OVATION®

EXPERT CONTROL SYSTEM

EMERSON™
Process Management

OV150-WIN
Ovation Maintenance Course

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Emerson Power and Water Solutions

Middle East & Africa

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COURSE OBJECTIVES

Upon Successful Completion of this course the student will be able to:

- **Understand** the typical Ovation Distributed Control System.
- **Use** Ovation Software Tools to Perform Basic Maintenance and Troubleshooting
- **Perform** Controller Diagnostics and Maintenance
- **Diagnose** and Troubleshoot I/O Subsystems
- **Perform** Tests of I/O Modules
- **Understand** Ovation Power and Grounding Requirements

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Module 1

OVATION SYSTEM OVERVIEW

MODULE 1 OBJECTIVES

- Understand the Ovation DCS.
- Describe the function of all the Ovation HMI drops.
- Describe the function of the Ovation controller drops.
- Understand the function of the Ovation network.

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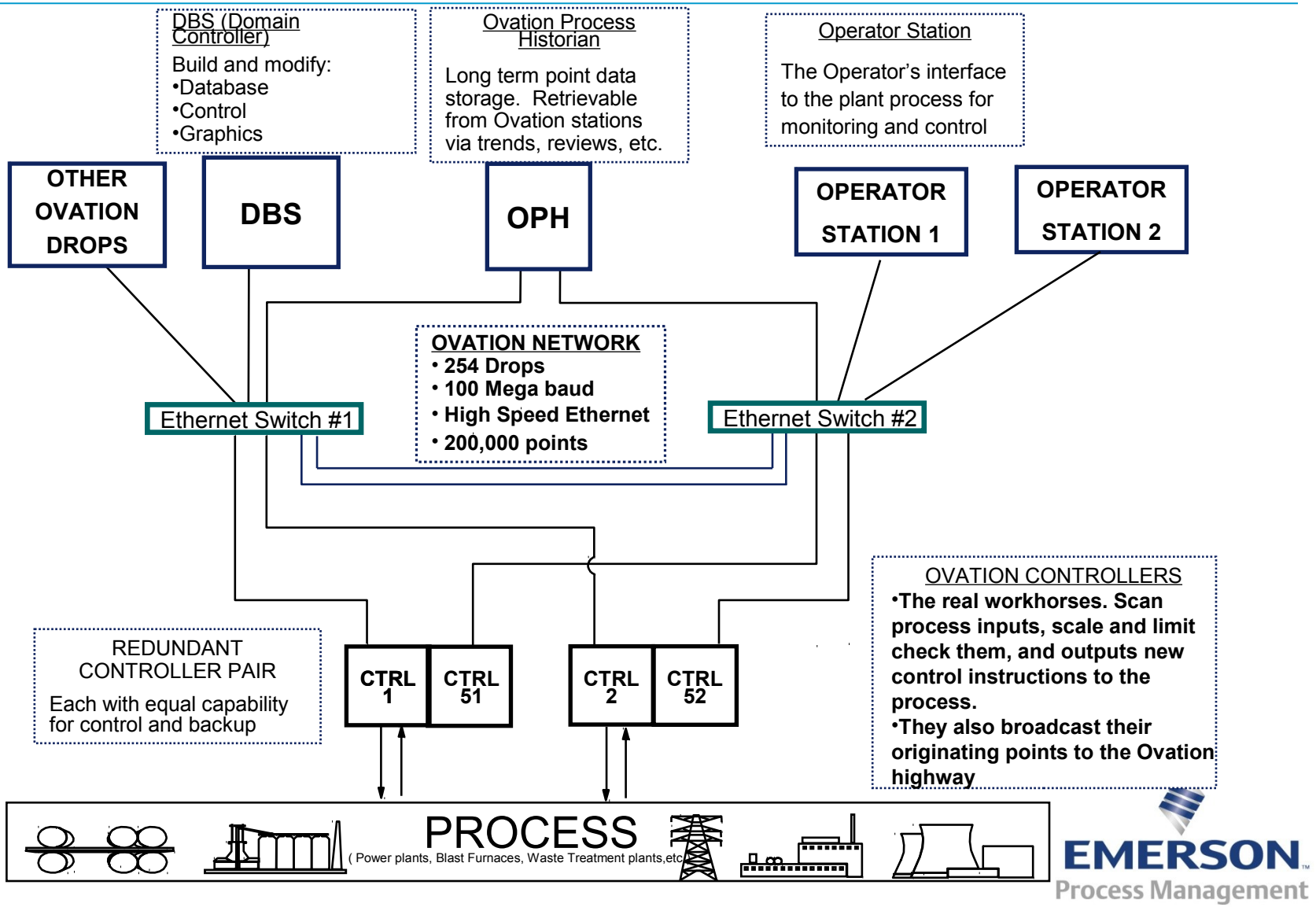
OVATION TYPICAL SYSTEM CONFIGURATION



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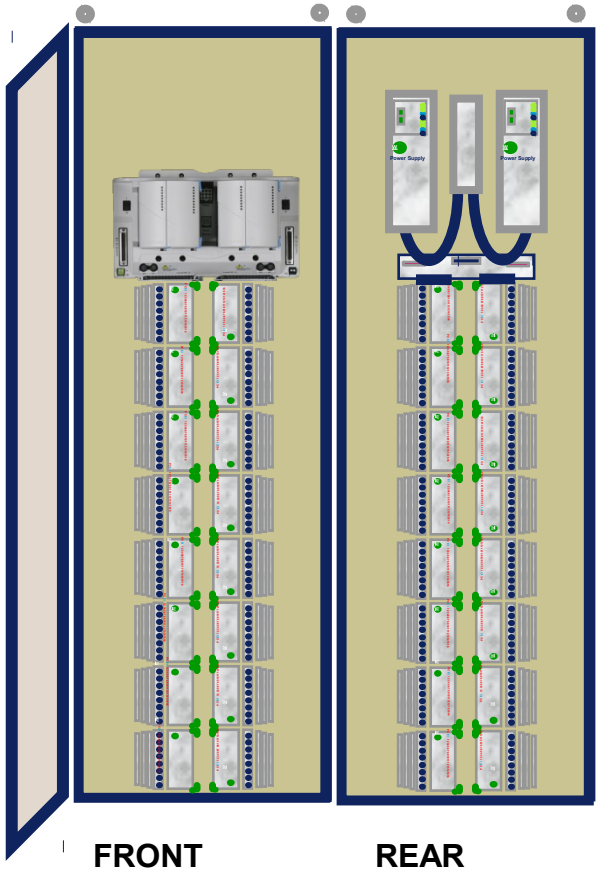
OVATION CONTROLLER MAJOR FUNCTIONS

Ovation
Controller Cabinet



- DATA ACQUISITION
- MODULATING CONTROL
- SEQUENTIAL CONTROL

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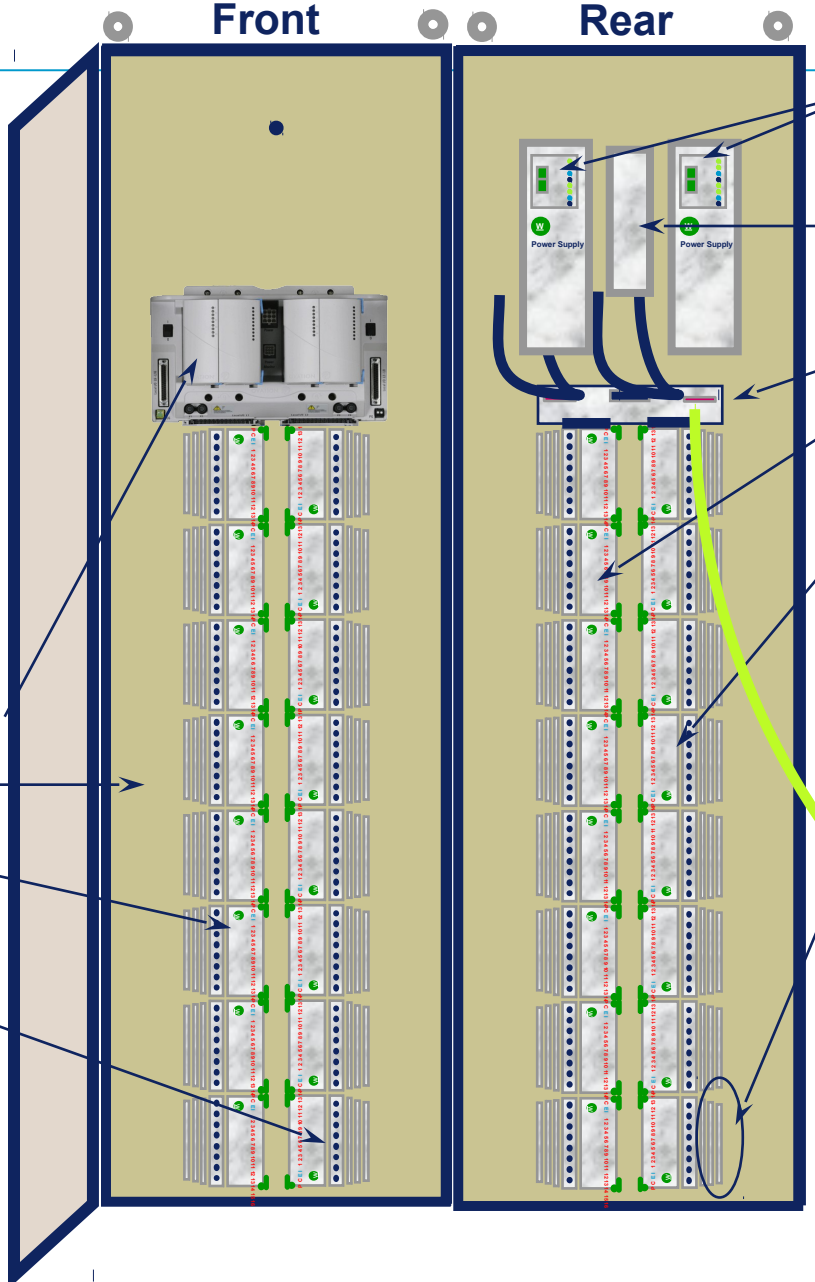
OVATION CONTROLLER – CABINET LAYOUT



- Redundant Power Supplies
- Power Distribution Module
- Transition Panel
- I/O branch 3
  - 8 Modules
- I/O branch 4
  - 8 Modules
- I/O terminal blocks at each module

- Controller chassis
- Mounting plate
- I/O branch 1
  - 8 Modules
- I/O branch 2
  - 8 Modules

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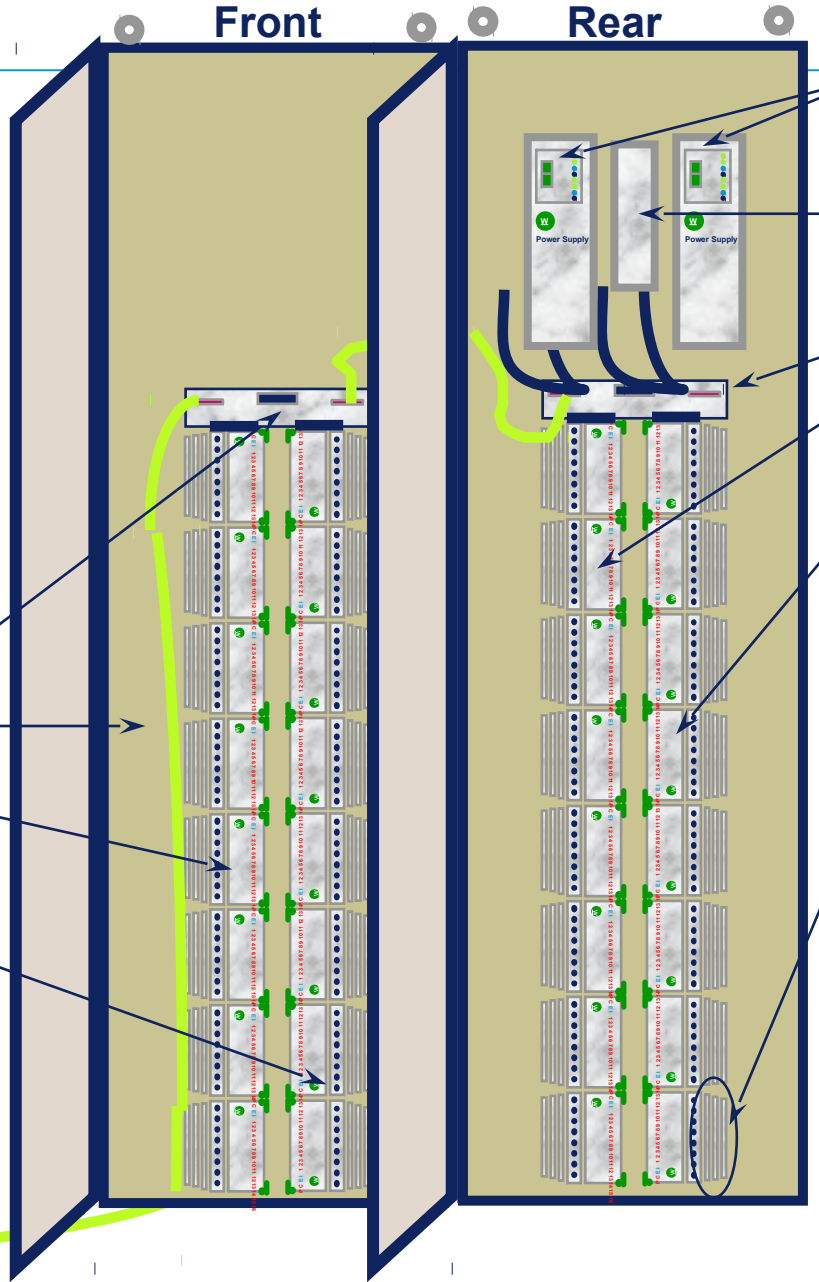
OVATION CONTROLLER – EXPANSION CABINET LAYOUT



- Redundant Power Supplies
- Power Distribution Module
- Transition Panel
- I/O branch 7
  - 8 Modules
- I/O branch 8
  - 8 Modules

- Transition Panel
- Mounting plate
- I/O branch 5
  - 8 Modules
- I/O branch 6
  - 8 Modules

- I/O terminal blocks at each module

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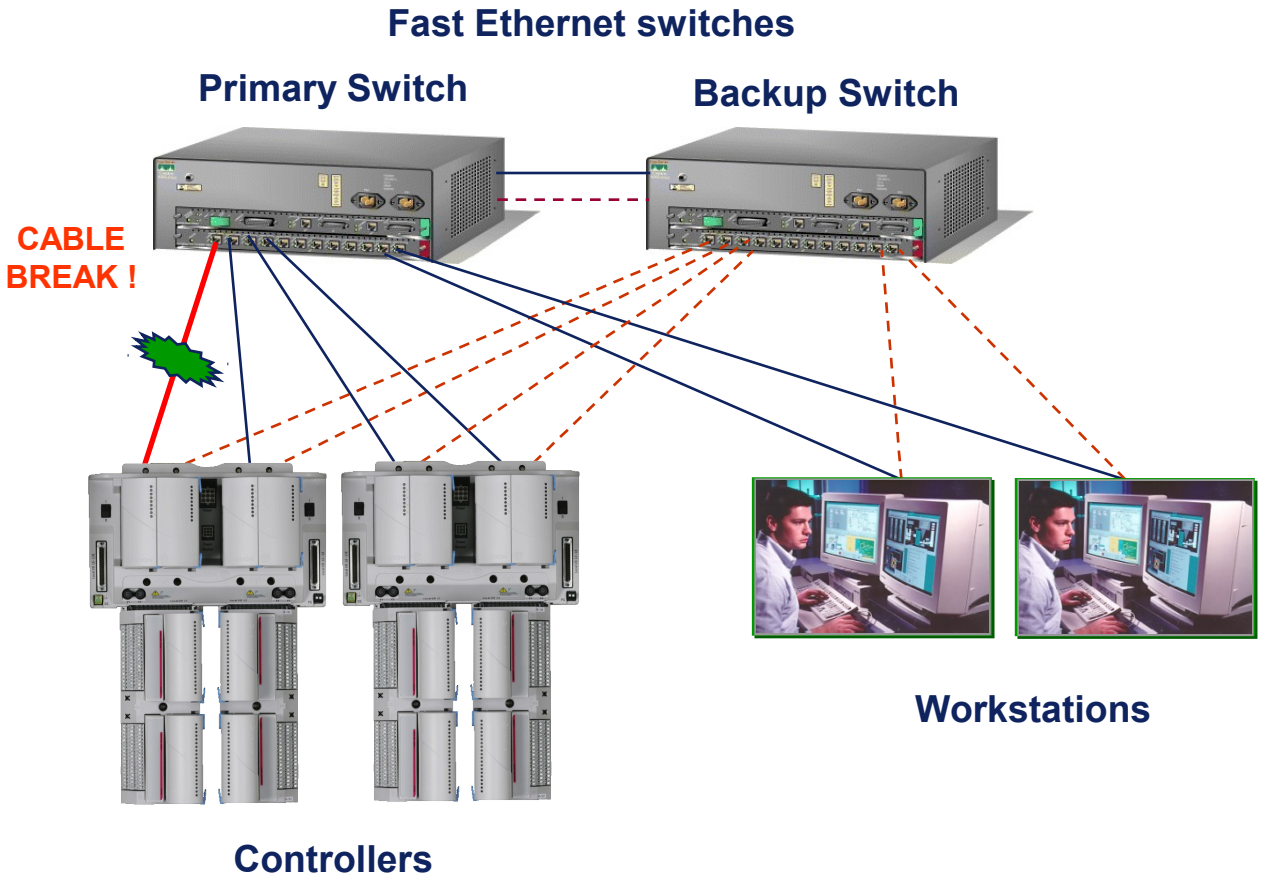
OVATION NETWORK – FAULT TOLERANCE



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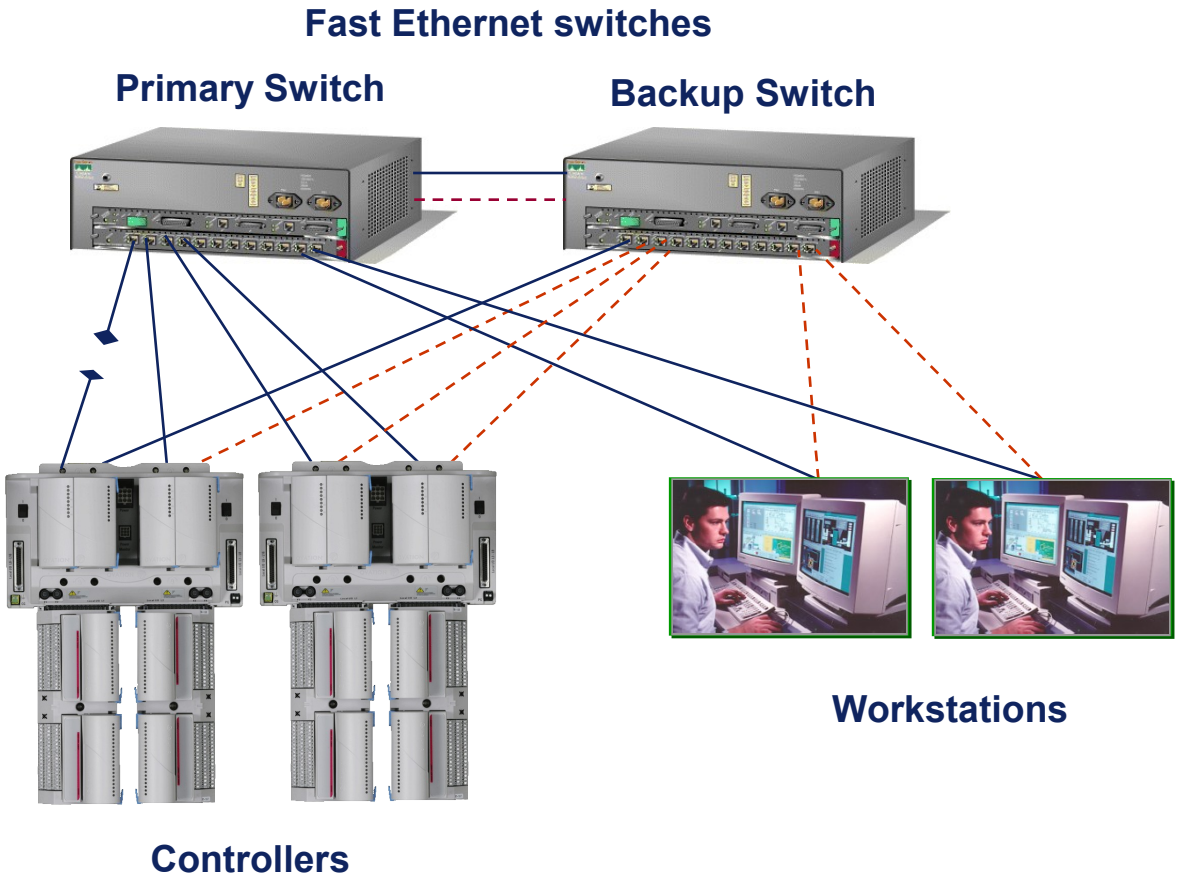
OVATION NETWORK – FAULT TOLERANCE



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Module 2

MMI STATION FUNCTIONS USEFUL FOR SYSTEM MAINTENANCE AND TROUBLESHOOTING

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MODULE 2 OBJECTIVES

- Utilize the Alarm List and History and understand different alarm types
- Use the Point information window to identify process point status
- Understand the meaning of Sensor Alarms and different qualities of signals
- Use Point Review function to identify possible problem areas

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SIGNALS/PROCESS POINTS

- Process points – Database records
- Record Types – Signal types
- Signal value
- Signal status: normal vs. in alarm
- Signal quality (creditability)
- Signal possible source

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OVATION DATABASE RECORD TYPES

Record Type	Abbr.	Monitor status of	Examples	Point name break down
Drop record	DU	Computers (MMI's or Controllers)	DROP100, DROP1	
Node record	RN	Power supplies, local and remote nodes	D002P1	Drop 2 PCI slot 1,
			D001P2N4	Drop1 PCI slot 2 remote node 4
Module record	RM	Configured I/O modules	D001P1B4L3	Drop1 PCI 1 Branch 4 Slot 3
◆Long digital	LD	Digital points, two possible values (1 or 0), both software and hard wired.		
◆Long analog	LA	Points with a range of values, both software and hardware. *Look for engineering units (PSI, %, °F, in Hg)*		
◆Long Packed	LP	16 digital bits that are treated as a single point or "word".		
Long control	LC	Algorithm points created by Ovation Control Builder for use on control sheets		

Ovation Solaris = The first three digits are the originating Drop number. 001-00123 is a DROP1 originated point

Ovation for Windows = Prefaced with **OCB** for Ovation Control Builder

◆ *Note: There are no "standard" Ovation point names and therefore, no examples are given.*

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POINT QUALITY

Generated by the Controller based on the operational readiness of a Process Point

Good - On scan, within Sensor Limits, within reasonability limits, Power ok, or Test Mode on

Fair - Entered Value or Test Mode on

Poor - Out of Engineering Limits, Over-range on AI module, some special algorithm, or Test mode on

Bad - Off scan, Out of Sensor limits, Out of Reasonability Limits, Power bad on a Digital point, bad card, or Test mode on

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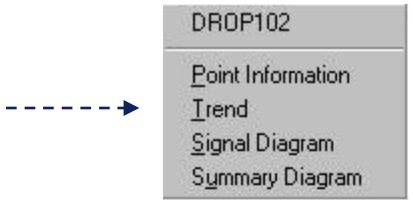
ALARM SYSTEM

- 15000 Alarm buffer at Operator Station
- Alarms are Color Coded by Priority
- Alarm Acknowledge and Reset functions are available
- Right Click to Point Menu



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ALARM COLOR CODES

PRIORITY	COLOR
Priority 1	
Priority 2	
Priority 3	
Priority 4	
Priority 5	
Priority 6	
Priority 7	
Priority 8	
Returns	

Default Ovation Alarm color scheme

Changes are made by the Project Engineer.

