Ovation GE Mark V/VI User Guide

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Appendix A. Guidelines for System Integration

Section 1. Introduction

1-1. Section Overview

This document describes the operation of the Ovation® Controller Ethernet General Electric SPEEDTRONIC™ Mark V/VI Turbine Control Interface (hereafter referred to as the Mark V/VI Interface).

The Mark V/VI Interface allows an exchange of data between the Ovation Network and the General Electric Mark V/VI Turbine Control. In the past, communication between these systems was accomplished via an RS-232 serial connection. Now, however, communication takes place via an Ethernet network connection. The Ethernet connection offers several advantages over the serial connection:

1. Faster connection (through the network) leads to greater throughput.
2. Additional functions are available.
3. Mark V/VI points appear as standard I/O points on an Ovation System.
4. The interface appears as a “virtual” PCI device.
5. All configuration is accomplished using the standard Ovation software configuration tools.

The MarkV/VI Interface makes exchange of the following types of data possible:

- Periodic data from General Electric to Ovation
- Event-driven data from General Electric to Ovation
    - — Sequence of events (SOE) from General Electric to Ovation
    - — Digital inputs from General Electric to Ovation
    - — Alarms from General Electric to Ovation
    - — Software Generated Events (Mark V only)
- Commands from Ovation to General Electric
    - — Ovation managing General Electric alarms
    - — Pushbutton and setpoint targets from Ovation to General Electric

The Controller can communicate with up to two pairs of GE gateways (Gnodes or HMIs). Up to 2,048 points of any type (for example, periodic, software event, digital input, alarm, setpoint out, pushbutton out) can be used per Controller. These can be distributed across the two gnodes (or HMIs). The user can have a maximum of 100 SOE points per Controller.

The network protocol is TCP/IP, which allows reliable transportation of link messages. The application protocol is General Electric's GSM (General Electric Drive Systems (GEDS) Standard Messages). GSM messages are passed to a TCP/IP program, which sends them over the network to the General Electric system. Refer to "GEDS Standard Messages Format (GSM)," document number GEI-100165, for more information about GEDS Standard Messages. Figure 1-1 illustrates how data flows between the Controller and the Mark V/VI systems.

