configuration Group**. The DCI Alarm Review is a predefined alarm state list which displays alarm state changes for all DCI tag objects. Single or multiple selected alarm acknowledges or silences can be done from this list. There is also an Alarm List aspect that is available in the DCI Tag objects that contains the alarms for that object only.

DCI Event Review

The DCI A&E Default Event Review is an Alarm and Event List aspect located in the Library Structure under **Alarm & Event Configuration > DCI A&E Default Configuration Group**. The DCI Event Review is a predefined event list which displays event state changes for the DCI objects.

DCI Message Review

The DCI A&E Default Message Review is an Alarm and Event List aspect located in the Library Structure under **Alarm & Event Configuration > DCI A&E Default Configuration Group**. The DCI Message Review is a predefined event state list which displays message events from DCI objects.

Section 4 Signal Objects

Introduction

Signal Objects contain information about control of system operational status that is not directly related to the process being controlled such as network controller node status, DCU node status, DCU operations, and I/O board information and status. This is found in an aspect at the Network Connection level for node status, and in an aspect at the DCU Object level for DCU and board information of 800xA.

Network Connection Object Type in the Control Structure

All objects communicating with the Symphony DCU controllers via the Symphony DCI network are organized under the Network Connection level of the Control Structure. The DCI Tag Importer does the instantiation of the Control Structure. The Symphony DCI Control System Status aspect provides DCU status information.

Each connected Symphony DCU is shown as an icon and identified by name. Operational and redundancy status for each are provided. The icons are color coded to signify communication status between the Symphony DCU and the I/O boards. Green indicates that communication with all boards is working correctly. Yellow indicates that communication with some of the boards is working correctly. Red indicates that communication with none of the boards is working correctly.

This information is a real-time network status that is dynamically updated and therefore may not match the static configuration of DCU objects listed beneath the Network Connection level. Clicking one of the icons causes the view to be changed to the I/O Boards aspect of that Symphony DCUs Node Object. The specified colors are the default logical colors and are configurable.

DCU Node Object Type

Each DCU Node Object Type contains aspects for DCU Service Support and DCU Status and Control (Figure 3). This Object Type is a container for the Harmony

DCU Controlware Objects. There is also a Control Connection aspect that supplies network connectivity.
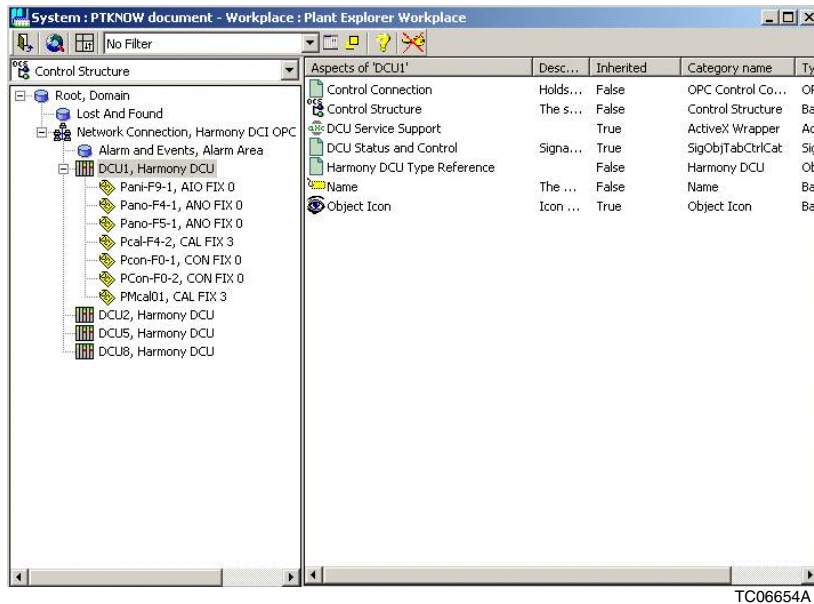
Figure 3. DCU Node Object Type

DCU Status and Control Aspect

The DCU Status and Control Aspect view is a tabular control that enables the display of the following subcategories:

- General Operations (Primary) on page 39.
- General Operations (Backup) on page 39.
- Information on page 40.
- I/O Boards on page 40.

General Operations (Primary)

This is displayed when the General Operations tab for the primary controller of a redundant pair is selected (Figure 4). Choose the operation and click **Apply**.