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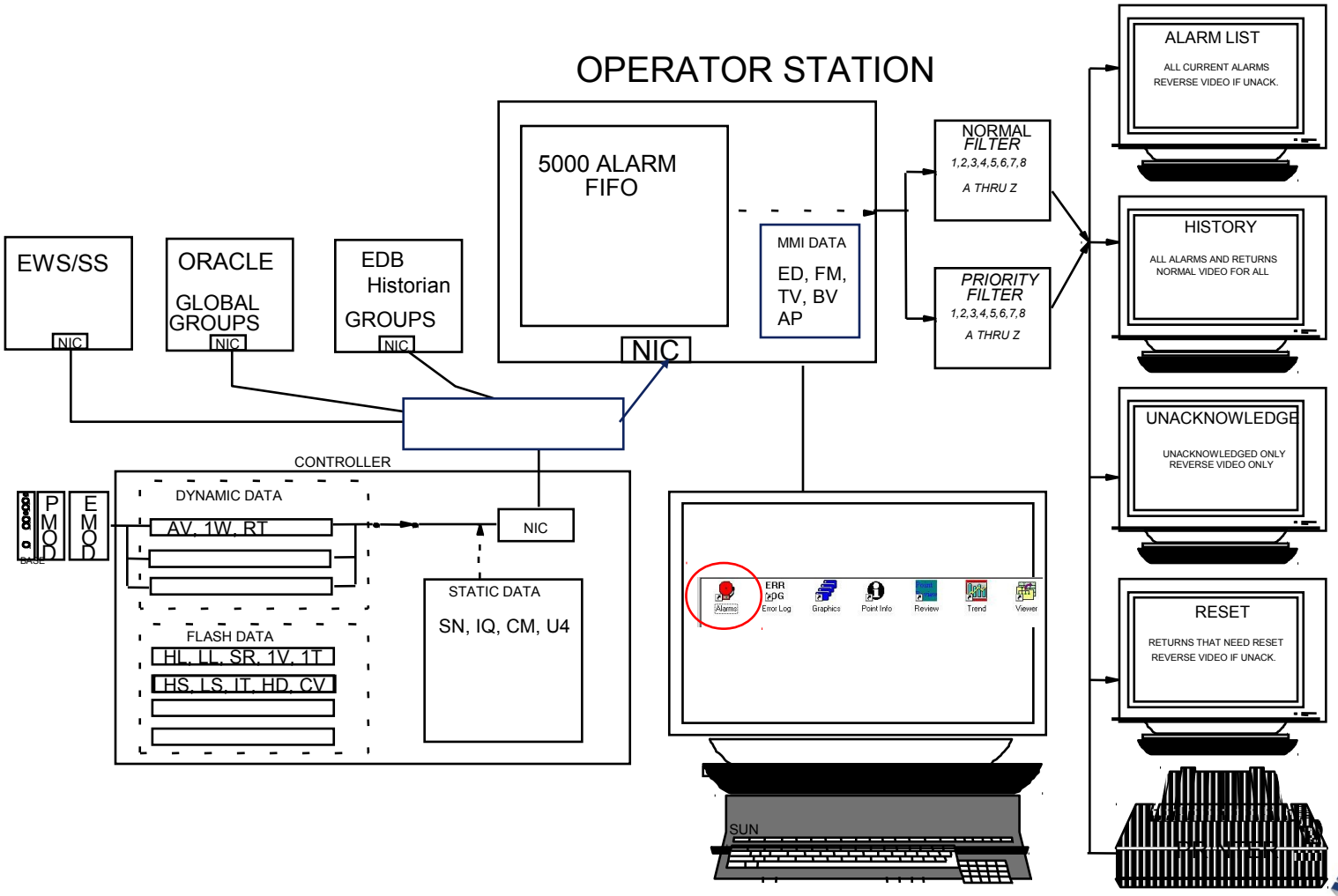
OVATION ALARM FLOW



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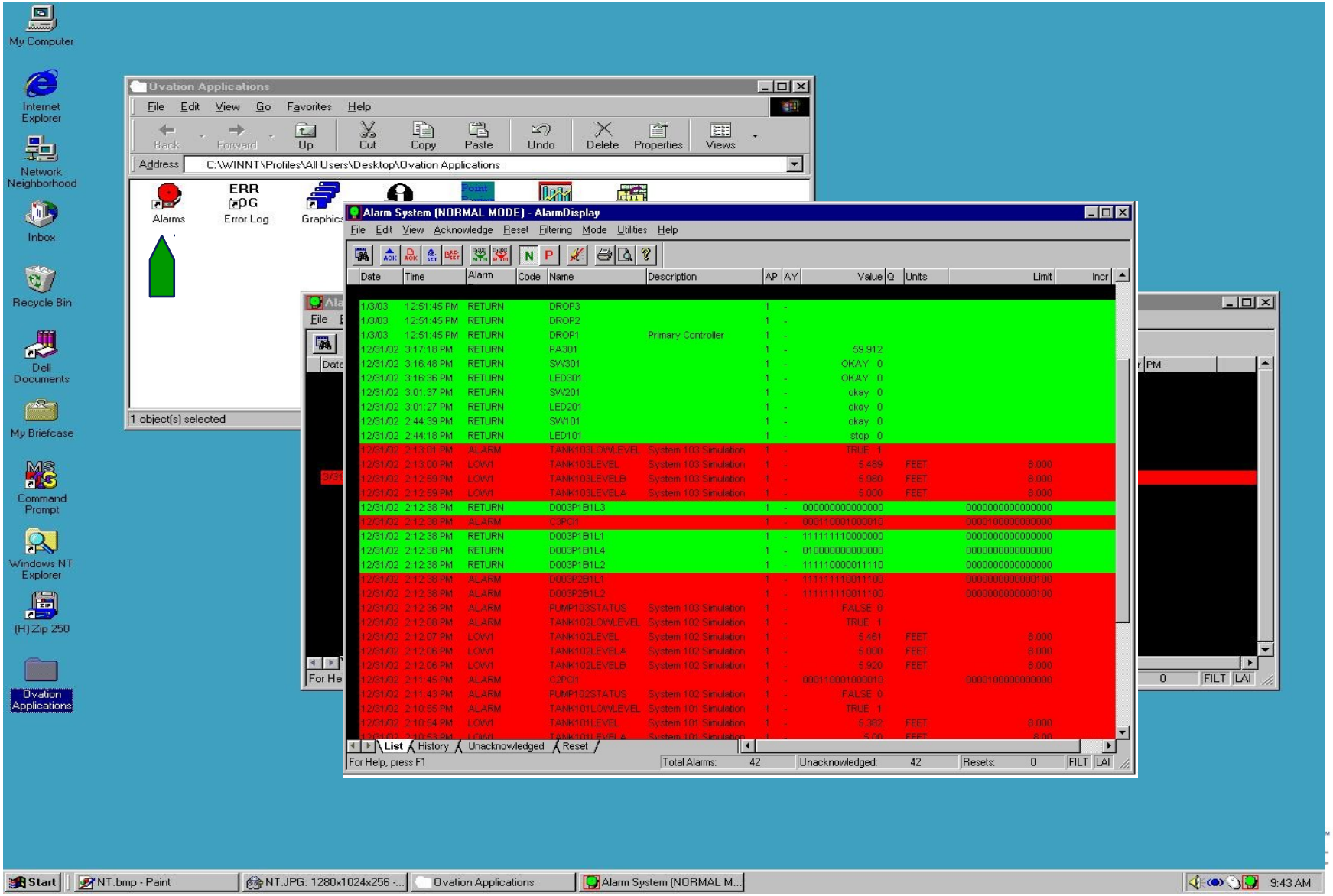
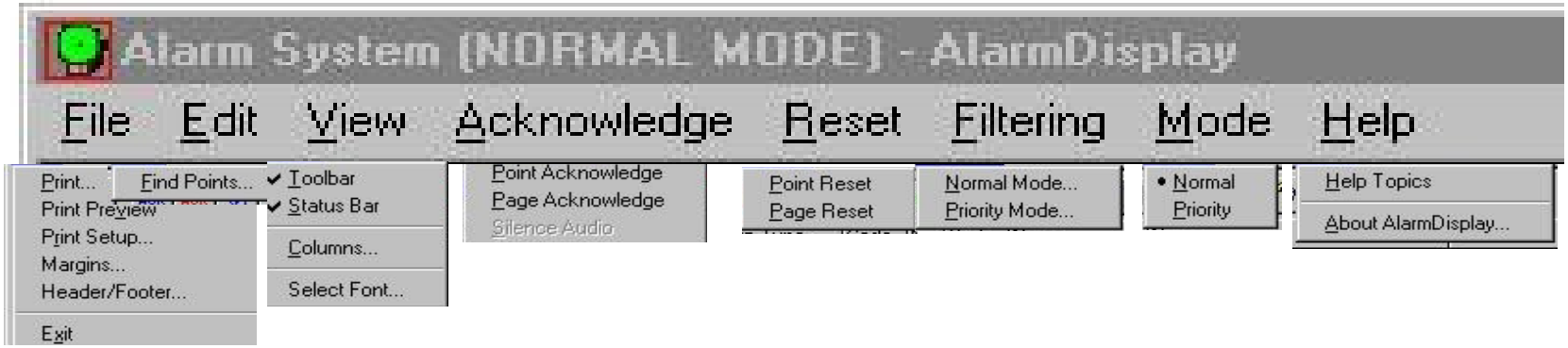
ALARM WINDOW



ALARM MENUS



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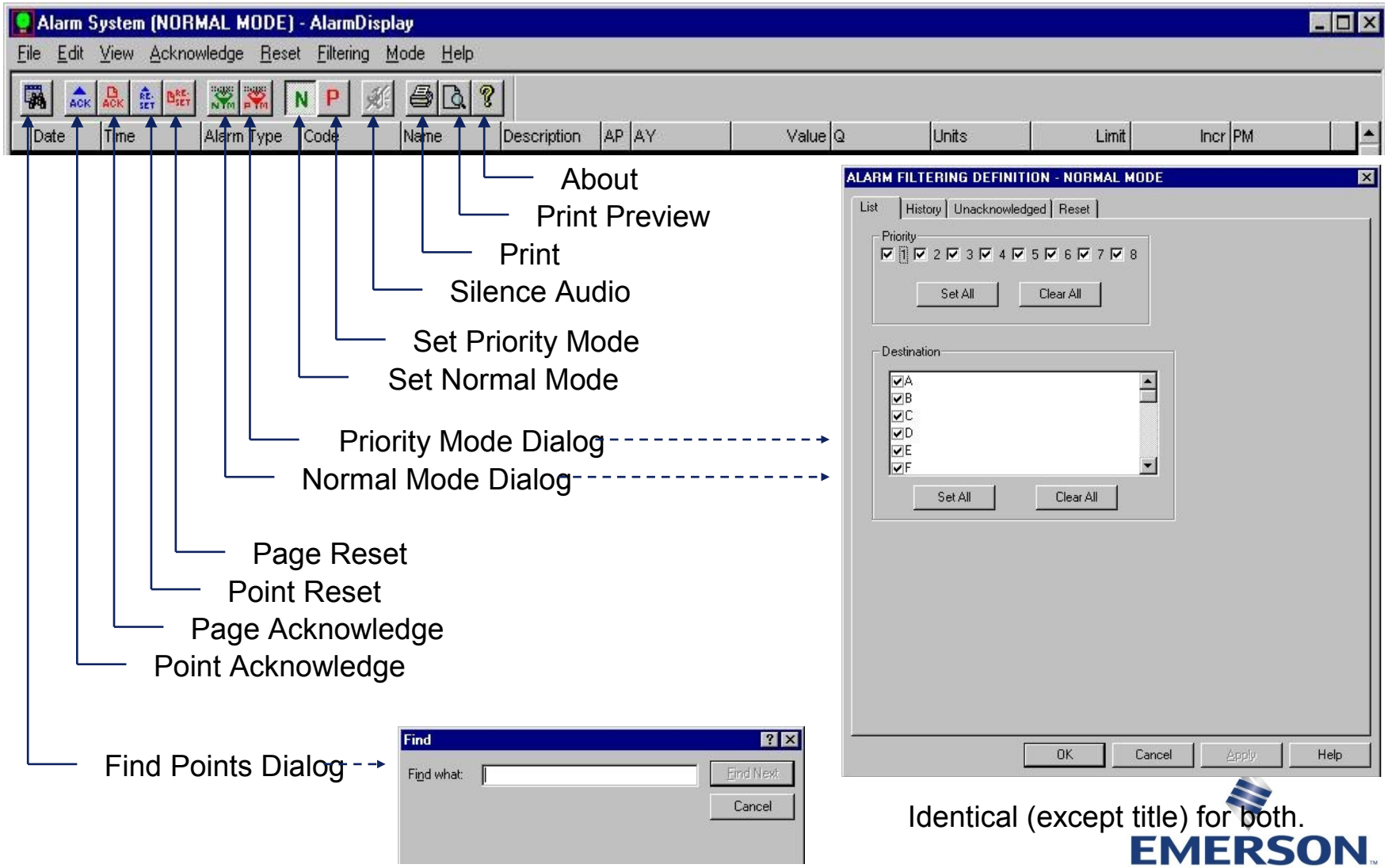
ALARM TOOLBAR



Identical (except title) for both.

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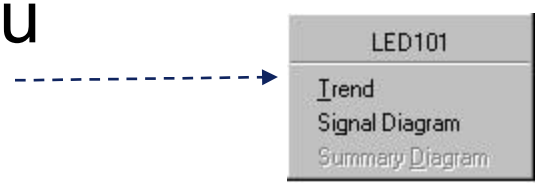
POINT INFORMATION

- Application to bring up information on individual points.
- Points can be searched for using the file menu or the search button.
- Information is presented in a tabular fashion
- Right Click to Point menu



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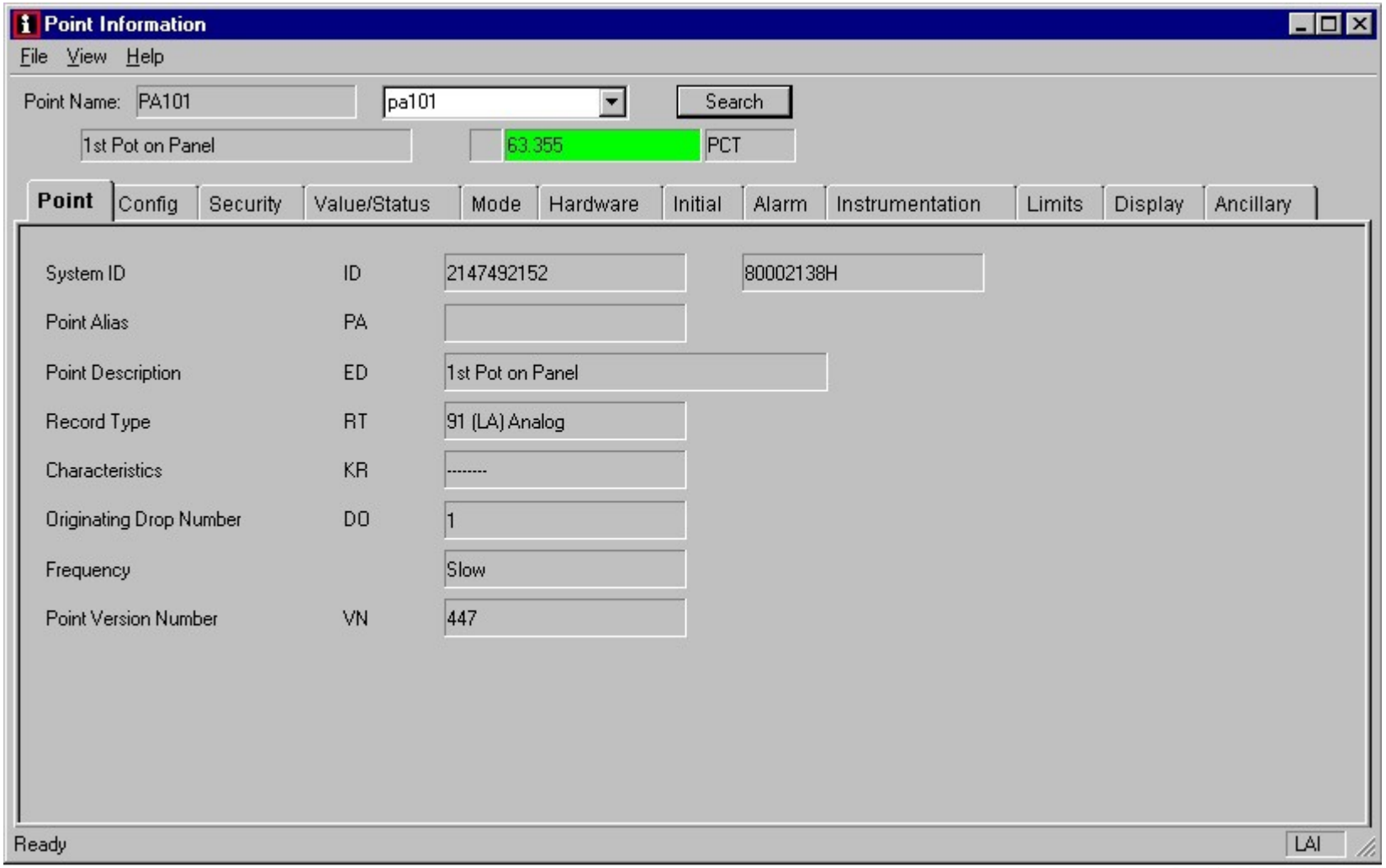
POINT INFO WINDOW



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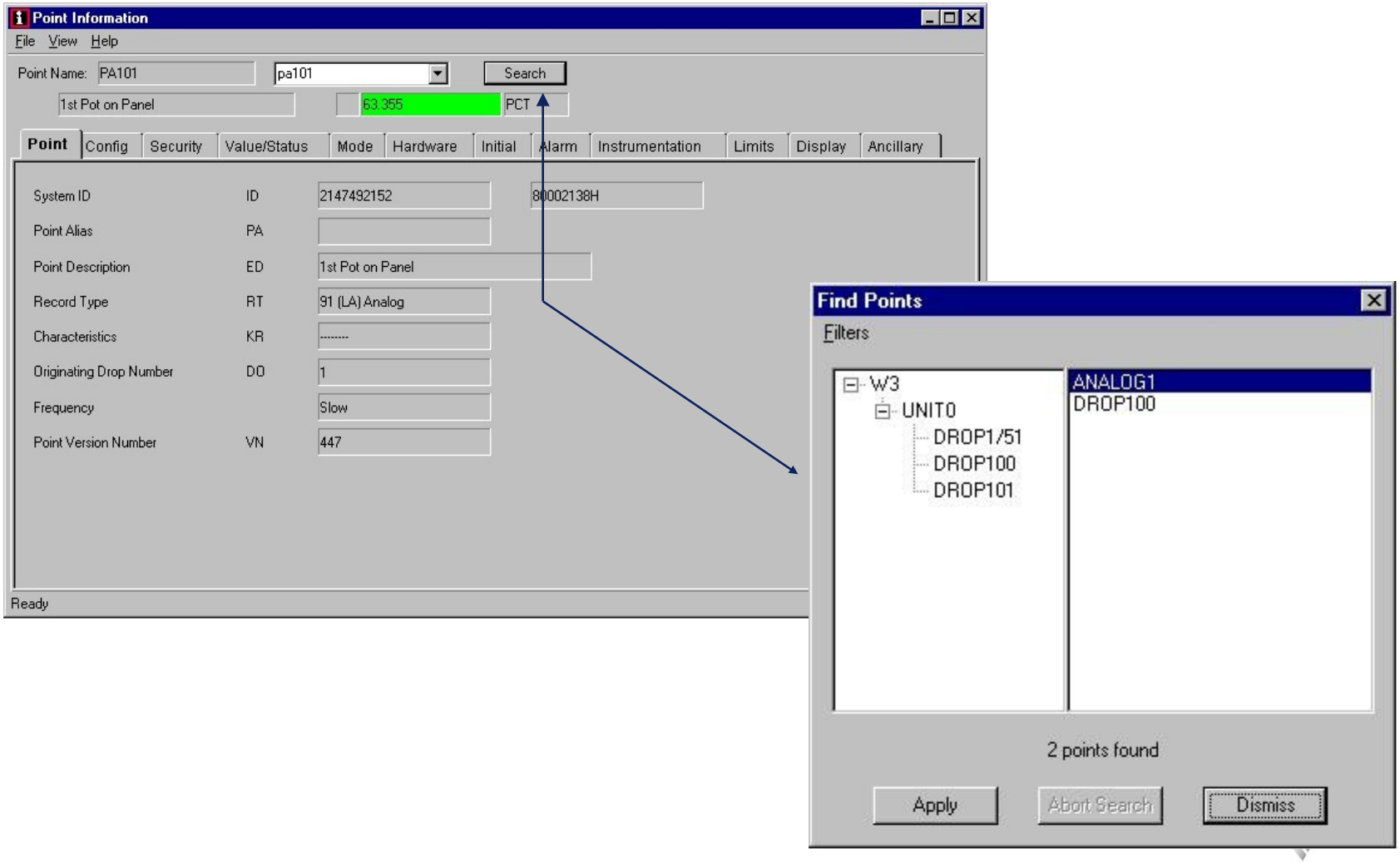
SEARCHING FOR POINTS



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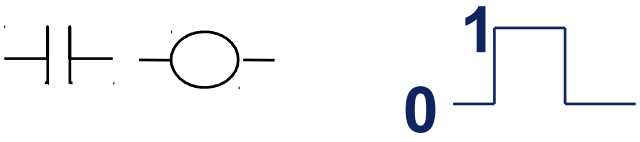
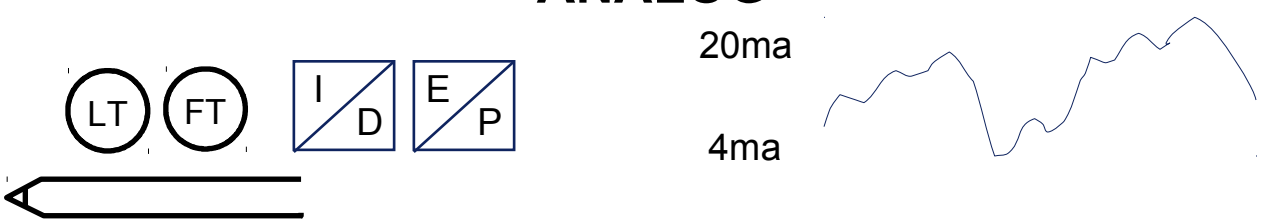
POINT INFORMATION TABS

•DIGITAL



Point	Config	Security	Value/Status	Mode	Hardware	Alarm	Display

•ANALOG



Point	Config	Security	Value/Status	Mode	Hardware	Initial	Alarm	Instrumentation	Limits	Display

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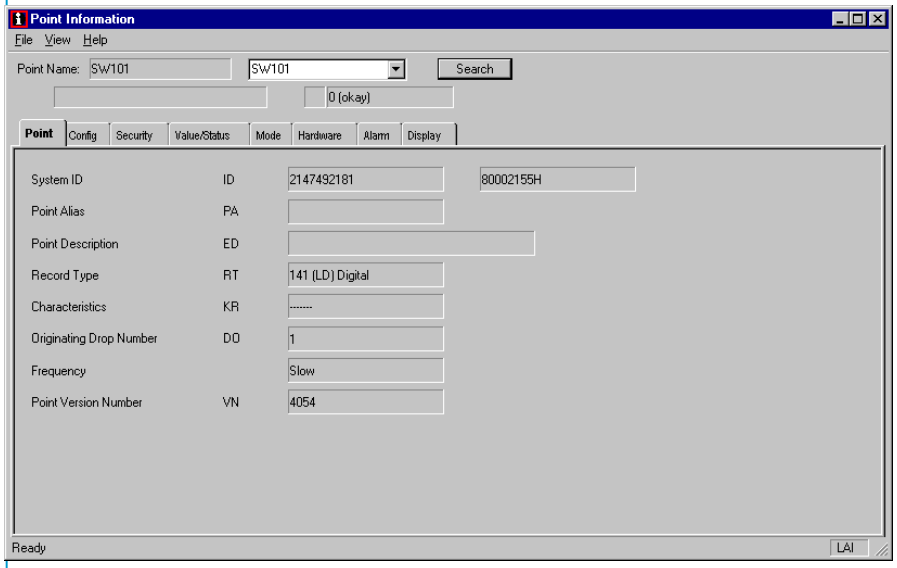
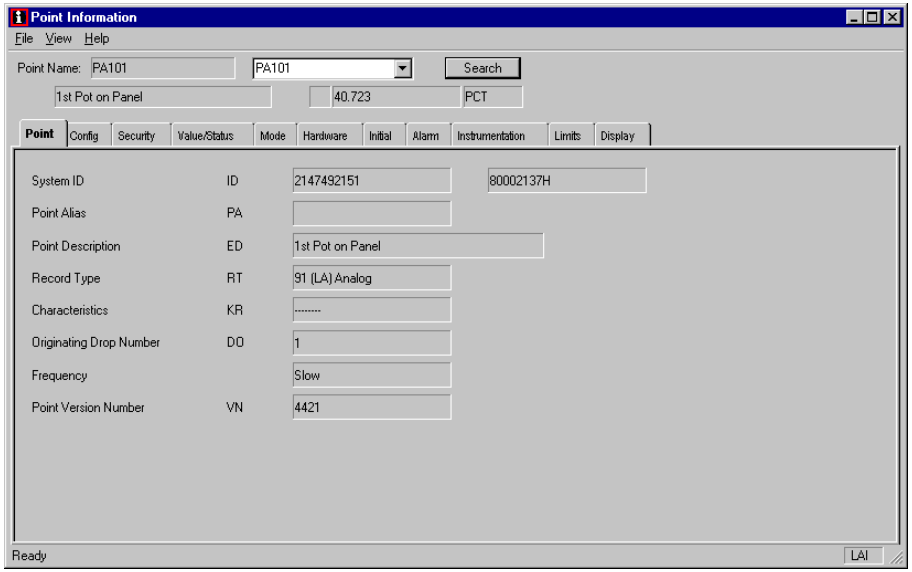
POINT TAB





Digital

Analog

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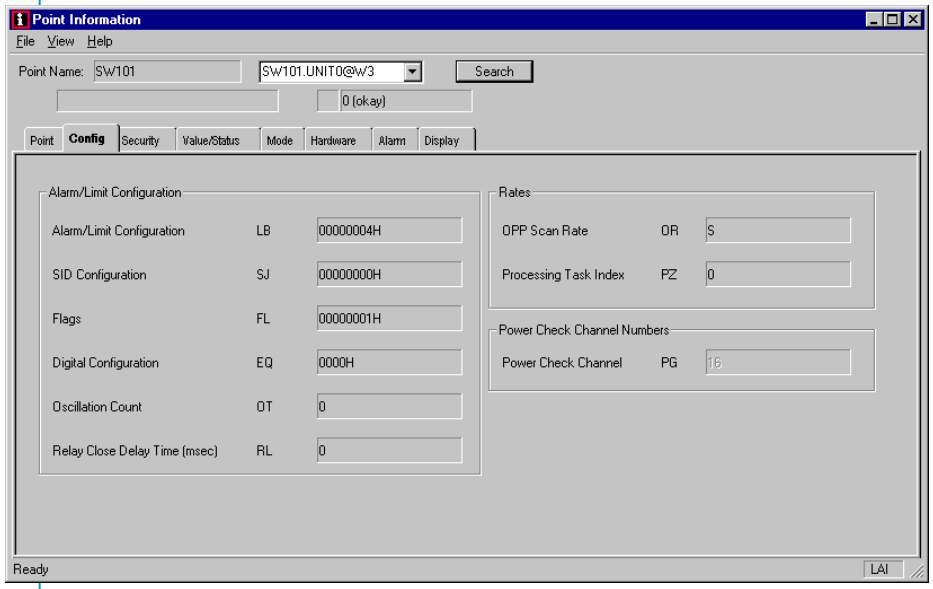
CONFIG TAB

Digital



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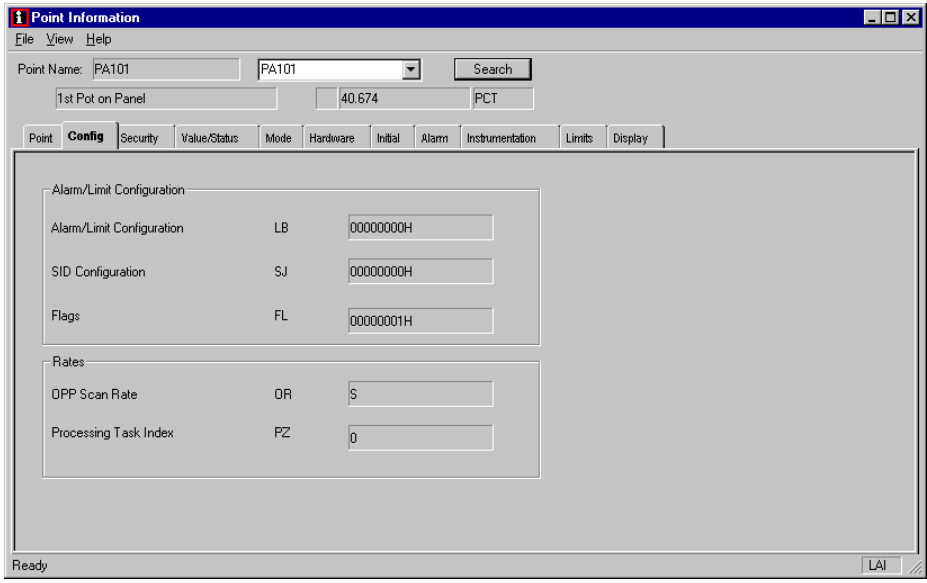

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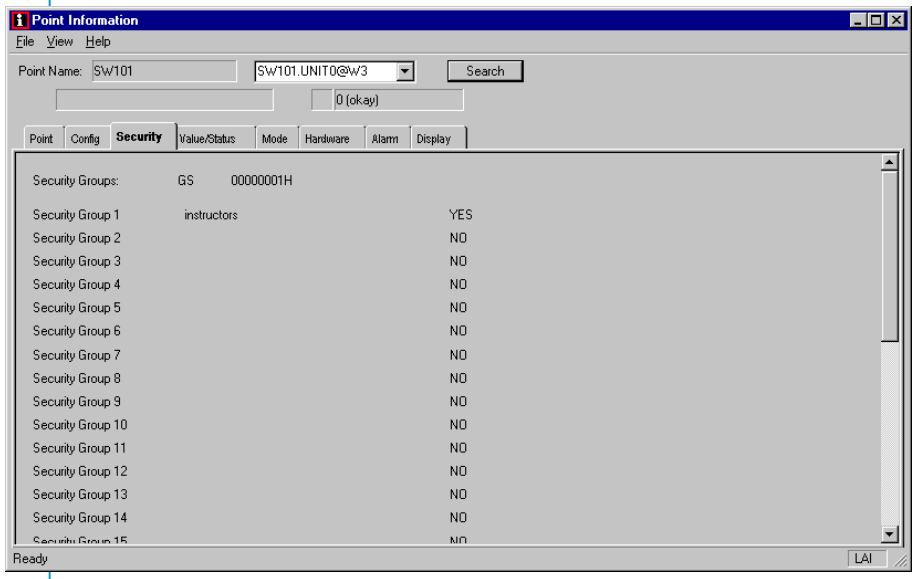
SECURITY TAB

Digital



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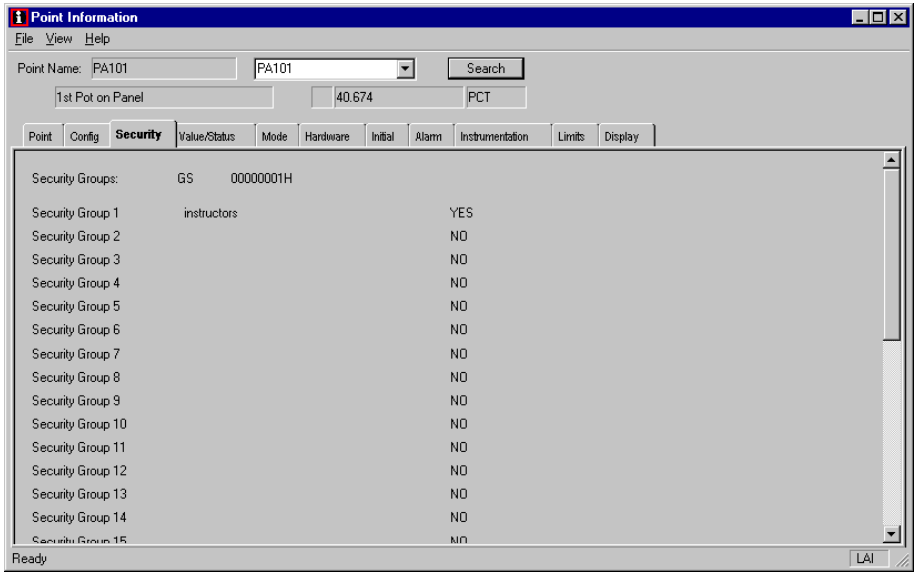

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VALUE/STATUS TAB

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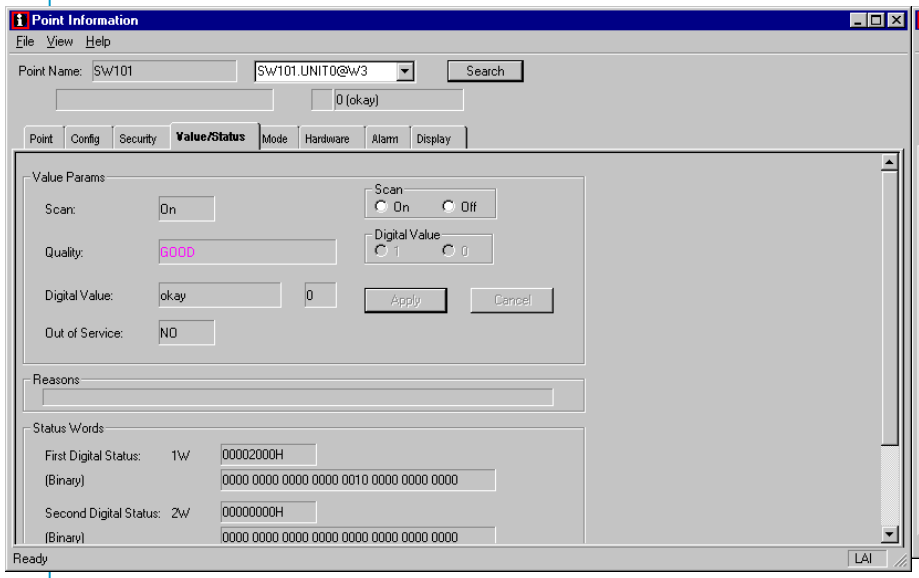

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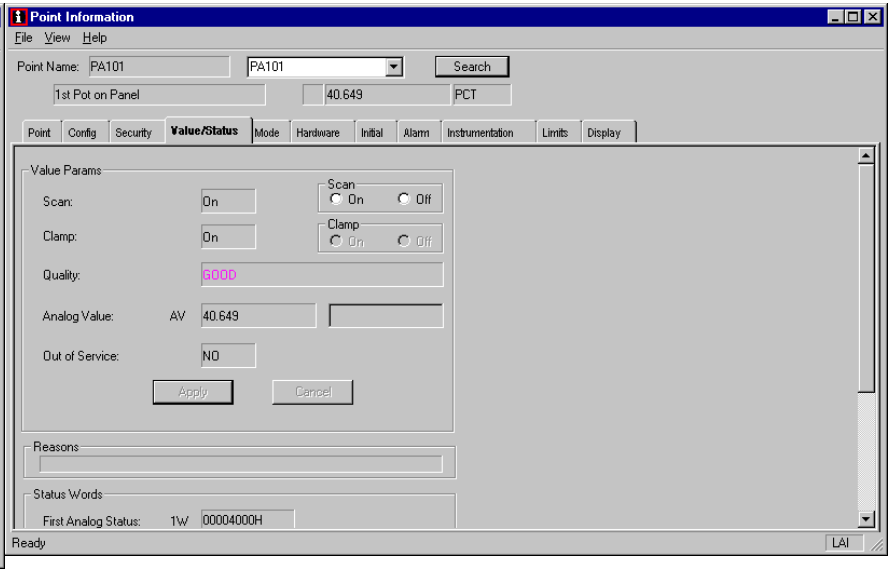

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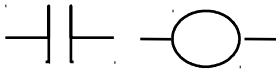
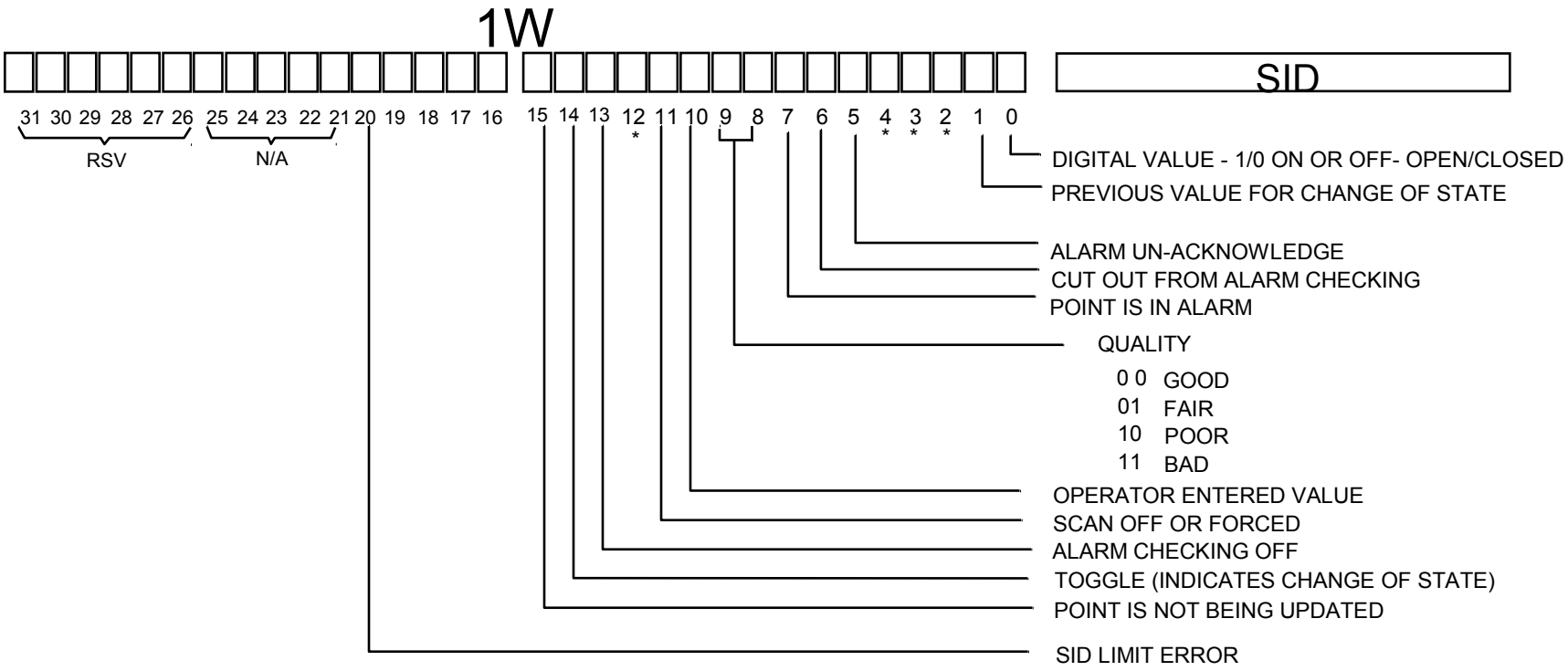
DIGITAL POINT ON OVATION HIGHWAY





Refer to R3 – 1140 Ovation Record Types Reference Manual

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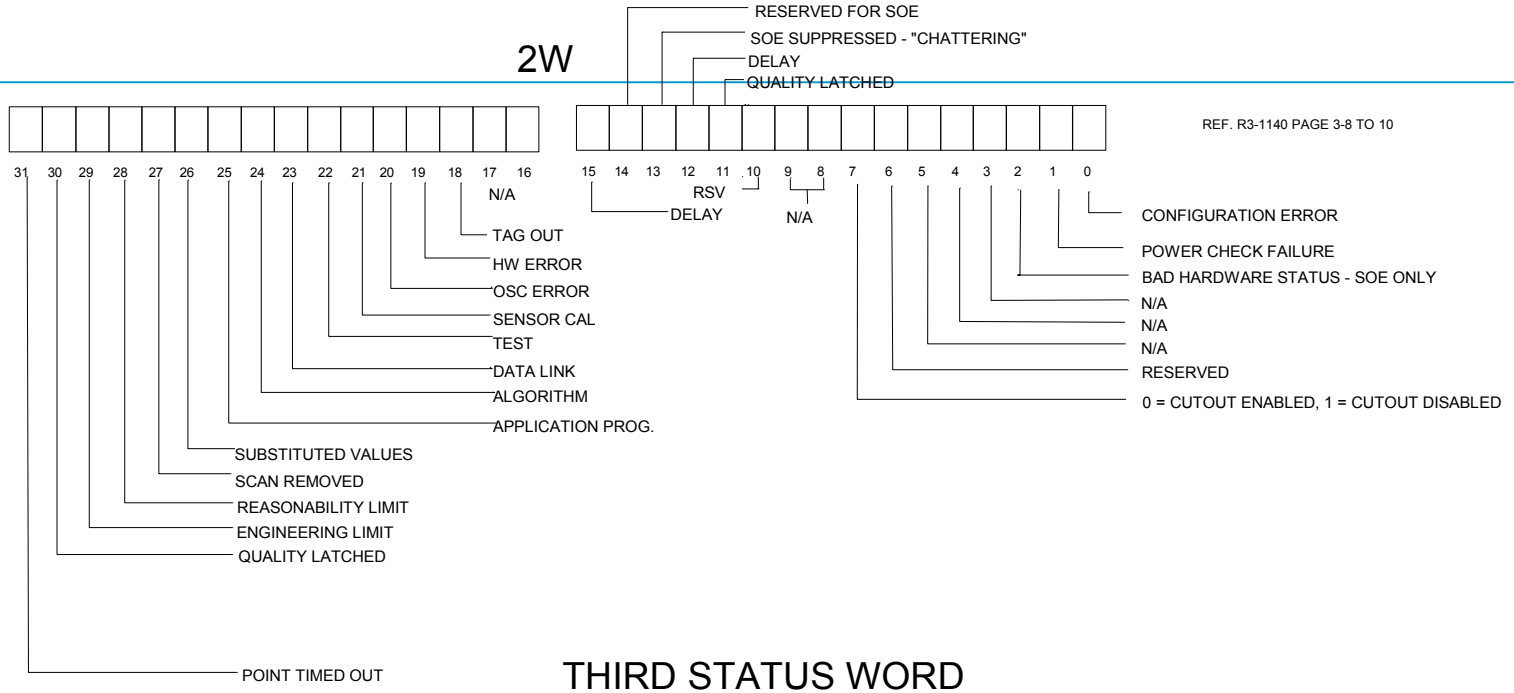
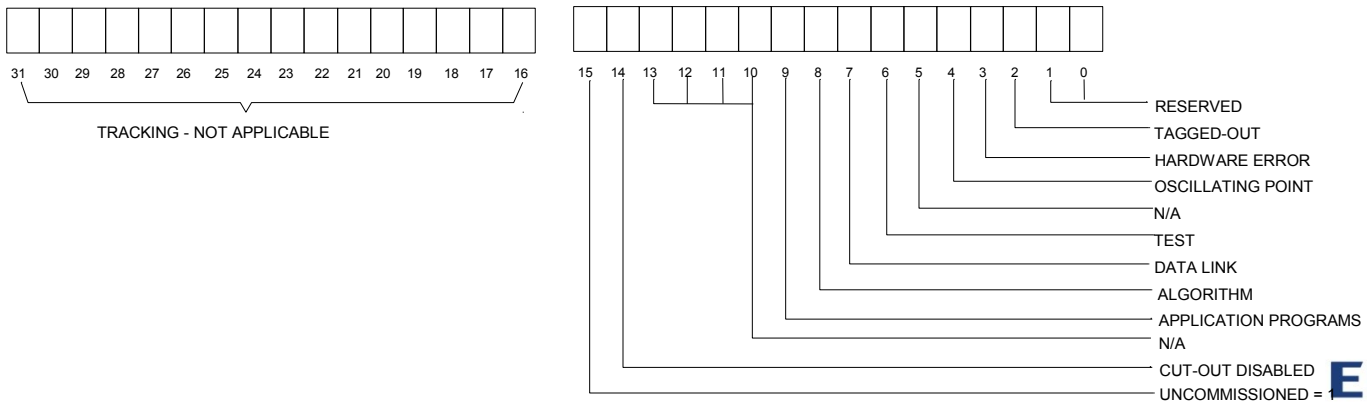
•SECOND STATUS WORD