TC06656B
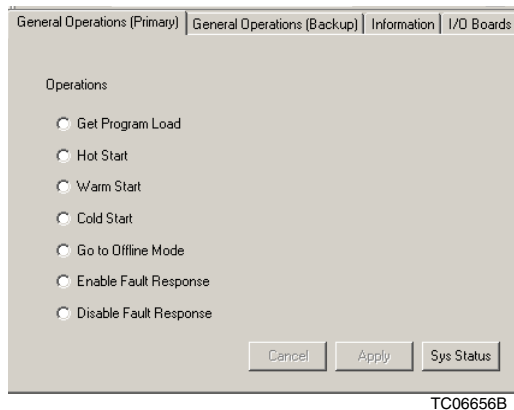
Figure 4. General Operation (Primary)

Select the **Sys Status** button to jump to the System Status Aspect.

General Operations (Backup)

This is the view displayed when the General Operations tab for the backup controller of a redundant pair is selected. The available operations are:

- Get database copy.
- Get program load.
- Go to offline mode.
- Do switchover.

Choose the operation and click **Apply**.

The button controls are disabled for this Symphony DCU if it is not redundant.

Information

The information tab view displays the controllers Name, Operational Mode, Hardware Type, and Redundancy Status.

I/O Boards

The I/O Boards tab displays a tree view that shows a hierarchy of status information pertaining to the I/O, controller, and power supply boards that comprise the physical configuration for that Symphony DCU.

I/O Board Slots

The top level displays the identification of the board type in each hardware slot. The associated icons are color coded to signify communication status of each board. This view display is dynamically updated. Green indicates that communication is working correctly. Yellow indicates that communication is partially working. Red indicates that communication is completely failed. White indicates that although a board is software configured for that slot, no communication has been established and the board may not be present. The specified colors are the default logical colors

and are configurable (Figure 5).
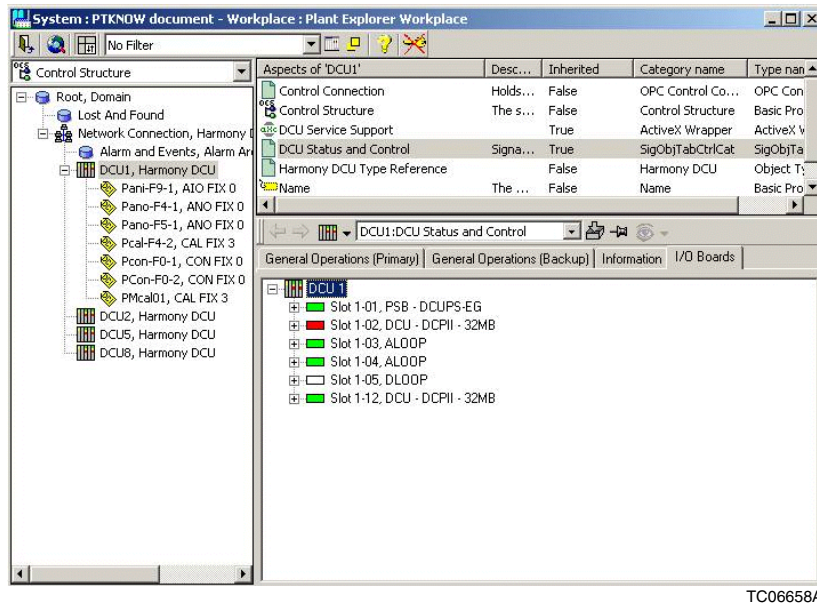
Figure 5. I/O Boards Tab

Power Supply Board Branch of Tree

Opening the tree branch display of a power supply board displays the DC Power, Battery, and Fault states, and also tag name of the Symphony DCUs associated PSB

module (Figure 6).

TC06659A
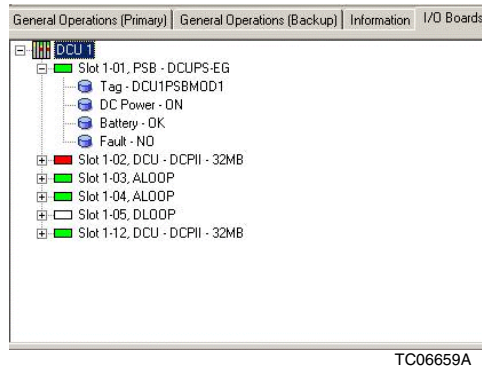
Figure 6. Power Supply

DCP Board Branch of Tree

Opening the tree branch display of a controller board displays three sub-branches that are named Software Information, Network Information, and Redundancy Status. Software Information shows aspects identifying tag name, DCP software version number, DCP EPROM version number, ECCD software version number, ECCD EPROM version number, and LCOM version number. Network information displays Host Name, IP Address, Ethernet Address, and Communication Status. Redundancy Status displays information showing Redundant or Standalone,

Primary or Backup, and Backup Ready or Backup Not Ready (Figure 7).