2W



THIRD STATUS WORD

3W



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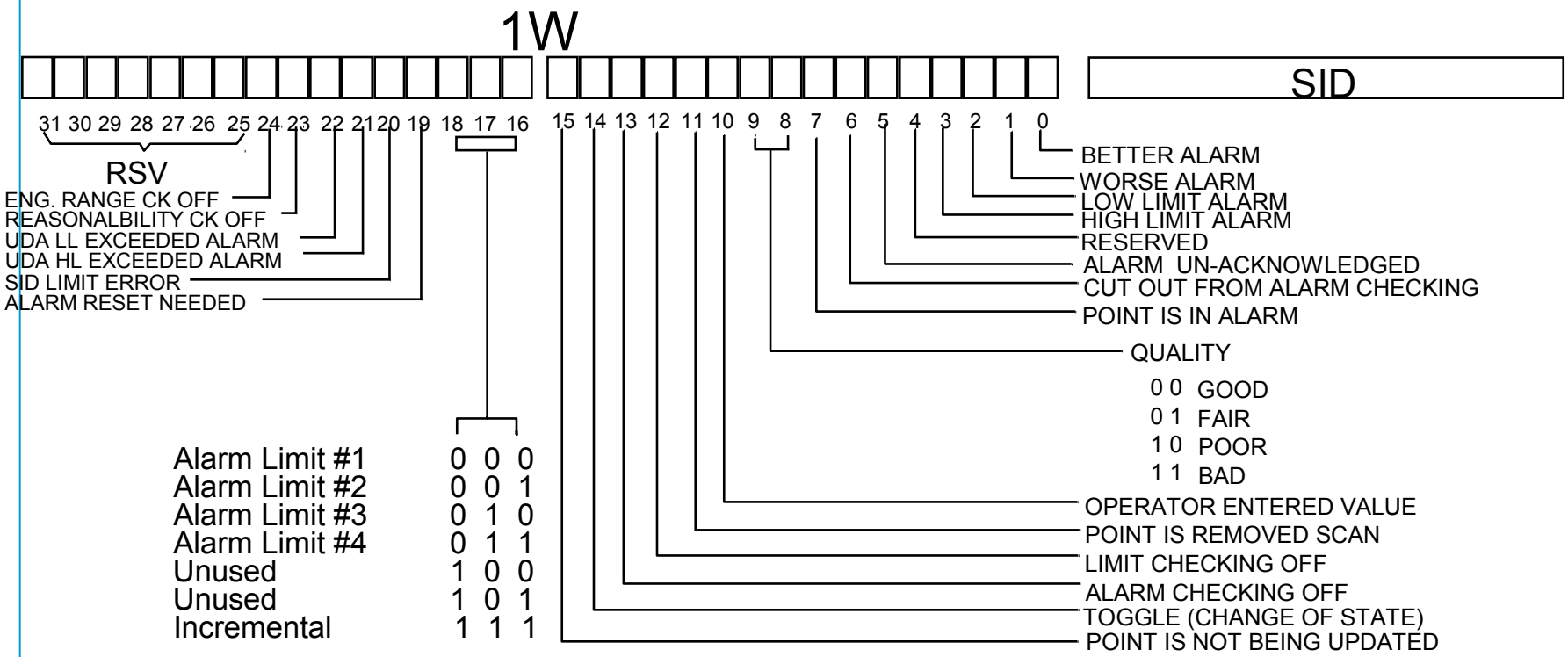
ANALOG POINT ON OVATION HIGHWAY



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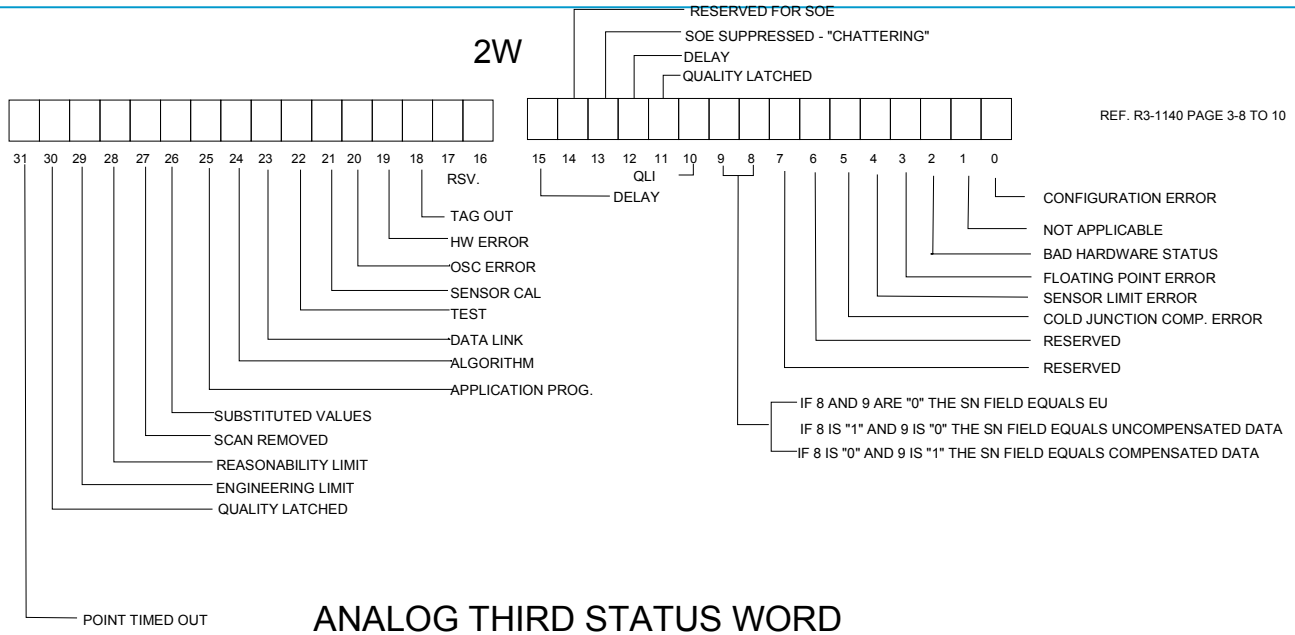
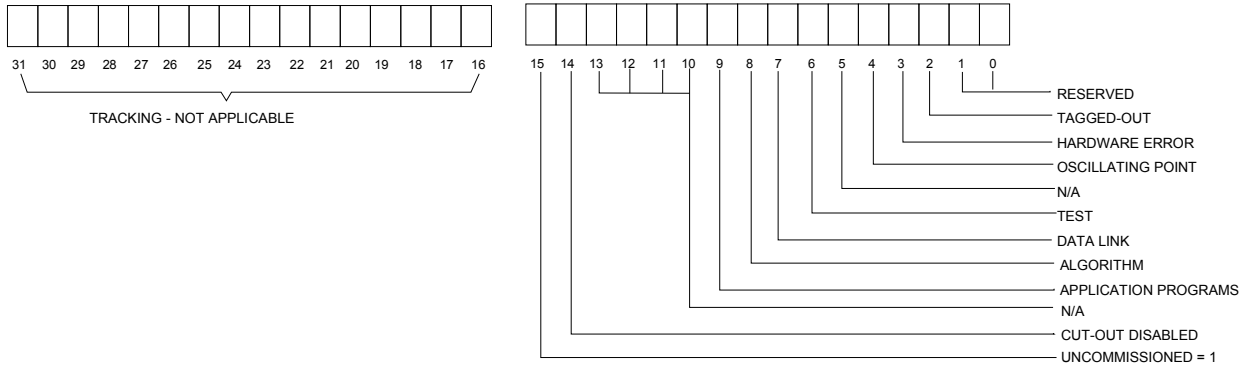
ANALOG 2W - 3W

ANALOG SECOND STATUS WORD



ANALOG THIRD STATUS WORD



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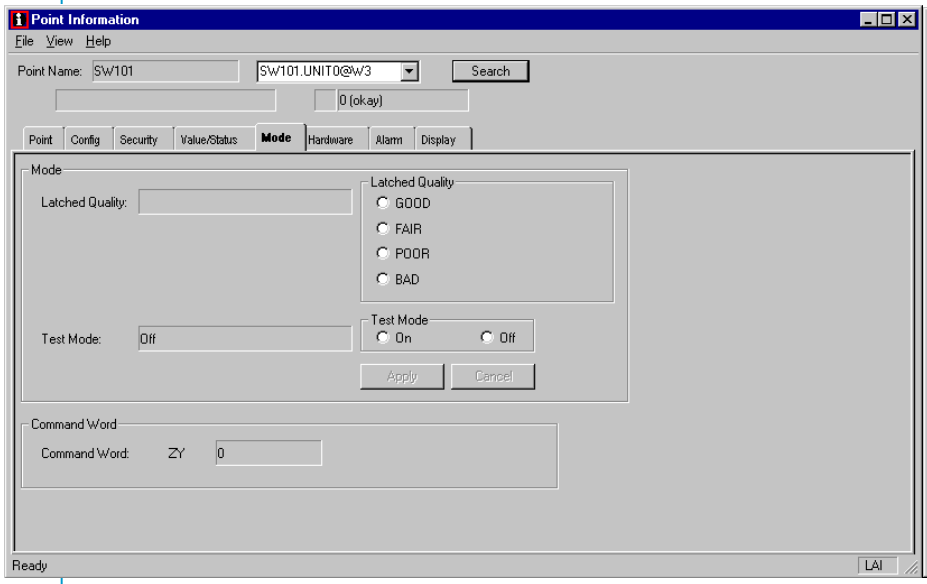
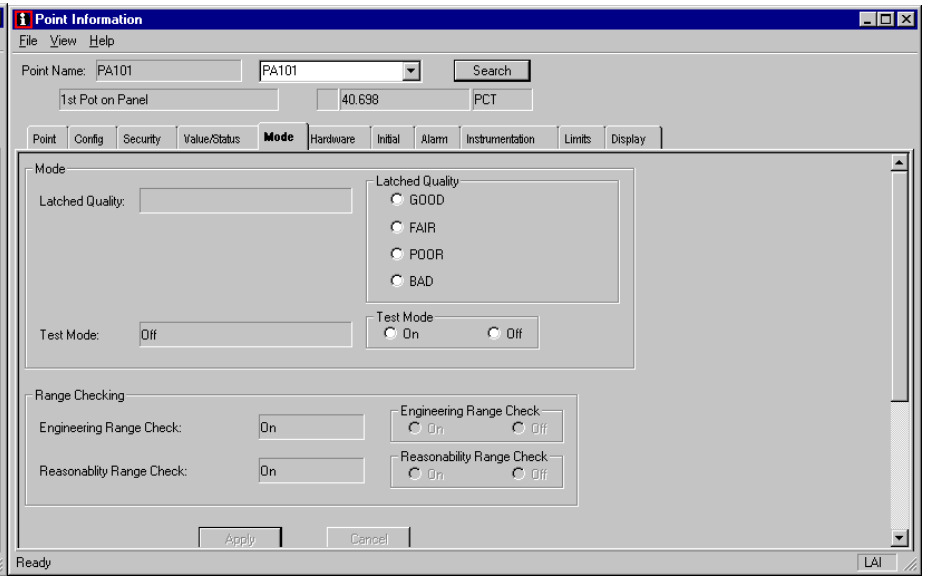
MODE TAB

Digital



Analog



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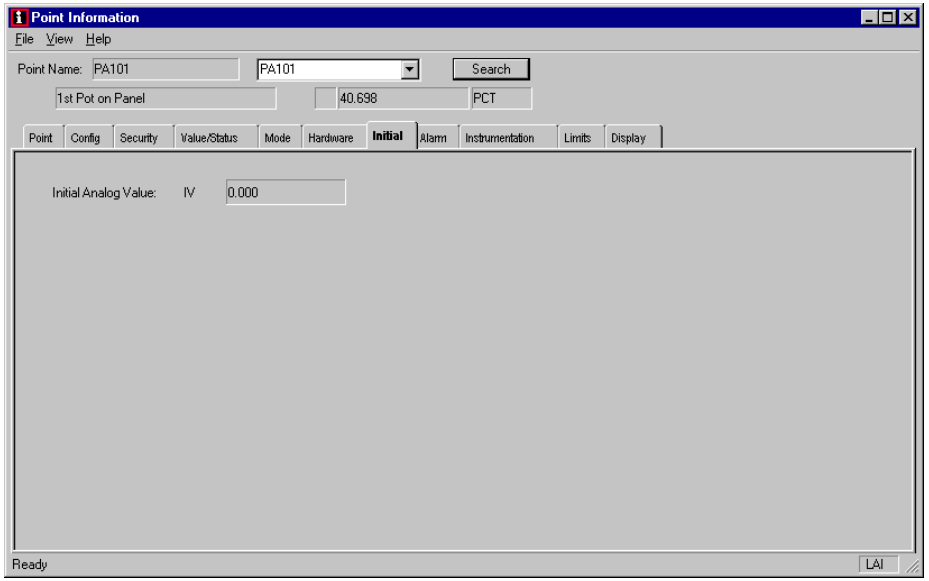
INITIAL TAB

Digital

Analog



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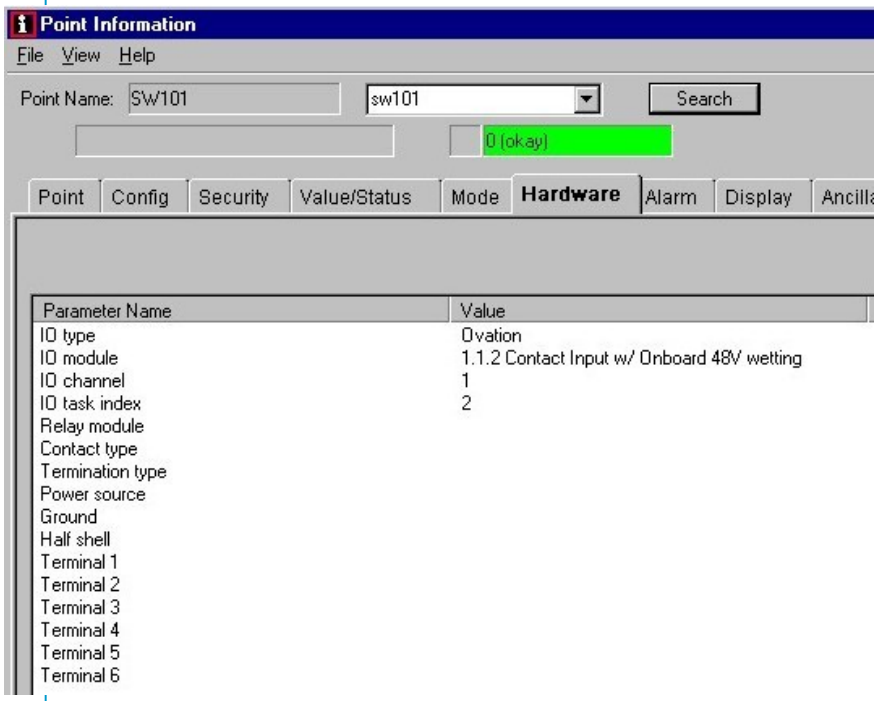
HARDWARE TAB

Digital



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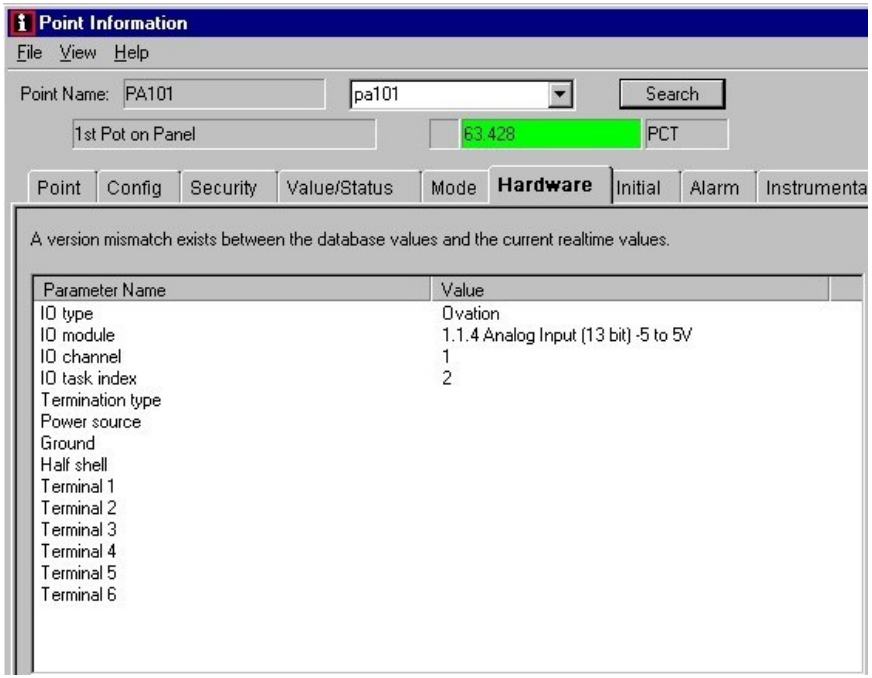

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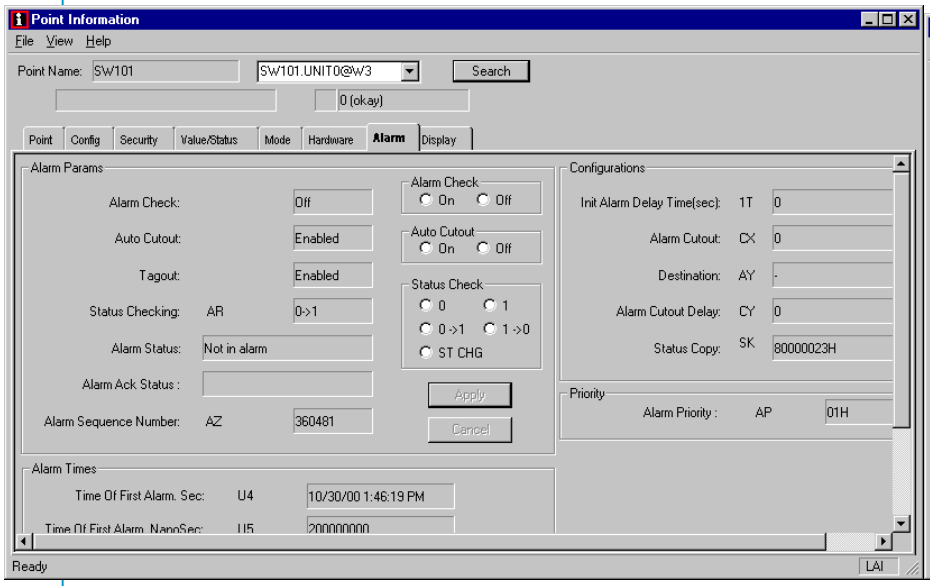
ALARM TAB

Digital



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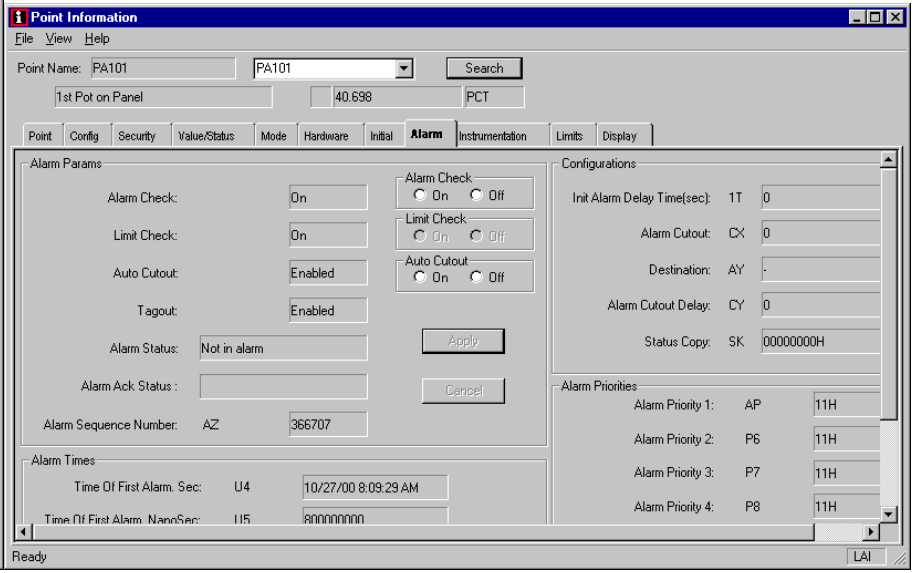

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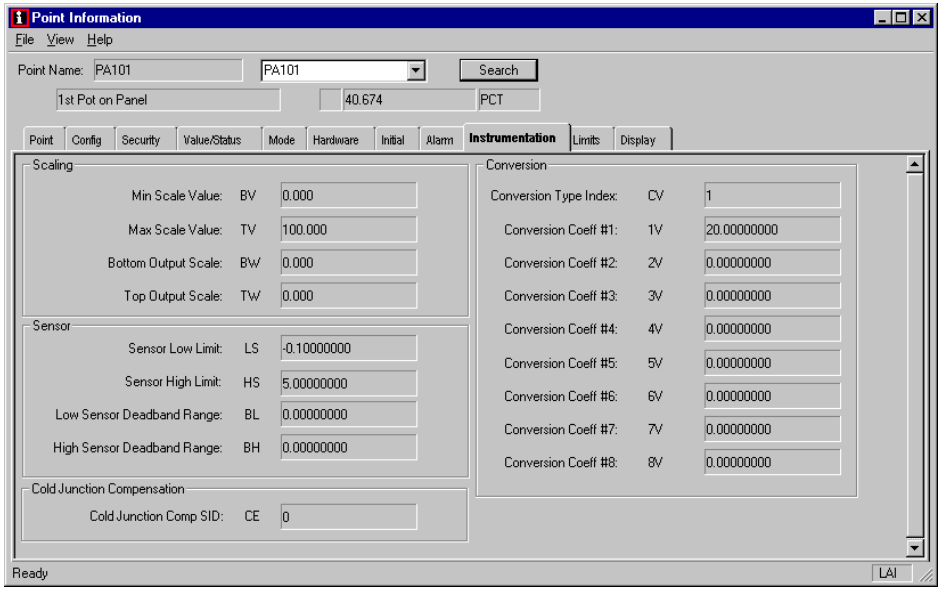
INSTRUMENTATION TAB

Digital

N/A

Analog



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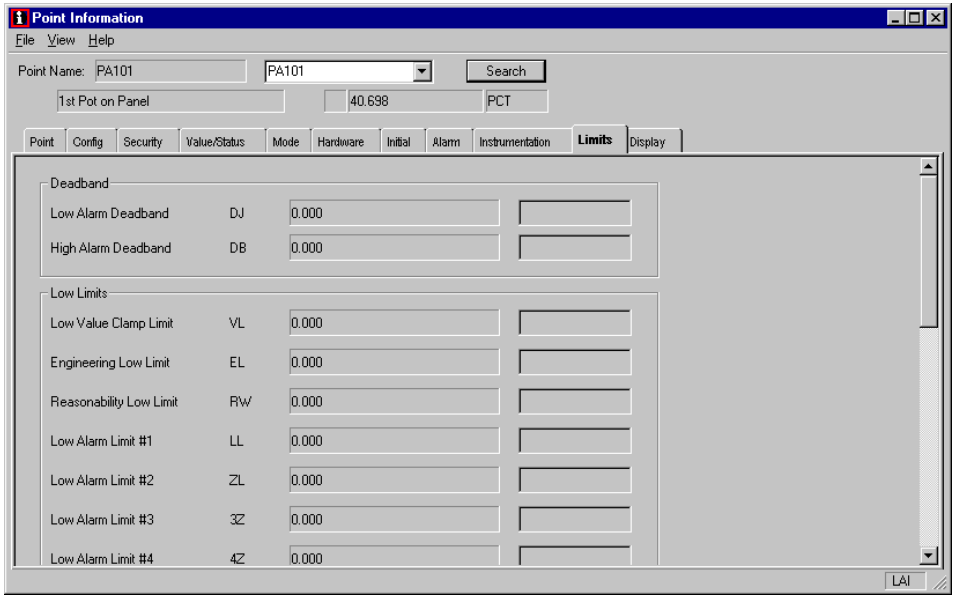
LIMITS TAB (TOP)

Digital

N/A

Analog



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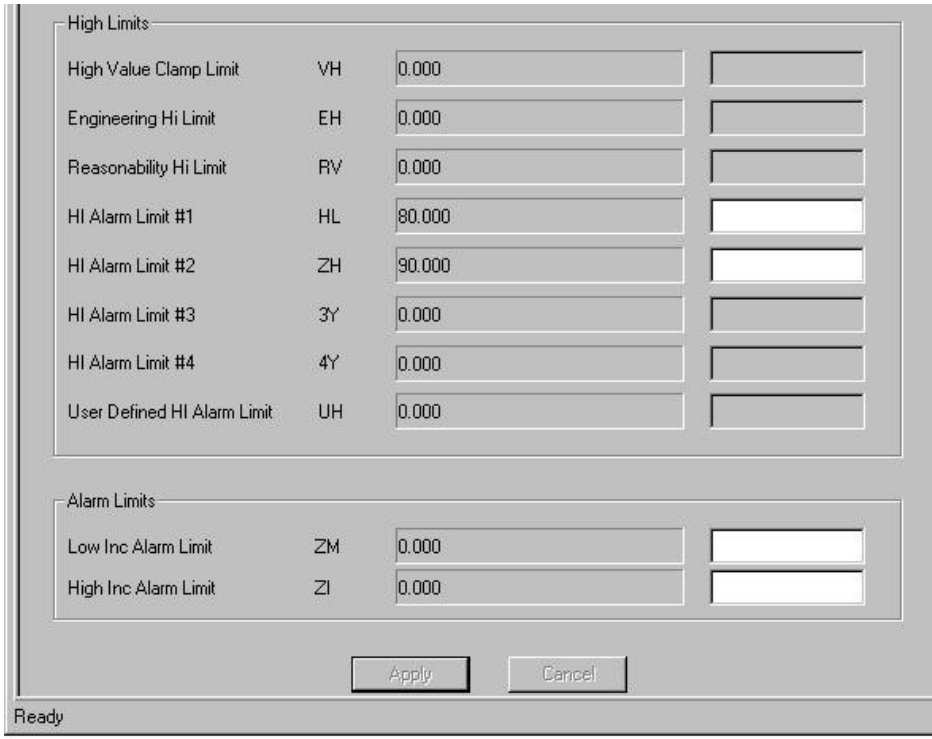
LIMITS TAB (BOTTOM)

Digital

N/A

Analog



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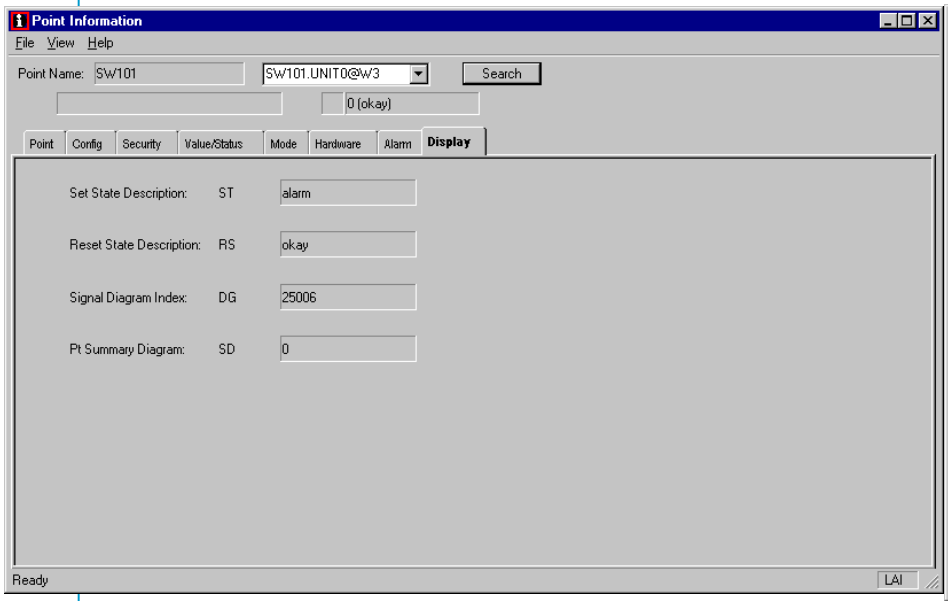
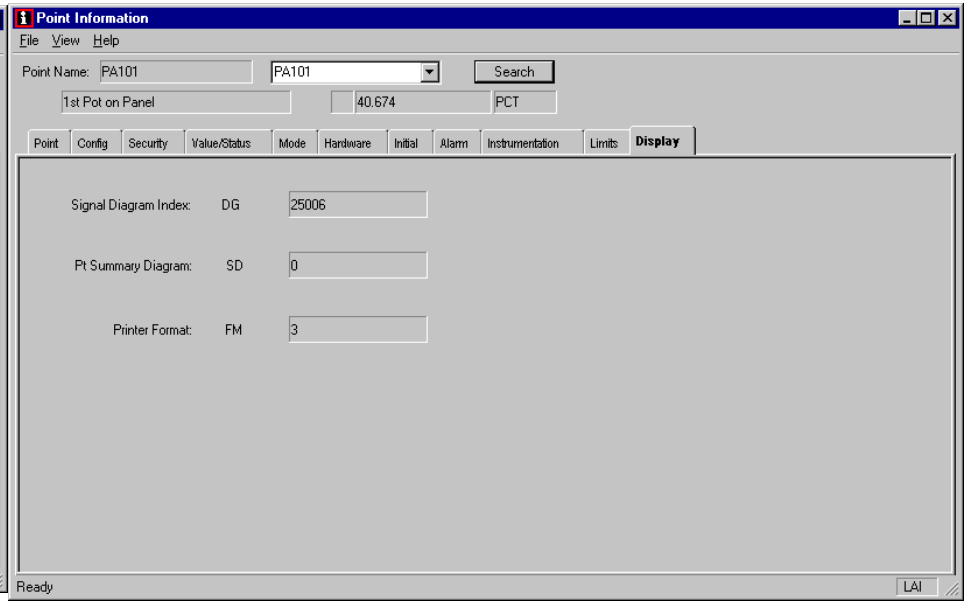
DISPLAY TAB

Digital



Analog



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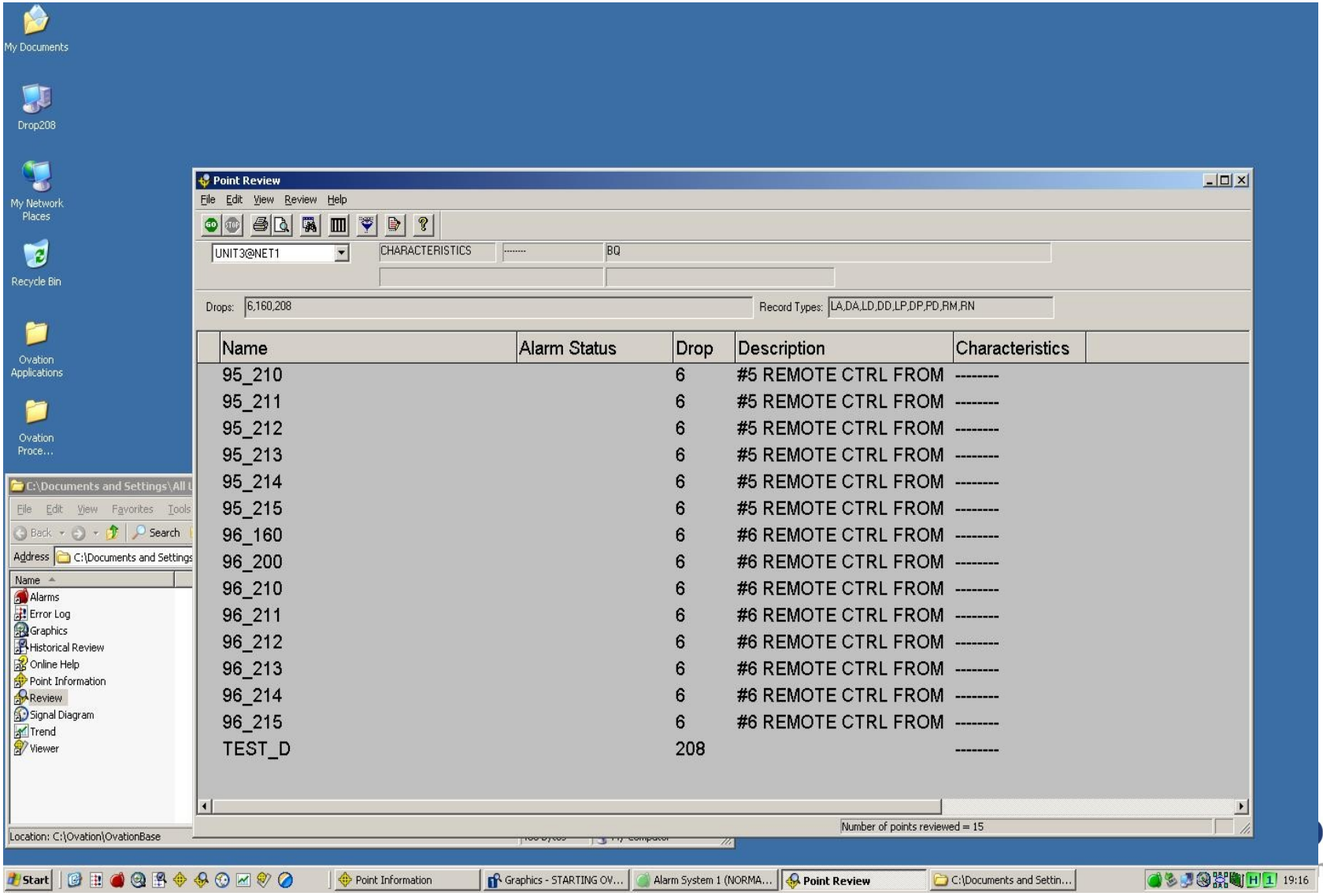
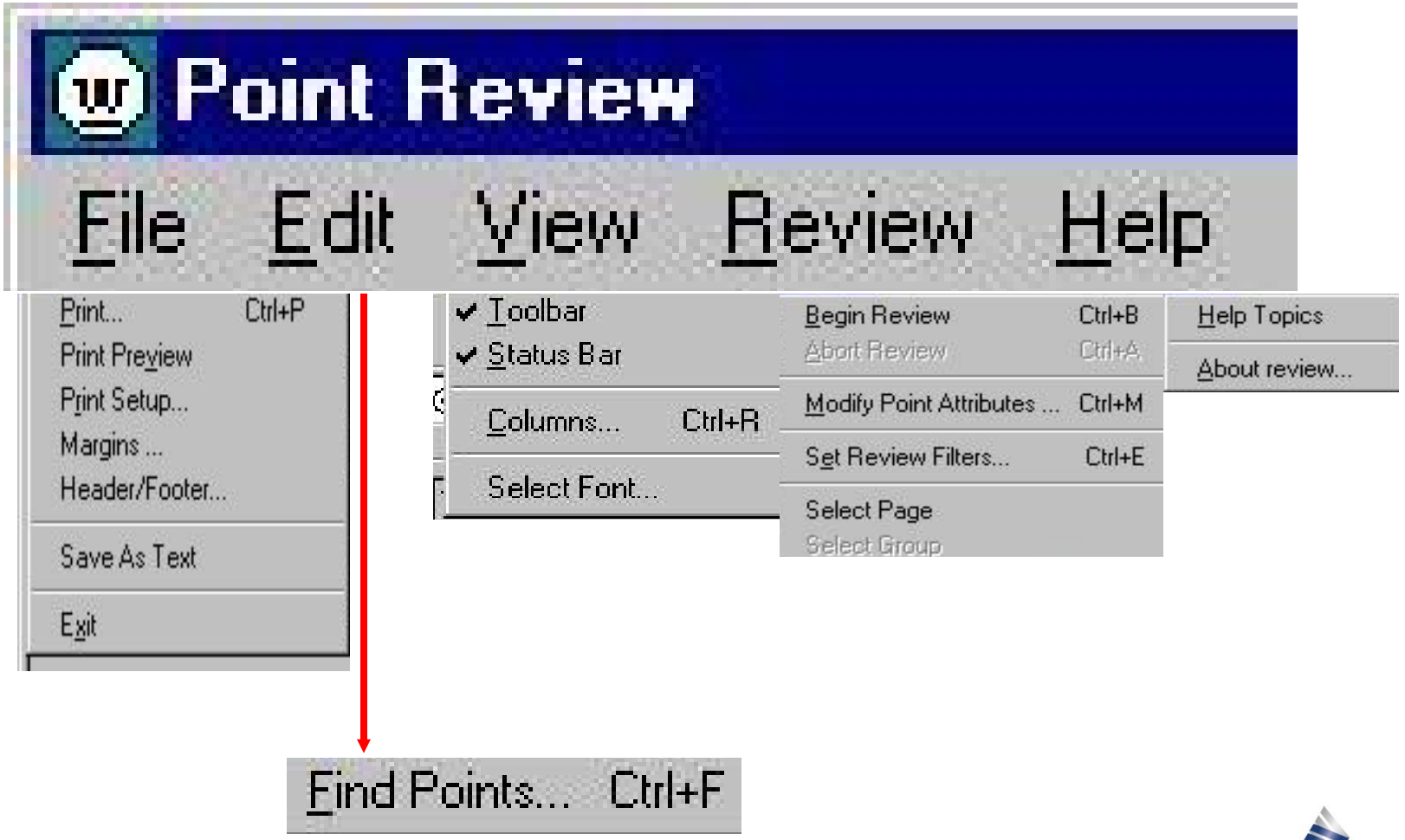
POINT REVIEW WINDOW



POINT REVIEW MENUS



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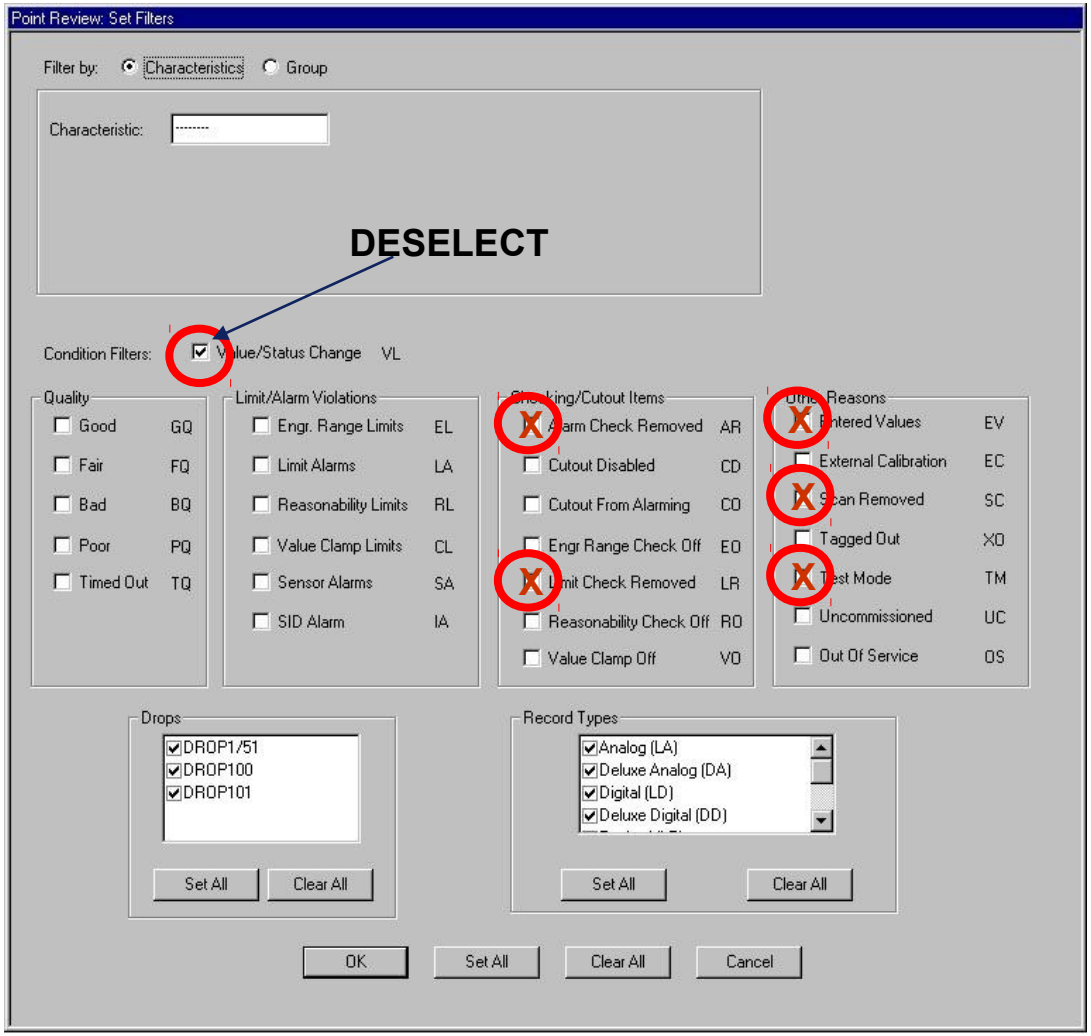
POINT REVIEW FILTERS



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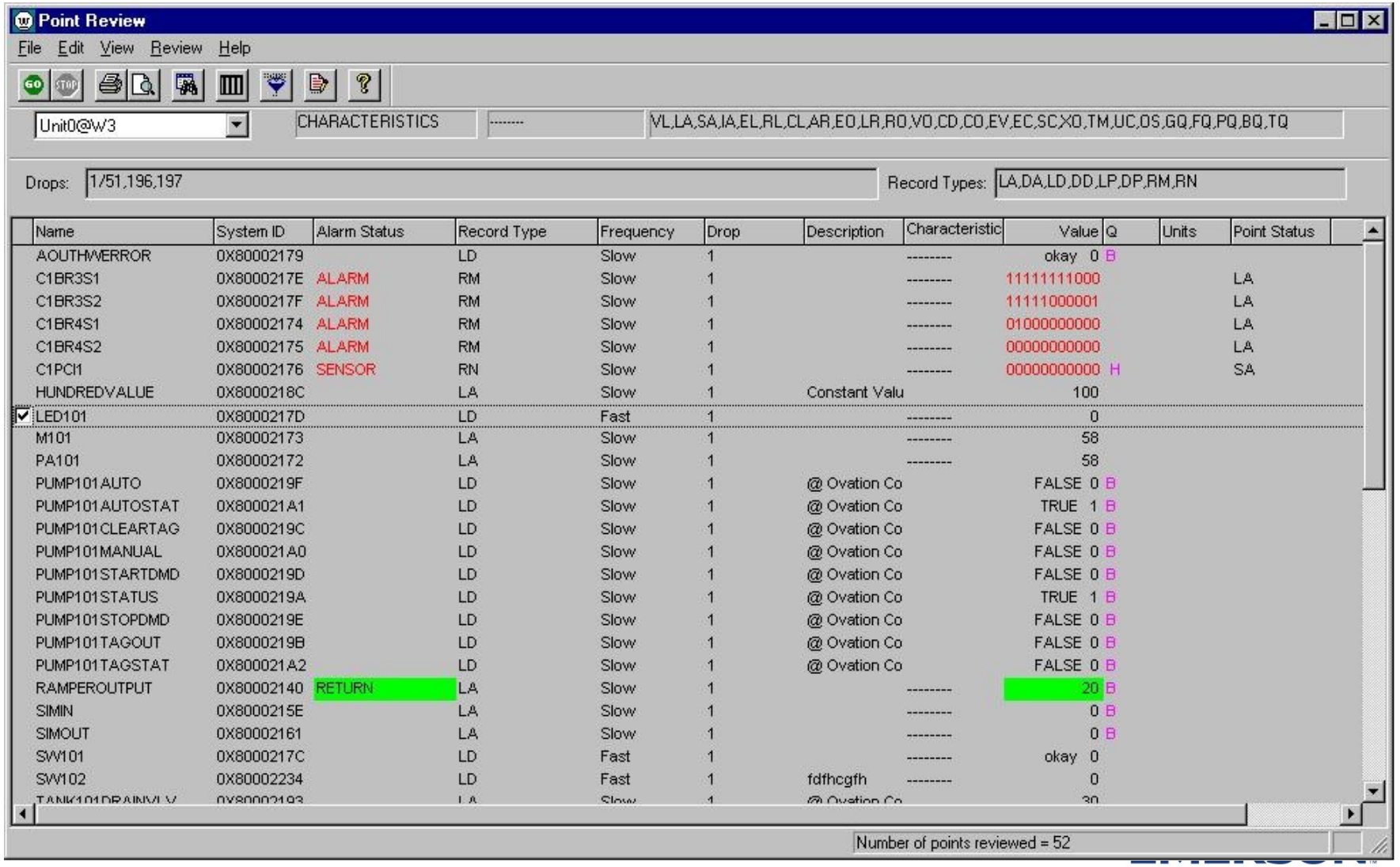
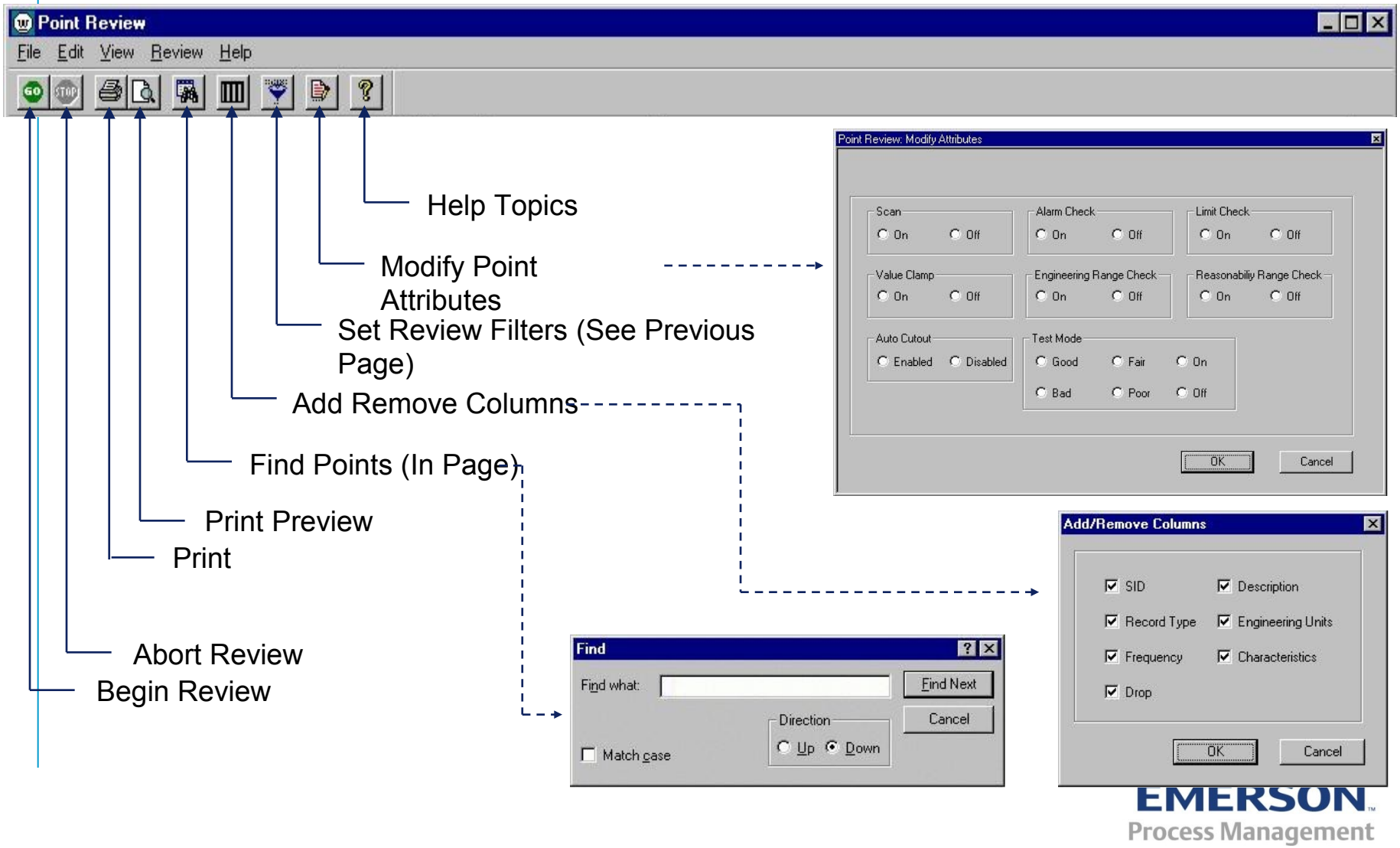
POINT REVIEW RESULTS