TC06660A
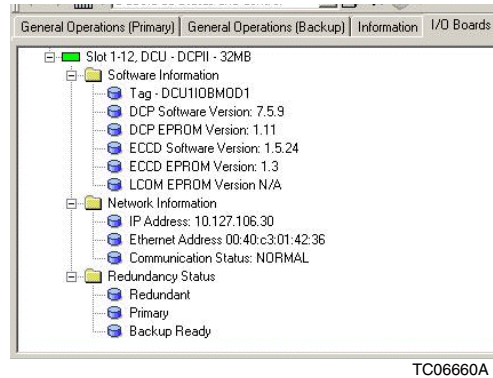
Figure 7. DCP Board

I/O Type (ALOOP) Board Branch of Tree

Opening the tree branch display of an I/O board displays the associated module tag name for that board (IOB, CIO, or PBUS module type). It also shows two sub-branches that are named I/O Status and Redundancy Status. I/O Status information includes Communication Status, Operational Status, and Auto/Suspend switch position. Redundancy Status displays information showing Redundant or Standalone, Primary or Backup, and Backup Ready or Backup Not Ready. The ALOOP is the only I/O type board presented because the other I/O board type views

are very similar (Figure 8).
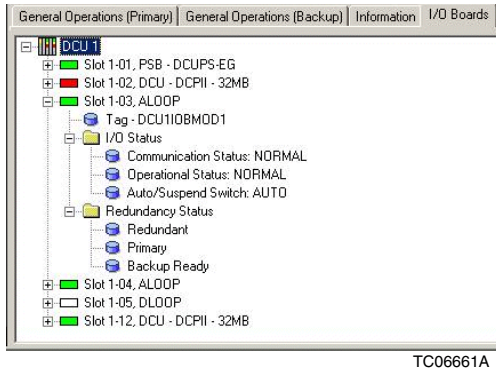
Figure 8. DCP Board

Section 5 Graphic Elements

Introduction

Several graphical elements have been implemented for DCI objects for the 800xA 5.1 release. Those elements are provided to assist users in developing graphic solutions for their process. The elements include many common use cases for analog values and digital control values. Table 5 lists the module types covered and the graphical element(s) for each.

Table 5. Graphical Elements

Module	Element	Value	Legend	Alarm Sensitive
ANI	ANI_Value	Out	Yes (optional)	Yes (optional)
CAL	CAL_Value	Out	Yes (optional)	Yes (optional)
CON	CON_PV_Value	PV	Yes (optional)	Yes (optional)
	CON_SP_Value	SP	No	Yes (optional)
	CON_Out_Value	Out	No	Yes (optional)
TOT	TOT_Value	Out	Yes (optional)	Yes (optional)
ANO	ANO_CtrlValveElem	AUT, OUT	n/a	Yes
DCD (FIX0,2)	DCD_ValveElem	AUT, FB1	n/a	Yes
	DCD_PumpElem			
	DCD_MotorElem			
	DCD_AgitatorElem			

Table 5. Graphical Elements (Continued)

Module	Element	Value	Legend	Alarm Sensitive
DCD (FIX1,3)	DCD_ValveElem	AUT, FB1, FB2	n/a	Yes
	DCD_PumpElem			
	DCD_MotorElem			
	DCD_AgitatorElem			

The ANI_Value, CAL_Value, and CON_PV_Value are all similar. They each provide the relative value with the module legend (optional,) and they will sense and respond to the module alarm state (optional.) The CON_SP_Value and CON_OUT_Value both provide the relative value and will sense and respond to the module alarm state (optional,) but do not display the legend. The TOT_Value will display the OUT value and the legend (optional.)

The ANO and DCD values provide graphical representation of valves, pumps, motors, and agitators. They are each sensitive to the module mode (automatic or manual,) output or feedback, and are always sensitive to the module alarm state. All of the ANO and DCD graphic elements can be rotated in 90 degree increments and/or flipped on either the vertical or horizontal axes.