POINT REVIEW TOOLBAR



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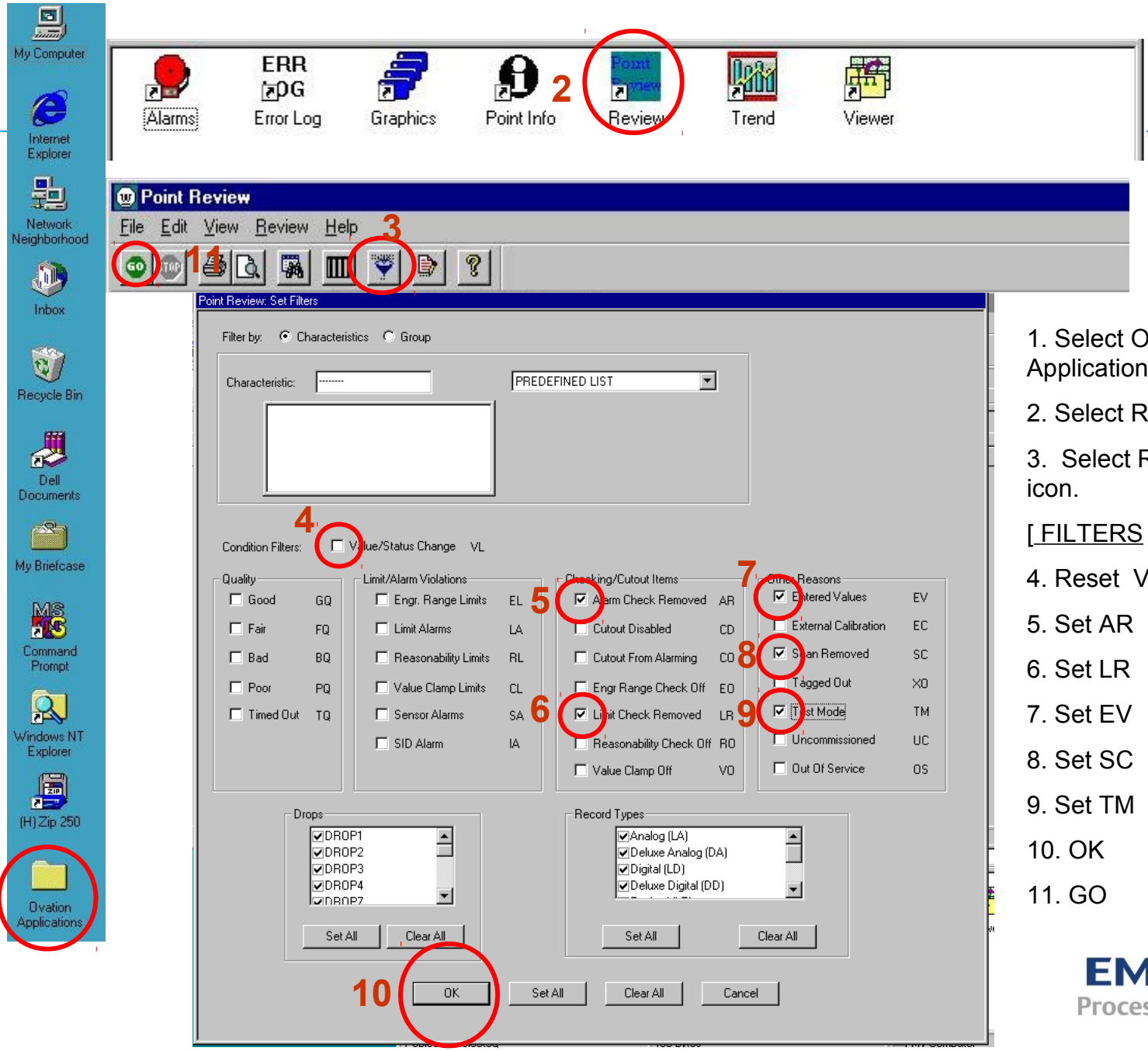

1. Select Ovation Applications icon.
2. Select Review.
3. Select Review Filters icon.

[FILTERS]

4. Reset VL
5. Set AR
6. Set LR
7. Set EV
8. Set SC
9. Set TM
10. OK
11. GO

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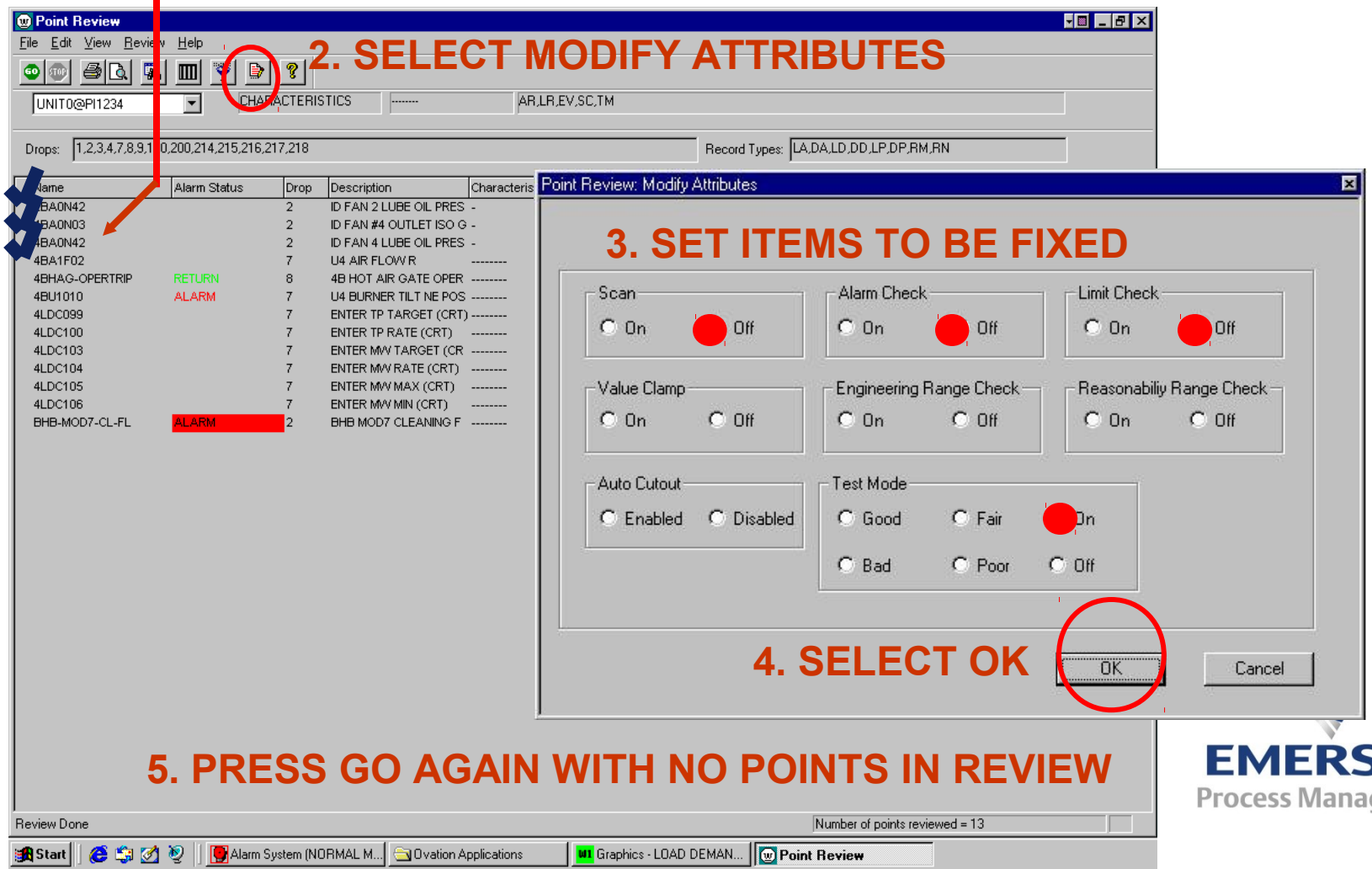
FIXING REVIEW RESULTS

1. CHECK POINTS THAT ARE TO BE FIXED. REMEMBER THE SHIFT KEY AND ADDITIONAL CLICK FILLS WITH CHECKS AND CTRL KEY REPEATS



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Module 3

CONTROLLER DIAGNOSIS AND MAINTENANCE

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MODULE 3 OBJECTIVES

- Understand the Architecture, components, redundancies of OCR Controller
- Understand the Controller features and capabilities
- Understand diagnostic diodes and displays on controller's cards
- Utilize System Status diagram; Error codes and Controller diagnostics
- Identification and replacement of a failed controller card

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OVATION CONTROLLER OCR400

- Processor Intel Pentium CELERON 400MHz
- Commertially available operating system VxWorks
- Flash Memory 64 MB
- DRAM 64 MB expandable to 128 MB
  No Battery / No PROM

- Capacity : up to 4778 I/Os
- Capacity : up to 32 000 process points

- Up to 5 control tasks,
  - T1 : 100 ms
  - T2 : 1000 ms (1s)
  - T3, T4, T5: configurable 10 ms to 30s

Entirely redundant
Bumpless failover
Watchdog function

- Supported connection with third party systems:
  - Allen-Bradley; GE Mark V/VI; Modbus ; E/S RTP;
  - Toshiba; MHI; GE Genius; Foundation Fieldbus.
  - External Ovation

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CONTROLLER COMPONENT MODULES

The OCR 400 Controller contains two main modules:

- Processer Module: This module communicates with the Ovation network and provides nine indicator LED's that display information about the status of network communication.
- IOIC Module: This module communicates with I/O devices and provides ten indicator LED‘s that display information about the status of I/O communication.

Note: ***Fan assemblies are not required for OCR 400 Controllers.***

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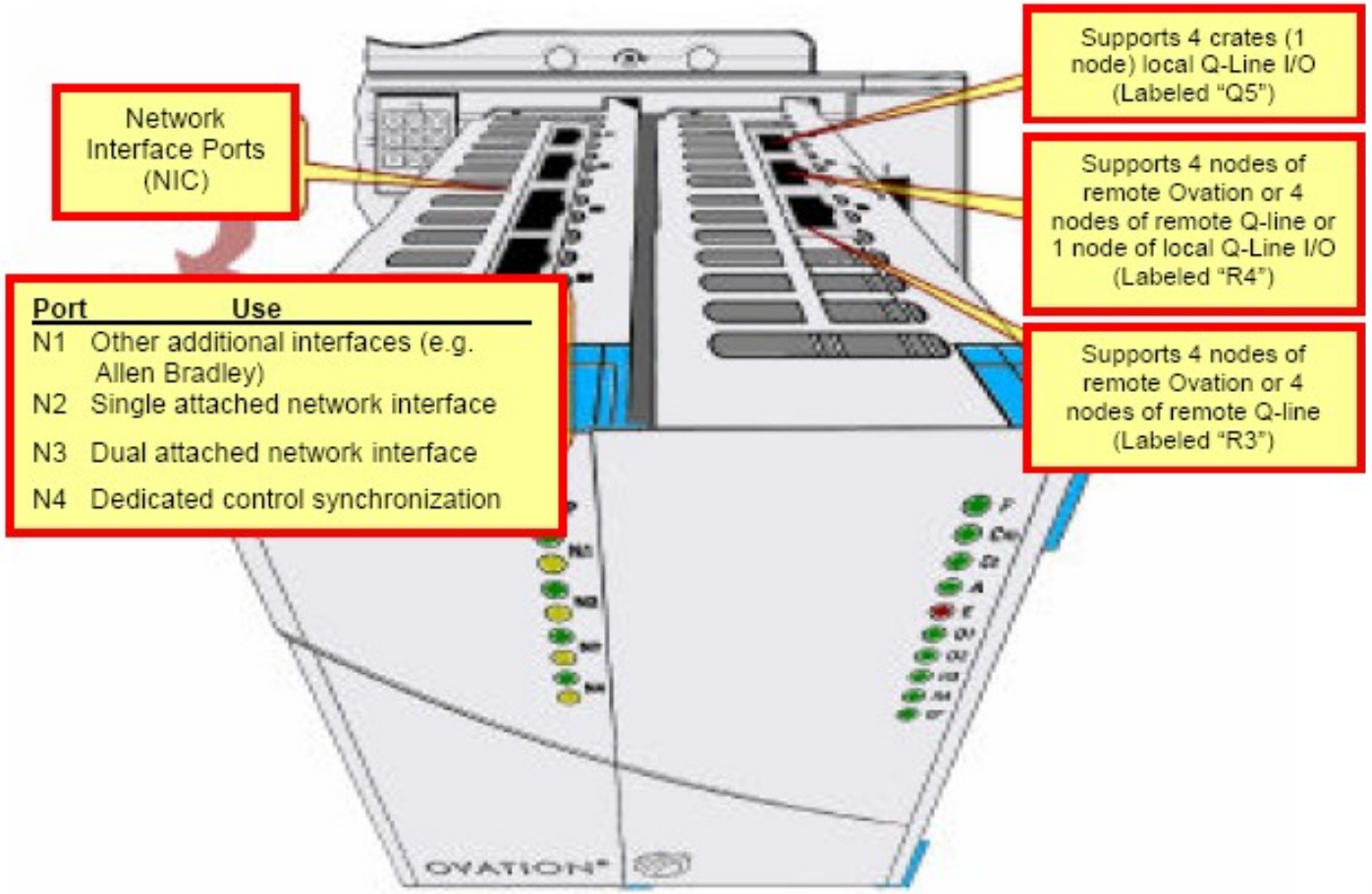
CONTROLLER COMPONENT MODULES



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PROCESSOR MODULE LED INFORMATION

LED	MEANING	ON	OFF	BLINKING
P	Power	Module is Powered	Module has no Power	N/A
N1, N2, and N4 N3	Ethernet port green LED (Link Intergrity/Power LED	Port Is Receiving Power	Port in not receiving power	Module is linked to the network through the port
	Etherner port amber LED (Link Activity Status	N/A	N/A	Module is receiving or transmitting data on the port

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IOIC MODULE LED INFORMATION

STATUS				
Label	**Meaning**	**ON (SOLID)**	**OFF**	**Blinking**
P	Power	Controller powered	Controller not powered	N/A
CM	Communication	Communications hung	No commands being received from the processor module	Commands being received from processor module
CT	Control	Controller is acting as Primary	Controller not operational, in boot-up mode, or cleared	Controller acting as secondary
A	Alive	Alive (under hardware control)	Alive timer timed out	N/A
E	Error	Performing diagnostics during boot sequence	Application firmware running. No errors	An error is indicated. Read error codes from node LEDs, GMD / Error Log.

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IOIC MODULE LED INFORMATION (cont.)

Node LED	STATUS			
Label	**Meaning**	**ON (SOLID)**	**OFF**	**Blinking**
O1	local Ovation #1 (port L1)	All I/O cycles succeeding (with “E” LED off)	No I/O cycles are being attempted (with “E” LED off)	Some or all I/O cycles are failing (with “E” LED off)
O2	local Ovation #2 (port L2)	All I/O cycles succeeding (with “E” LED off)	No I/O cycles are being attempted (with “E” LED off)	Some or all I/O cycles are failing (with “E” LED off)
R3, R4	Port R3 and R4	All I/O cycles succeeding (with “E” LED off)	No I/O cycles are being attempted (with “E” LED off)	Some or all I/O cycles are failing (with “E” LED off)
Q5	Port Q5	All I/O cycles succeeding (with “E” LED off)	No I/O cycles are being attempted (with “E” LED off)	Some or all I/O cycles are failing (with “E” LED off)

NOTE:

A Controller fault is indicated when the red E LED is blinking. In this state, the node LEDs (O1, O2, R3, R4, and Q5) will blink the actual error code as two separate binary numbers followed by a 3-second pause (all node LEDs off, 0000). This sequence repeats as long as the error state persists.

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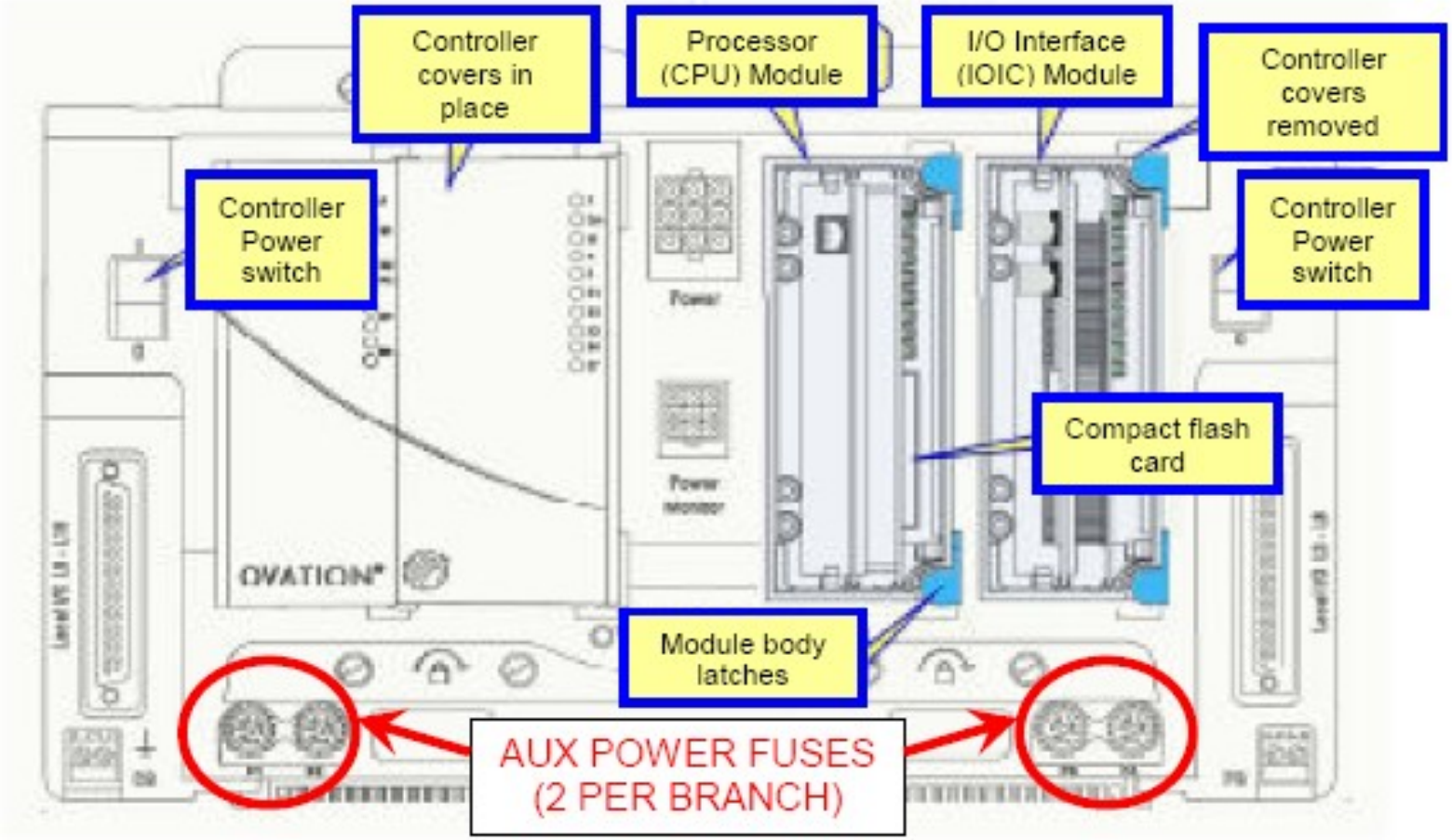
OCR400 CONTROLLER ASSEMBLY



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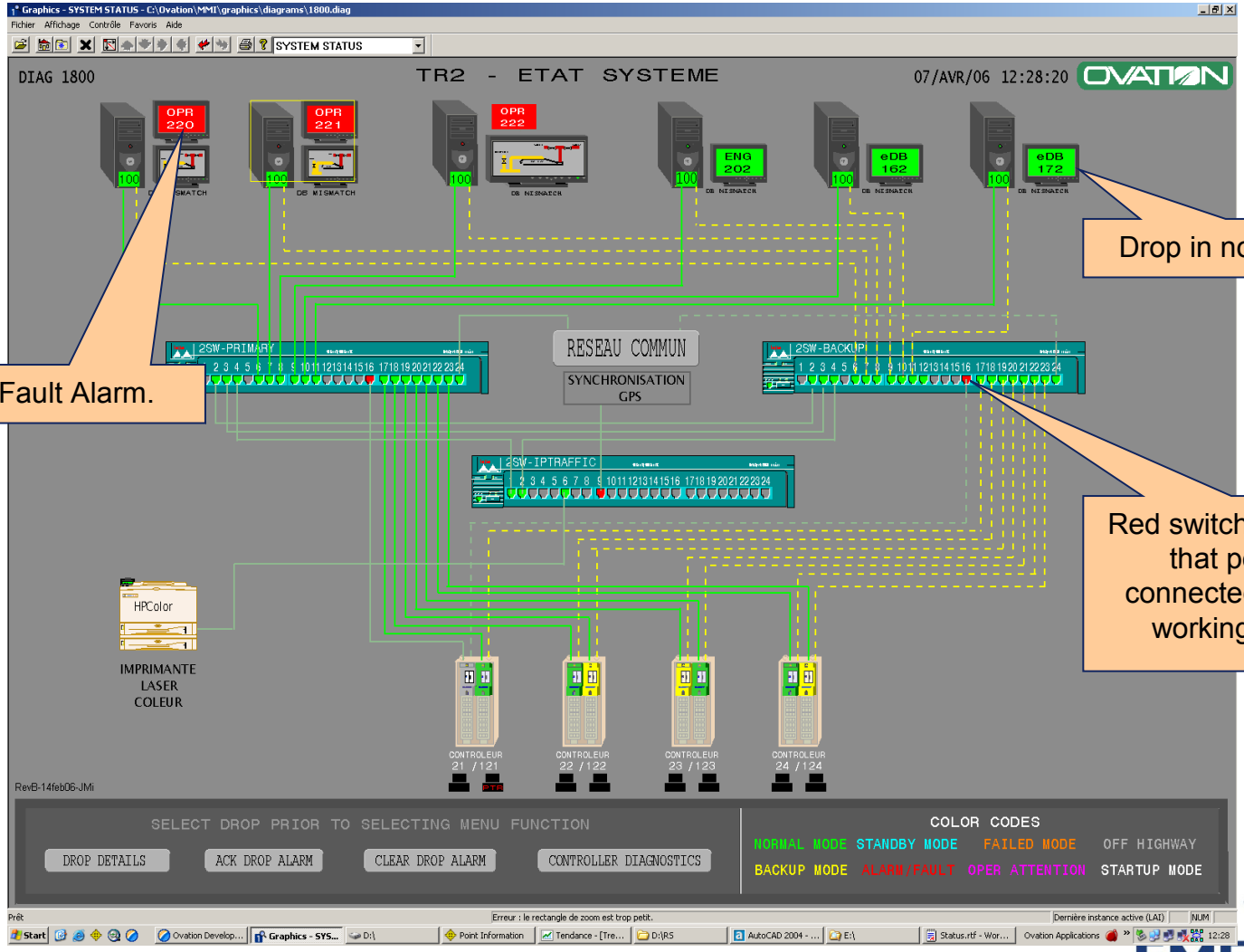
SYSTEM STATUS DIAGRAM



Drop Fault Alarm.

Drop in normal mode

Red switch port indicate that port is not connected and/or not working properly.

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DROP STATUS DIAGRAM

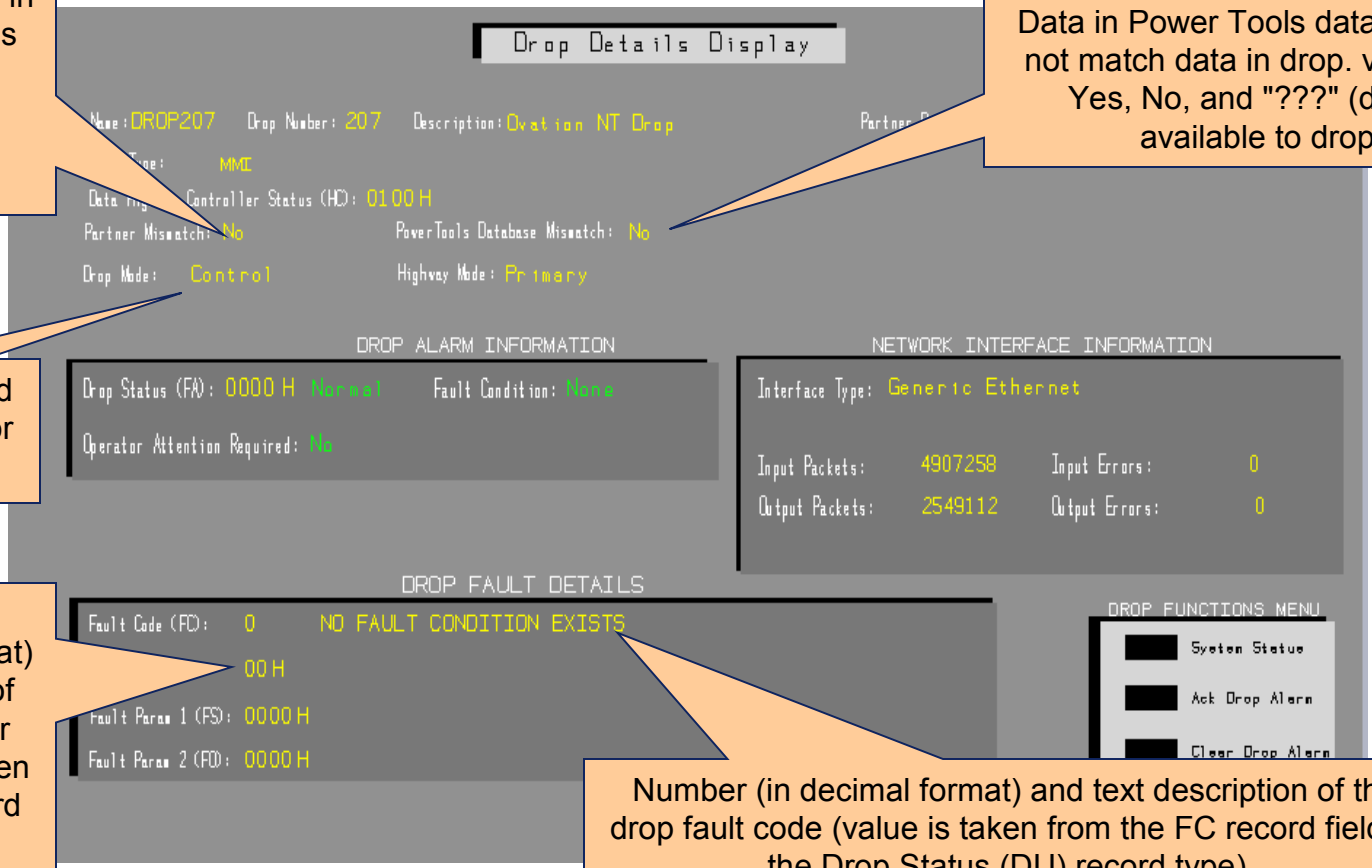
Data in selected drop does not match data in partner drop. Values are: Yes, No, and "???" (data not available to drop).

Data in Power Tools database does not match data in drop. values are: Yes, No, and "???" (data not available to drop).

Indicates if selected drop is in Backup or Control mode.

Number (in hexadecimal format) and description of the fault identifier code (value is taken from the FK record field of the DU record type).

Number (in decimal format) and text description of the drop fault code (value is taken from the FC record field of the Drop Status (DU) record type).



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DROP FAULT CODE

- Drop fault information is found on the System Status diagram and the Drop Details diagram.
- Drop Fault Code information is found in the following record fields of the Drop Status (DU) record or in a designated station's Error Log Viewer.
  - Fault Code = FC (displayed in decimal in the Drop Details diagram).
  - Fault ID = FK (displayed in hexadecimal in the Drop Details diagram).
  - Fault Parameter 1 = FS (displayed in hexadecimal in the Drop Details diagram).
  - Fault Parameter 2 = FO (displayed in hexadecimal in the Drop Details diagram).
  - Fault Parameters 3, 4, and 5 (displayed in hexadecimal in the Windows based Error Log Viewer).

FAULT INFORMATION TOOL

- The Ovation Fault information Tool provides general Fault information and recommended action steps (if any)
- OvFIT Available in web version and standalone version.

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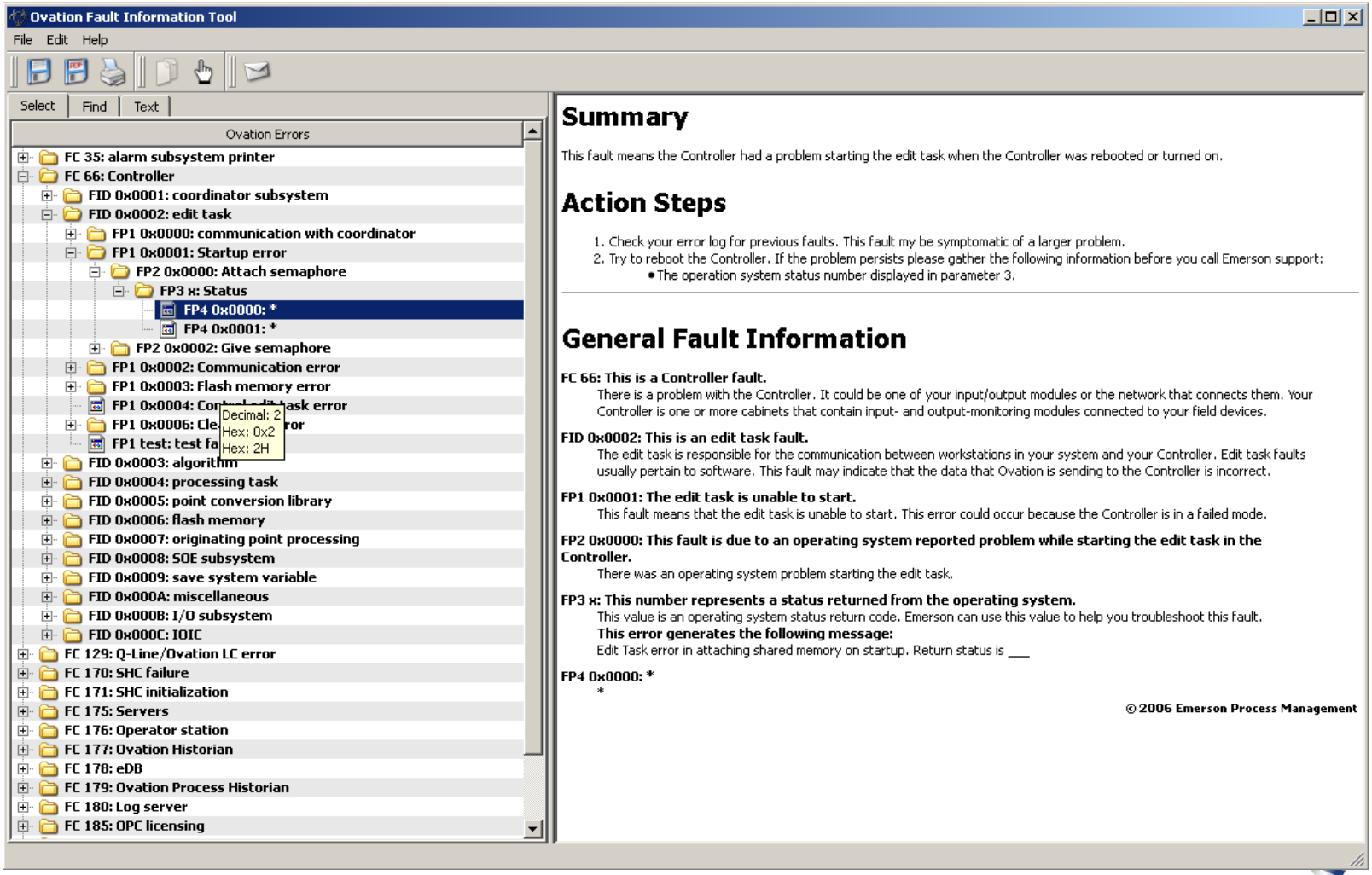
FAULT INFORMATION TOOL



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CONTROLLER DIAGNOSTICS TOOL

The Controller Diagnostics Tool is a diagnostic tool that displays information about the Controller.

You can select the Controller that you want to query from a drop hierarchy tree or from a dialog box. The information about the selected Controller appears in a user-friendly Controller Diagnostics window.

CONTROLLER DIAGNOTIC TOOL

You can use the Controller Diagnostics window to perform the following functions on the selected Controller:

1. Select and display information about a Controller
2. Update data in a backup Controller to match the data in the primary Controller
3. Display information about the control tasks for that Controller
4. Display information about I/O modules that interface to the selected Controller
5. Download firmware to intelligent I/O modules that interface to the selected Controller

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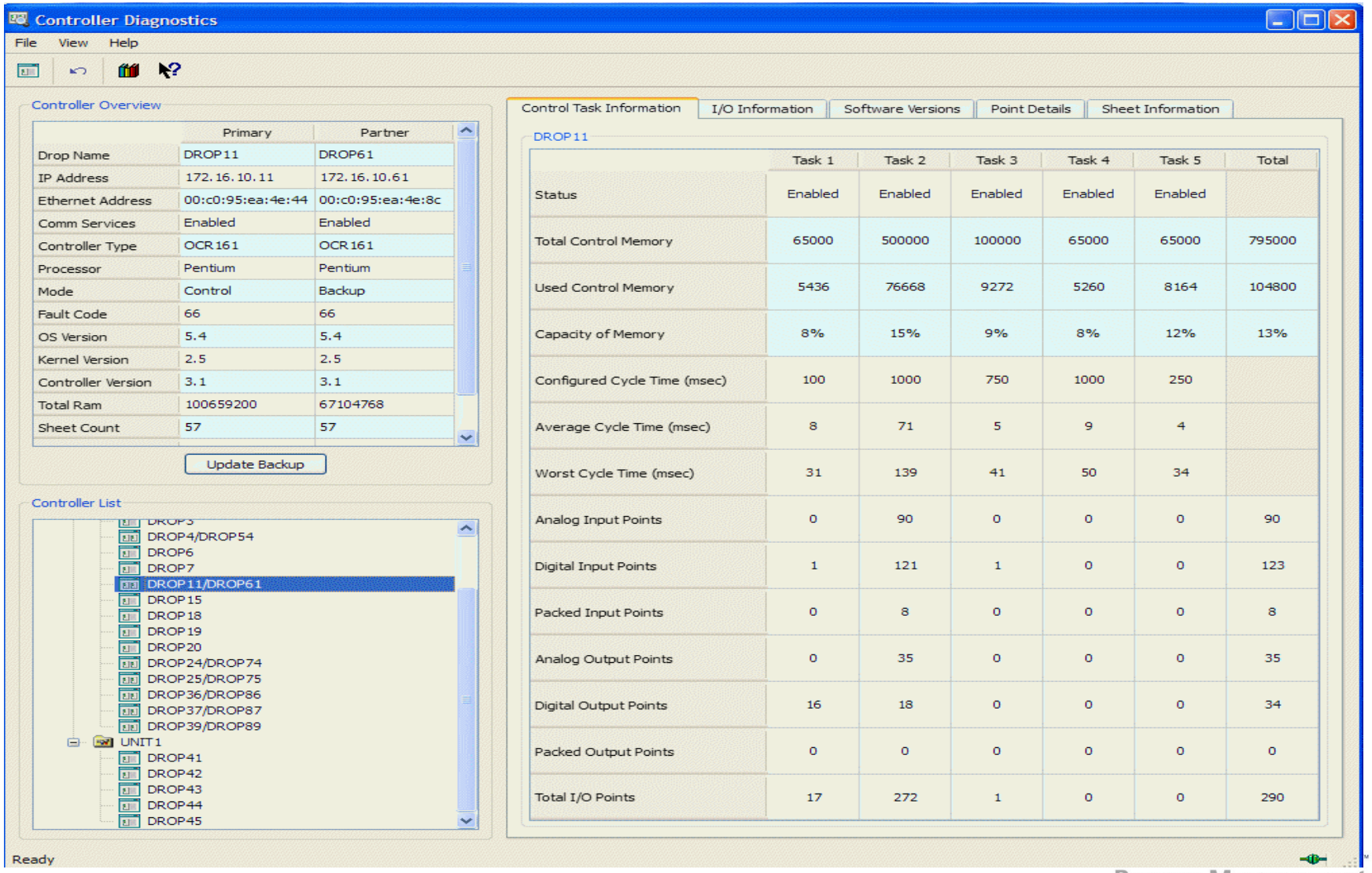
CONTROLLER DIAGNOSTIC TOOL



REPLACING OCR400 CONTROLLER

To replace OCR400 Controller modules

1. Determine what Controller module needs to be replaced (Processor or IOIC module).
2. Make sure to Power Off the Controller to be replaced.
3. Unlatch the blue corner latches on the module case.
4. Remove the old module from the Controller backplane.
5. Install the new module in the Controller backplane.
6. Use the blue corner latches on the module to secure it to the Controller backplane

Note: *If you need to replace a module in the Controller, you must remove the IOIC module first. When you re-install the modules, you must install the Processor module first.*

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Module 4

I/O SUBSYSTEM, DIAGNOSIS AND TROUBLESHOOTING

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MODULE 4 OBJECTIVE

- Understand the Structure and addressing roles of I/O modules
- Interpret Diagnostic diodes on I/O modules
- Understand Consequences of signal hardware failure (transducer, cable, I/O module)
- Find hardware address / location and channel of the faulty process point
- Replace a failed I/O module and analyze possible consequences

I/O MODULES

- 16 Channel Digital Input
- 16 Channel Contact Input
- 16 Channel Digital Output
- 4 Channel Analog Output
- 8 Channel Analog Input
- 8 Channel 3 and 4 wire RTD Input
- 2 Channel Pulse Accumulator/Counte
- 16 Channel Sequence of Events
- Single Loop Interface with SLIM
- Datalink Controller
- Speed Sensor
- Servo Driver with Readback
- Valve Positioner
- 8 Channel HART Analog Input
- 4 Channel HART Analog Output
- FF devices

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OVATION MODULE DIAGNOSTIC LED

Every Ovation module contains diagnostic LEDs. These are used to indicate the status of the module and to alert you to any module problems. All I/O modules contain the following LEDs:

- **P =** (Green) Power OK LED is lit when the power supply to the module is good.
- **C =** (Green) Communications OK LED is lit when the Controller is communicating with the module, and when the communication watchdog timer is not timed out.
- **E =** (Red) Optional External Error LED is lit when there is a problem external to the module, such as a blown common auxiliary power supply fuse.
- **I =** (Red) Internal Fault LED is lit when a failure internal to the module has occurred. This LED is typically an indication that the Electronics module needs to be replaced.

Note:

- ***A communication timeout also lights the Internal Fault LED and turns off the Communications OK LED.***
- **The other LEDs for each module vary according to the functions of the module. Definitions for LEDs are provided for each module in their individual sections in the Ovation I/O reference Manual**

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CONTROLLER CABINET with LOCAL OVATION I/Os

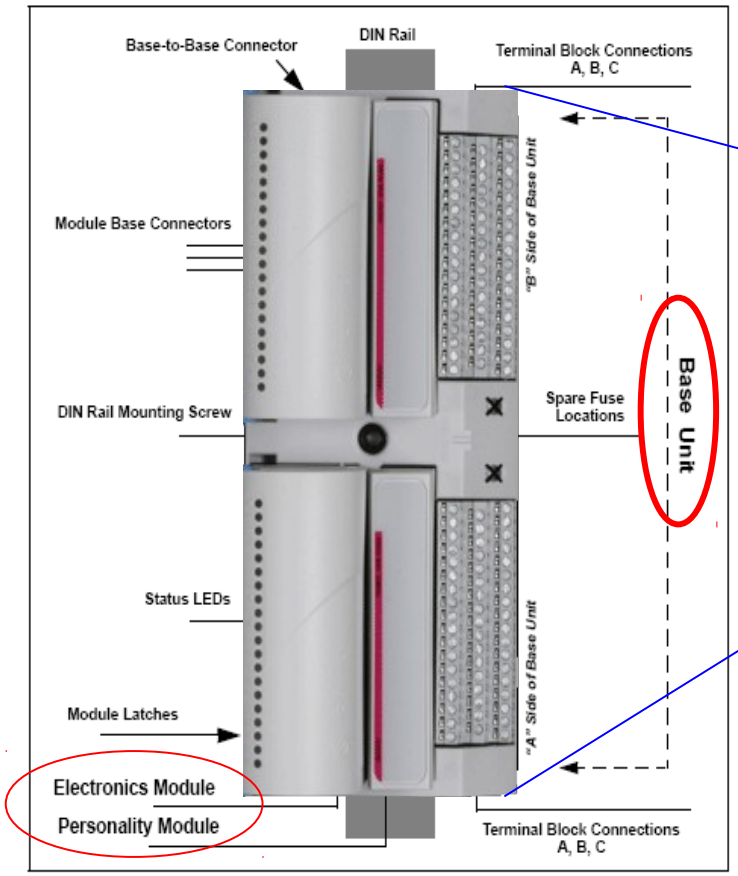
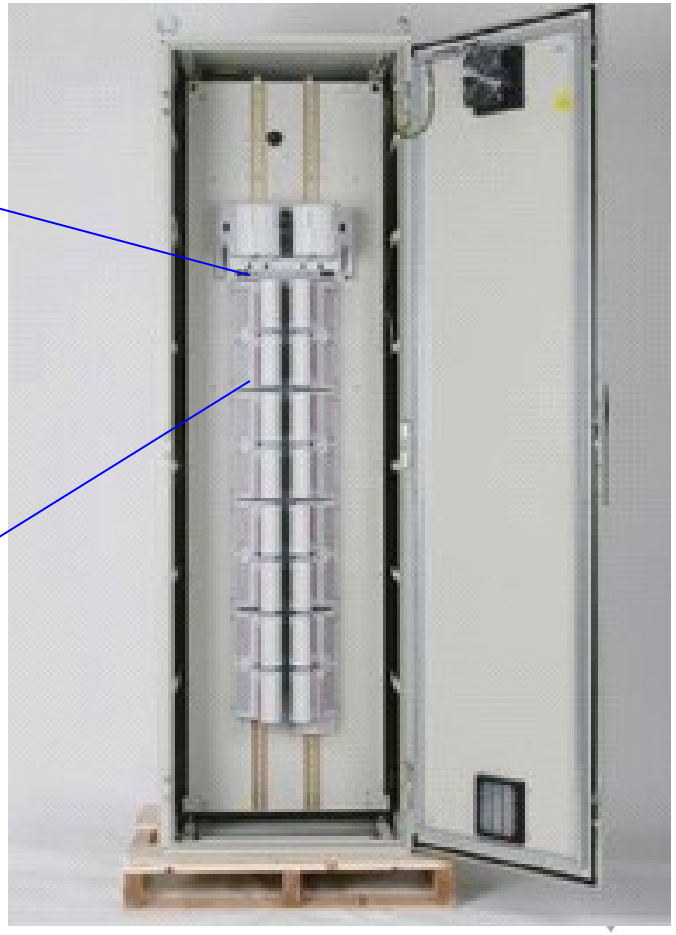