Optional items are set by the user at design time (in the Visual Basic editor.) They are properties on the element that the user may change if it is desirable. The default setting for legends is to include the legend. The default value for alarm sensitivity is not sensitive.

Analog Values

The Analog values are designed to be used together. As they are instantiated on a graphic, they are all the same height and width for the number portion. If the user wants to place them in a column, they may be aligned by the left side. The number portion is wide enough to accept up to ten digits.

The property names for showing the legend and alarm state are named so that it is obvious what will happen if it is changed. The ANI_Value, CAL_Value, CON_PV_Value, and TOT_Value all have the HideLegend property. All the analog values have the ShowAlarm property. The default value of both is FALSE.

The TOT_Value also has a property ValueFmt that can be used to override the system default number display format as defined by the Format Constants on the DCI Super Class object Type. ValueFmt may be any valid Visual Basic number format string.

Default Size

The default size of the numeric portion of the aspect is 60 pixels. The default size of the legend portion is 40 pixels. If you stretch the aspect, it will retain the 60/40 ratio. The font size reacts to the height of the aspect; taller aspects will have larger font sizes.

Default Behavior

The aspects default to the behavior shown in Table 6.

Table 6. Modifiable Aspect Properties

Property	Type	Default	Available
HideLegend	Boolean	False	All but CON_SP_Value and CON_OUT_Value
ShowAlarm	Boolean	False	All
ValueFmt	String	blank	TOT_Value

Those that have legends will show them, and the aspects will not change when the module is in alarm. The default font colors have been chosen to show up well on dark backgrounds, such as the standard graphic background. The numeric text is shown in NoAlarmColor and the legend text is shown in the LegendColor as shown

in Table 7.

Table 7. Partial Alarm Colors

Priority	Color	RGB Value
1		255, 0, 0
2		255, 255, 0
3		0, 255, 0
4		117, 134, 190
5		255, 105, 180
6		0, 255, 255
7		255, 140, 0
8		0, 0, 255
9		41, 171, 151
10		43, 167, 112
11		210, 105, 30
12		230, 230, 250
13		178, 143, 86

Table 7. Partial Alarm Colors (Continued)

Priority	Color	RGB Value
14		255, 120, 71
15		0, 134, 139
16		255, 20, 147
Legend Color	White	255,255, 255
No ALarm Color		0, 255, 255

ShowAlarm

Setting ShowAlarm to True causes the numeric text to respond to changes in the module alarm state. If the module is in alarm and unacknowledged, the numeric text will blink in the color defined for its priority level, as defined in Table 7. If it is in alarm and acknowledged, the numeric text is shown in the color defined for its priority level without blinking. If the module has returned to normal before it is acknowledged, it is shown blinking in the NoAlarmColor.

Table 6 shows the relevant colors as setup in the Harmony DCI Alarm Colors table. These colors may be modified by the user. This is the only way to change the color of the numeric and legend text. The color of the legend text may be changed by modifying the LegendColor value in the table.

ANO_CtrlValveElem

ANO modules can be represented by a valve symbol encapsulated in the ANO_CtrlValveElem aspect. The aspect is sensitive to the value of the module output, the mode (automatic or manual,) and the alarm state (in alarm, not in alarm.) The basic shape of the aspect is shown in Figure 9. Figure 9 represents an analog output value of 0% in manual mode. The aspect shows as a solid fill whenever the module is in manual mode. In automatic mode, the aspect shows as a shaded figure

as in Figure 10. Figure 11, and Figure 12 show how the aspect will look while the valve is in transit (output > 0%, but < 100%) and at 100%.
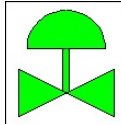
Figure 9. ANO_CtrlValveElem, Output 0%, Manual Mode
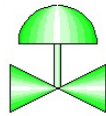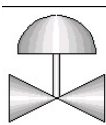

Figure 10. ANO_CtrlValveElem, Output 0%, Automatic Mode

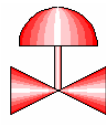*Figure 11. ANO_CtrlValveElem, Output > 0 and < 100, Automatic Mode*

Figure 12. ANO_CtrlValveElem, Output 100%, Automatic Mode

If the ANO module is in alarm (acknowledged or unacknowledged,) the aspect is shown blinking between the shown color and yellow. The colors can be changed by

changing the values in Table 7. Refer to Table 8 for more information.

Table 8. Graphical Aspect Colors

Output Value	Alarm State	Color 1	Color 2	RGB 1	RGB 2	Color Name In Table
0	Normal		None	0, 255, 0	None	GrEleOn
.> 0, < 100	Normal		None	154, 154, 154	None	GrEleInput Trouble
100	Normal		None	255, 0, 0	None	GrEleOff
0	Alarm			0, 255, 0	255, 255, 0	GrEleAlarm UnAckedOn
> 0, < 100	Alarm			154, 154, 154	255, 255, 0	GrEleAlarm UnAcked
100	Alarm			255, 0, 0	255, 255, 0	GeEleAlarm UnAckedOff

DCD Graphical Elements

DCD modules have four graphical elements; one each, representing a paddle agitator, a motor, a pump, and a valve. All four have identical behavior with respect to the DCD module. The aspects change color depending on the state of FB1 (and FB2 for FIX 1 and 3), and the alarm state. They show as solid figures when the module is in manual mode and shaded figures when the module is in automatic

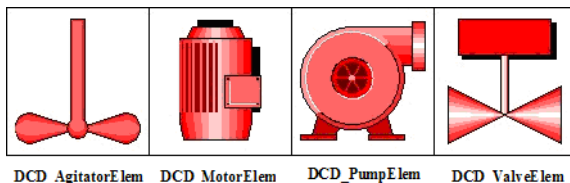mode (the same as ANO_CtrlValveElem). Refer to Figure 13 for more information.

Figure 13. Graphical Elements

DCD Color Usage

The DCD graphical elements use most of the same colors as the
ANO_CtrlValveElem. In addition, they also use a blinking color, GrEleOnFlash, to
indicate a state of operation. The colors used and feedback states detected are listed
in Table 9. The colors can be changed in the Harmony DCI Alarm Colors table.

Table 9. DCD Graphical Element Color Usage

Feedback State	Alarm State	Color 1	Color 2	RGB 1	RGB 2	Color Name In Table
FB1=1	Normal			0, 255, 0	192, 192, 192	GrEleOnFlash
FB1 = 0 and FIX0,2	Normal			255, 0, 0	None	GrEleOff
FB1 = 0, FB2 = 1 and FIX1,3	Normal			255, 0, 0	None	GrEleOff
FB1 = 0, FB2 = 0 and FIX1,3	Normal			154, 154, 154	None	GrEleInputTrouble
FB1 = 1	Alarm			0, 255, 0	255, 255, 0	GrEleAlarm UnAckedOn
FB1 = 0	Alarm			255, 0, 0	255, 255, 0	GeEleAlarm UnAckedOff

Modifiable Aspect Properties

The ANO and DCD graphical elements have two user modifiable properties; one to flip the object and another one to rotate the object in 90° increments. Manipulating these properties provides the user with a high degree of flexibility in creating graphics. Refer to Table 10.

Table 10. Flip and Rotate Properties

Property Name	Values	Action
Flip	0 - None	None
	1 - Horizontal	Flips on the horizontal axis
	2 - Vertical	Flips on the vertical axis
	3 - Both	Flips on both axis
Rotate	0 - Rotate0	None
	90 - Rotate90	Rotate left 90°
	180 - Rotate180	Rotate left 180°
	270 - Rotate270	Rotate left 270°

Tank Cutaway Graphic Element

A general static graphic element that provides a model of a tank body with a cut-away portion is provided in the MoreTankElements graphic library. In order to use this element, call up the graphic in Visual Basic, click on the Tools menu and select Graphic Libraries from the drop-down list. Then click on the box next to MoreTankElements and click on the **OK** button.

This will populate the MoreTankElements tool panel with the icon for TankCutaway. Select this icon and place the tank element on the graphic. The TankCutaway graphic element is intended to be used with the DCD_AgitatorElem, and possibly, a bar graph to define the current tank level.

INDEX

S

Revision History

Introduction

This section provides information on the revision history of this User Manual.

ℹ The revision index of this User Manual is not related to the 800xA 5.1 System Revision.

Revision History

The following table lists the revision history of this User Manual.

Revision Index	Description	Date
-	First version published for 800xA 5.1	November 2010
A	Second version published for 800xA 5.1 Rev E	July 2015

Updates in Revision Index A

The following table shows the updates made in this User Manual for 800xA 5.1 Revision E.

Updated Section/Sub-section	Description of Update
Section 1: Introduction	Product Overview

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3BUA000129-510 A

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