Figure 3-1. Ovation Modules (Top View)



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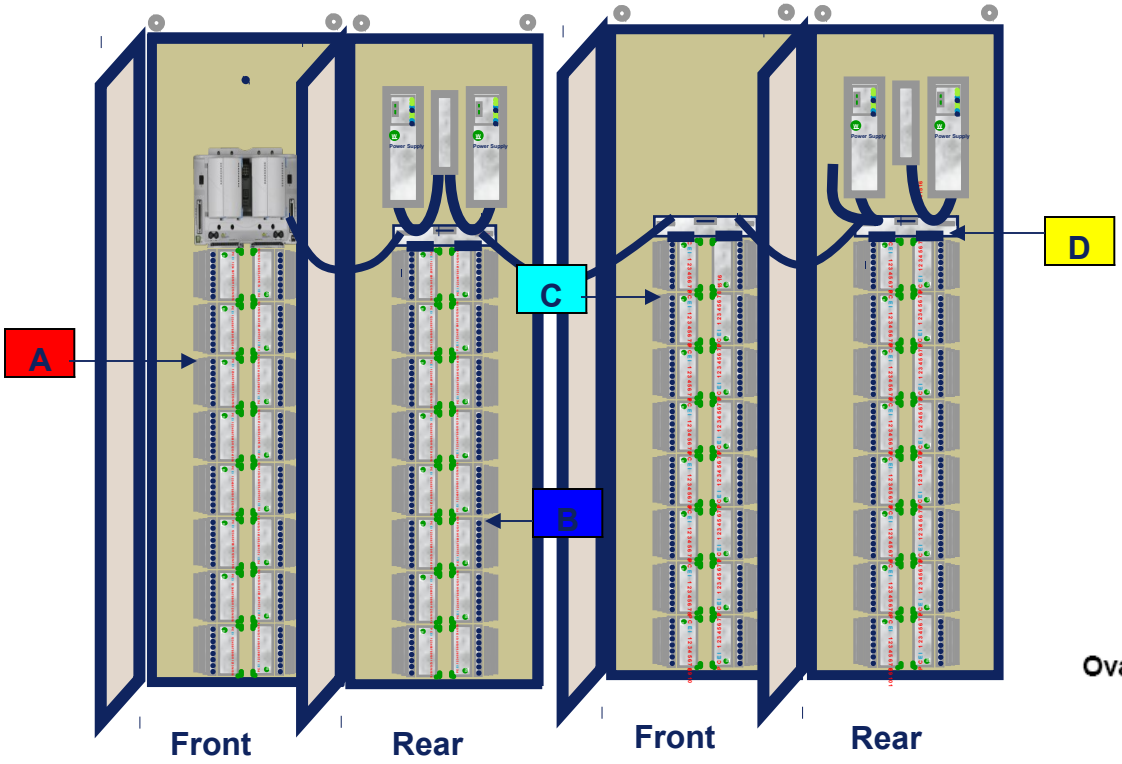
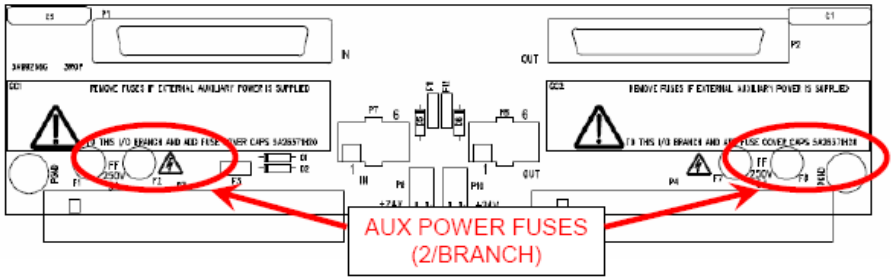
I/Os monitored from Controller's Device #1



Ovation Local I/O Panel (ROP)



A	= Address 1.1.4	Device 1 Branch 1 Slot 4
B	= Address 1.4.2	Device 1 Branch 4 Slot 2
C	= Address 1.5.3	Device 1 Branch 5 Slot 3
D	= Address _____	What is the I/O Address? Why?

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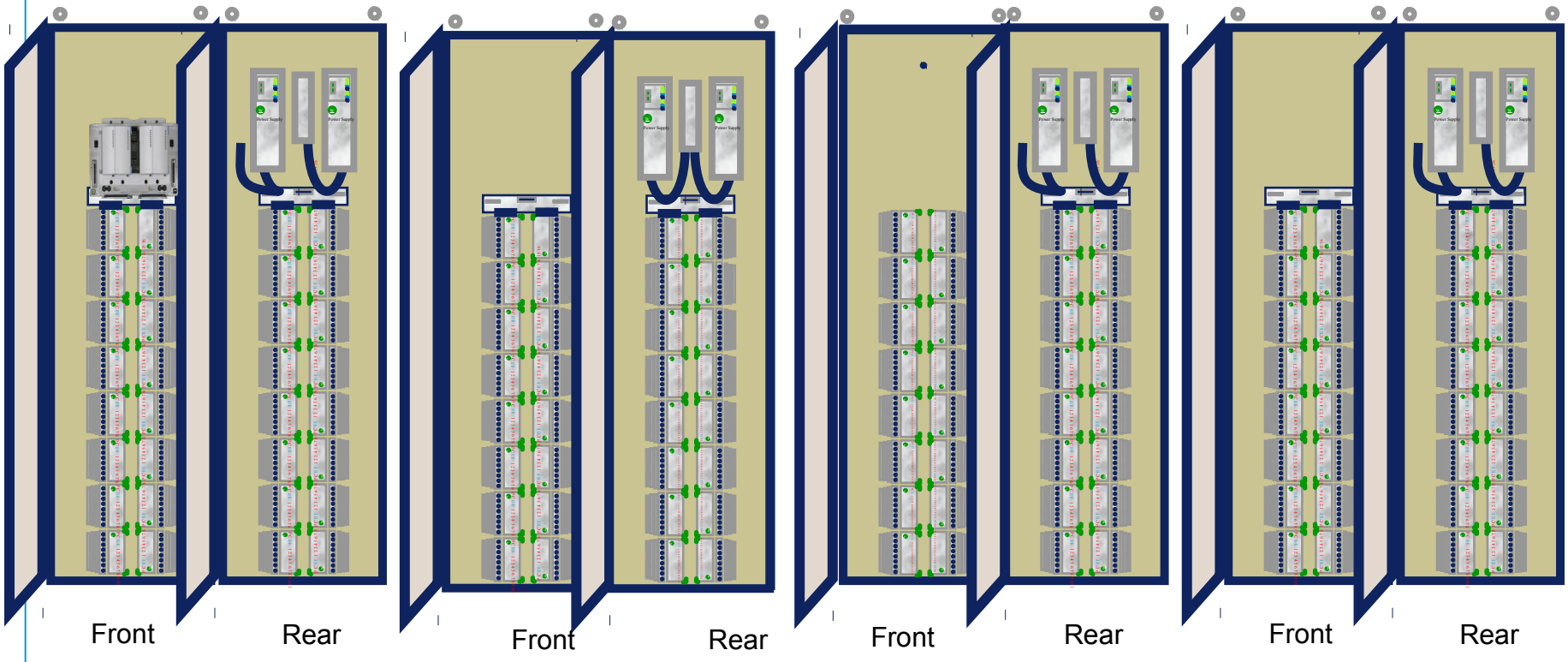
Ovation I/Os monitored from Devices #1 & #2



- Up to 16 local branches per controller
- Up to 128 I/O modules per controller

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Module 5

TESTING I/O MODULES

MODULE 5 OBJECTIVES

- Overview of I/O modules
- Perform practical tests of digital I/Os
- Perform practical tests of analog I/Os

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ANALOG INPUT TESTING

To test a 13-Bit Analog Input (1C31113), l4-Bit Analog Input (1C31224) and High Speed Analog Input (5X00070), apply input signal with current loop (either self or field powered) or voltage source and verify at min, mid, and max scale (per database, via termination list)by monitoring value in system graphics or engineering station.

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RTD INPUT TESTING

To test RTD Input (1C31161) and 8-Channel RTD Input (5X00119), a decade resistor box is attached in 2, 3 or 4-wire configuration (per point configuration). Decade box is used to apply inputs at min, mid, and max scale (per database, via termination list).

ANALOG OUTPUT TESTING

To test Analog output modules, monitor output with voltmeter or ammeter to verify at min, mid, and max scale (per database, via termination list).

DIGITAL INPUT TESTING

To test Digital Input (1C31107) and Compact Digital Input (1C31232), apply specified signal (per database) and verify individual point activation. Apply "every other" point simultaneously to verify no cross-talk occurs.

CONTACT INPUT TESTING

To test Contact Input (1C31142) and Compact Contact Input (1C31234), apply individual inputs using a switch. Verify at system graphic. If possible, apply "every other" point simultaneously to verify no crosstalk occurs.

SEQUENCE OF EVENTS TESTING

To test Sequence of Events (1C31157) and Compact Sequence of Events (1C31233),the input is activated using a switch or jumper and verified at an engineering station or control graphic. If a historian drop is present, and all required SOE sub-system configuration with the database is completed, check the SOE report that shows the sequential activation of SOE points.

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DIGITAL OUTPUT MODULE TESTING

To test Digital Output (1C31122), activate individual points via the system graphic faceplates, and verify by checking continuity of activated relay contacts (verified at open and closed state). If Module is not terminated to relay panel, point is verified using a test light for standard terminations or voltmeter for custom terminations.

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RELAY OUTPUT MODULE TESTING

To test Relay Output (1C31219), Individual relays are activated via the control graphic. Outputs are verified via continuity check of the relay contact (verified at open and closed state).

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Module 6

POWER SUPPLY AND GROUNDING – MAINTENANCE AND TROUBLESHOOTING

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Module 6 Objective

- Understand Proper grounding for the Ovation equipment
- Understand Power requirements for Ovation equipment
- Locate Fuses – typical location
- Understand how to perform proper startup and shutdown of the Ovation equipment

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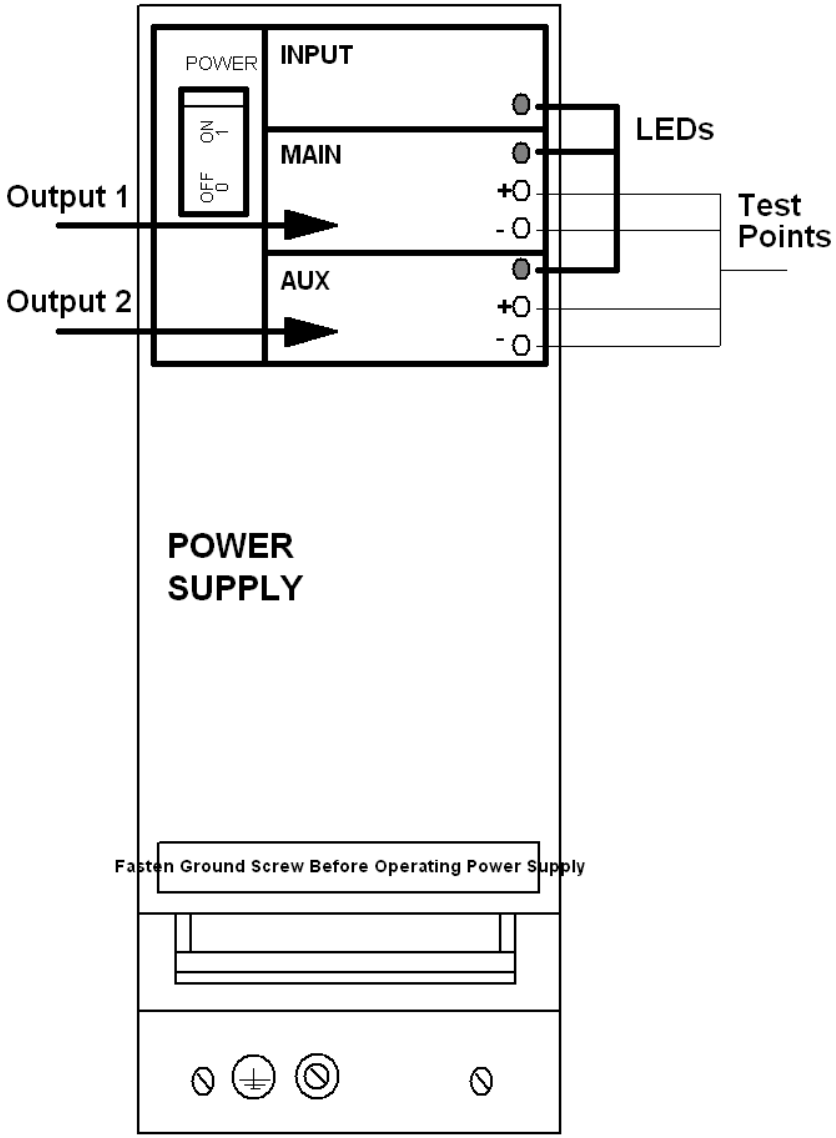
OVATION POWER SUPPLY



OVATION POWER SUPPLY

- 24 VDC Main and 24/48 VDC auxiliary outputs.
- Power factor corrected
- Hot swap capability (online replacement in redundant configurations)
- 32 mS hold-up time

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POWER SUPPLY RECOMENDATIONS

Reverse polarity and Improper Lead Connection

- You should always make proper connections to the power distribution module which provides power to the Ovation power supplies. This ensures proper operation and safety to the Ovation cabinet and associated electronics. The power supply units are tolerant of a reversal at the inputs, but proper terminations are important in maintaining the overall integrity and safety of the system.

Improper voltage level and/or frequency

- You should always maintain proper input voltage and frequency ranges for the applicable power supply unit. Failure to do so could cause the power supply output to go beyond the specification limits or cause the output to shut off which could result in a system upset.

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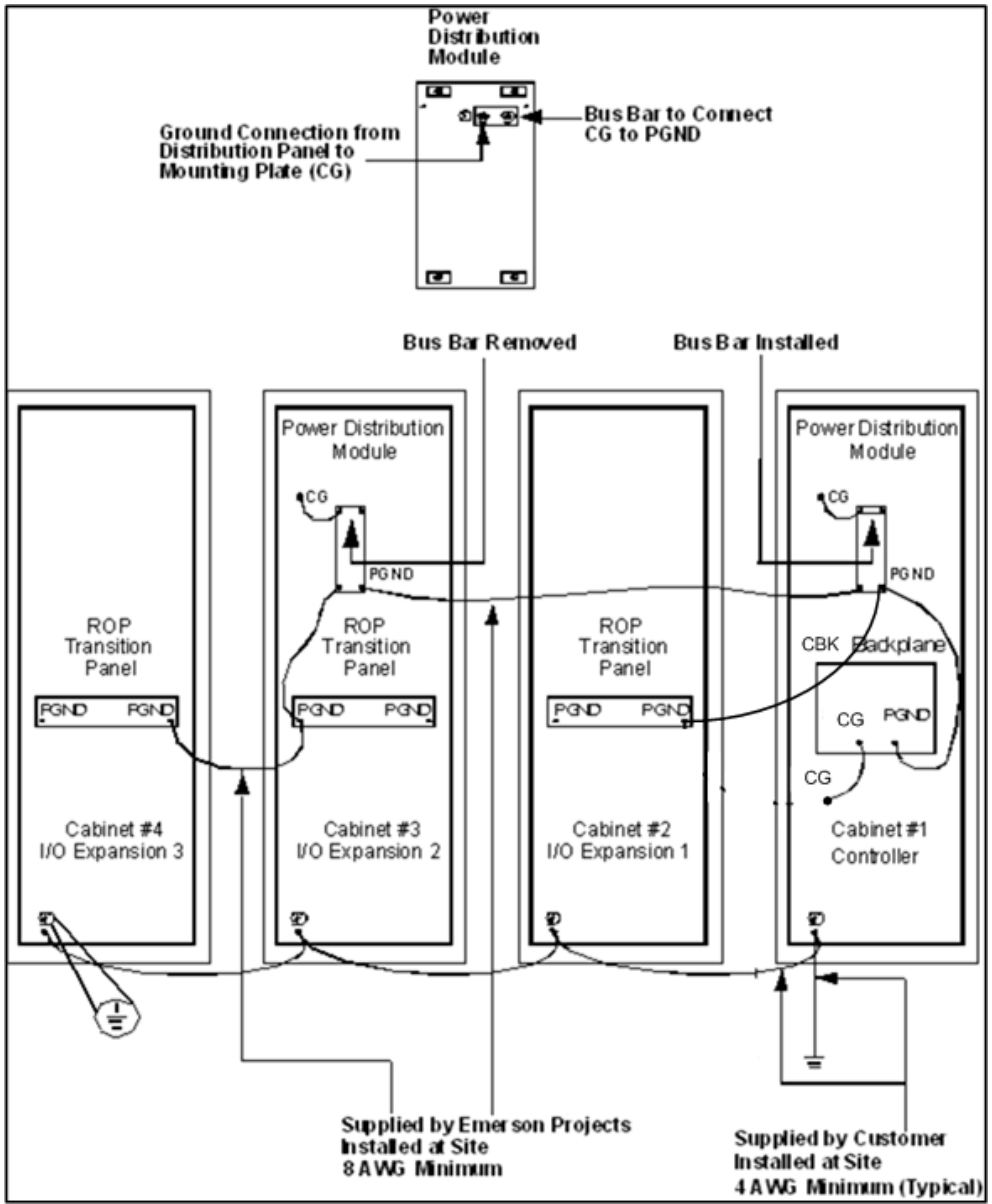
GROUNDING OF OVATION CABINET



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REPLACABLE FUSES

- Electronics Module

TYPE	RATING	MODEL (I/O Module)	PART NUMBER
5 x 20 mm cartridge	0.50A; 250V; Fast acting	Compact Digital Input Emod 1C31232G01 Compact Sequence of Events Emod 1C31233G01	EX06100

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REPLACABLE FUSES

- Personality Module Fuses

TYPE	RATING	MODEL (I/O Module)	PART NUMBER
5 x 20 mm cartridge	1.0A; 250V Fast acting	Relay Base 16 G2R - 1C31223G01	EX06104
5 x 20 mm cartridge	1.25A; 250V; Fast acting	Loop Interface Pmods 1C31177G01 - G03 Digital Output Pmods - 1C31125G01 Valve Positioner Pmods 1C31197G01 - G04 Relay Panels (Solid State) 5A22410H01 - H02 Relay Panels (16 G2R) - 5A22411H01	EX06098
5 x 20 mm cartridge	2.0A; 250V; Fast acting	Relay Panels (8 KU) - 5A22412H01 Relay Base (12 KUEP) - 1C31222G01	EX06105

REPLACABLE FUSES (cont.)

- Personality Module Fuses

TYPE	RATING	MODEL (I/O Module)	PART NUMBER
Micro-Fuse Plug-in	0.5A;125V Fast acting	16 Point Individually fused, Digital Input Pmod - 5X00034G01 HART Analog Input Pmods 5X00063G01	1X00030H02
Micro-Fuse Plug-in	0.063A;125V Fast acting	HART Analog Input Pmods Analog Inputs - 5X00059G01	1X00030H01
Micro-Fuse Plug-in	0.6A;125V Fast acting	HART Analog Output Pmods 5X00063G01	1X00030H05

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REPLACABLE FUSES

- Ovation Cabinet Fuses

TYPE	RATING	MODEL (I/O Module)	PART NUMBER	NOTES
Micro-Fuse Plug-in	5.0A; 250V; Fast acting	CBO Backplane 3A99200G01 - G02 ROP Panel 4D33922G01 TND Panel 4D33924G01 RRP Panel 3A99252G01 RRB Panel 3A99253G01	4A00120H01	Auxiliary power Branch fuses CBO: F1 -F4 ROP: F1, F2, F7, F8 TND: F1, F2, F6, F7 RRP: F1, F2 RRB: F1, F2
3AB	15A; 250V; Fast acting	Power Distribution Panel 5A26304G02	EX06009	AC Main fuses F1, F2

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NORMAL CABINET POWER DOWN

To execute a normal cabinet power-down sequence for maintenance or repairs

- Assure that the power-down of one or more DCSs/RIOs inputs and outputs (and assumption of default values) will leave the plant processes in a safe condition.
- Turn off the Controller supplying information to the DCUs/RIOs in question.
- Turn off power supplies in any of the DCUs/RIOs in question.
- Turn off all circuit breakers to the DCU/RIO in question.

Note: ***Some digital inputs are wetted (powered from) 120 VAC UPS power. Digital input power is fused on an individual branch basis. A removable 3.1A 120VAC fuse is provided for each branch.***

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NORMAL CABINET POWER UP

To execute a normal cabinet power-up sequence following maintenance or repairs

- Assure that power-up of the DCS/RIO inputs and outputs, and activation of DCS command values will leave the plant processes in a safe condition.
- Turn on the all circuit breakers to DCU/RIO in question.
- Turn on power supplies in any of the DCUs/RIOs in question.
- Turn on the Controller supplying information to the DCUs/RIOs in question.

- ***Note:*** ***Some digital inputs are wetted (powered from) 120 VAC UPS power. Digital input power is fused on an individual branch basis. A removable 3.1A 120VAC fuse is provided for each branch.***

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REPLACING POWER SUPPLIES

- Turn the power OFF at the power supply by switching the power switch in the upper left corner to the **OFF position.**
- Remove the power cable from the bottom of the power supply by squeezing the two locking tabs on each side of the power cable connector, then pull downward removing the connector from the socket.
- Loosen the power supply locking mechanism which is located at the bottom of the power supply (see Power Supply Locking Mechanism)

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POWER SUPPLY LOCKING MECHANISM

Note: A locking mechanism, located at the bottom on the power supply, holds the power supply firmly to the DIN rail. Using a slotted head screwdriver or a hex head wrench, loosen the center screw by turning the locking screw counter-clockwise. Re-tighten the locking screw using a clockwise rotation.

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REPLACING POWER SUPPLIES

- After the locking mechanism has been loosened, lift the power supply slightly upward to remove the power supply from the power supply mounting bracket.
- Install the replacement power supply on the power supply mounting bracket.
- Make sure the replacement power supply is fitted securely on the mounting bracket, and then tighten the power supply locking mechanism.
- Make sure the power switch is in the OFF position before attaching power cabling to the power supply.

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REPLACING POWER SUPPLIES

- Re-attach the power cable by pushing the power supply cable connector upward into the socket of the power supply.
- ***Note:*** *The power cable connector is designed to plug into the power supply socket in one way only.*
- Make sure that the cable connector locking tabs on each side of the connector secure the cable connector from falling out of the socket.
- If all connections are tight, you can re-apply power by switching the power switch in the upper left corner of the power supply to the ON position. This completes the power supply replacement process.

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Glossary

CPU =	Central Processing Unit
CTRL =	Controller
DBS =	Data Base Server
EMOD =	Electronics Module
EWS =	Engineering Work Station
FIFO =	First In First Out
I/O =	Input/Output cards
NIC =	Network Interface Card (Highway Card)
OPH =	Ovation Process Historian
PMOD =	Personality Module
PTDB =	Power Tools Data Base Server
RAM =	Random Access Memory

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QUESTIONS?