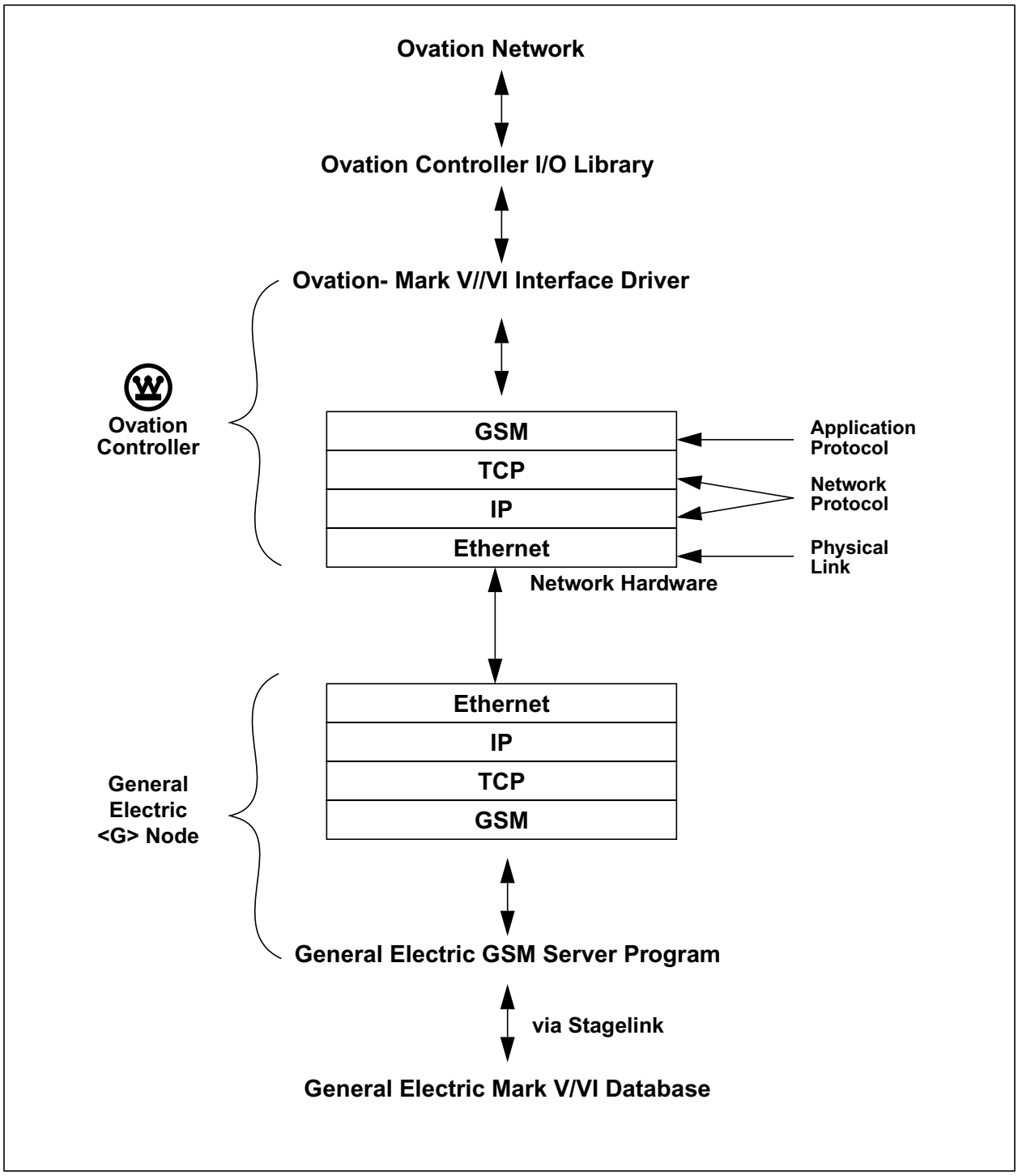

Figure 1-1. Data Flow Diagram

1-2. Contents of This Document

This document is organized into the following sections:

Section 1. Introduction provides an overview of the Mark V/VI Interface.

Section 2. Hardware describes the hardware required for the Controller Ethernet Mark V/VI Interface.

Section 3. Software Installation discusses the required interface software and how it is installed.

Section 4. Software Startup and Operation discusses the interface software functions.

Appendix A. Guidelines for System Integration discusses common integration problems.

1-3. Reference Documents

Additional reference documents for the Ovation 2.X (NT) System that may be helpful to the Mark V/VI Interface user are listed in Table 1-1.

Table 1-1. Reference Documents

Document Number	Name	Description
NT-0010	Ovation NT Load Kit	Describes the procedures for loading the Microsoft Windows NT™ Operating System and Ovation Application software at an Ovation NT workstation.
NT-0055	Ovation Controller	Describes Ovation Controller and its functions
NT-0060	Ovation NT Developer Studio	Describes how to use the Ovation Developer Studio to configure the Ovation system.
NT-0070	Westinghouse eDB Historian User Guide	Describes the configuration and use of the Westinghouse eDB Historian.
R3-1140	Ovation Record Types Reference Manual	Describes the Point Records types for the Ovation system.
R3-1145	Ovation Error Codes and Messages	Lists and describes the Ovation error codes.
R3-1150	Ovation I/O Reference Manual	Describes the use and installation of Ovation I/O modules.
U3-1000	Planning and Installing Your Ovation System	Describes the planning and installation of an Ovation system (FDDI).
U3-1005	Planning and Installing Your Ovation System	Describes the planning and installation of an Ovation system (Fast Ethernet).
GEI-100165	GEDS Standard Messages Format (GSM)	Describes General Electric's GSM messages.
GEH-6195, Rev. B	Chapter 11- Ethernet &TCP-IP (Mark V)	Describes General Electric's application as it relates to the <I> operator interface.
GEH-6126	Chapter 7–Remote access and control (Mark VI)	Describes General Electric's application as it relates to the <HMI> operator interface.

Section 2. Hardware

2-1. Section Overview

This section describes the hardware required for the Mark V/VI Interface. It is divided into the following sections:

- Ovation Hardware (Section 2-2)
- General Electric Hardware (Section 2-3)
- Hardware Configuration (Section 2-4)

2-2. Ovation Hardware

The Mark V/VI Interface runs on a Controller drop. The Ovation hardware required for the Controller drop is:

- Controller (using expanded configuration) on the Ovation Network
- 32 MB memory
- The Ovation Network can be either FDDI or Fast Ethernet. Figure 2-1 and Figure 2-2 show the network topologies for Ovation FDDI systems. Figure 2-3 and Figure 2-4 show the network topologies for Ovation Ethernet systems.

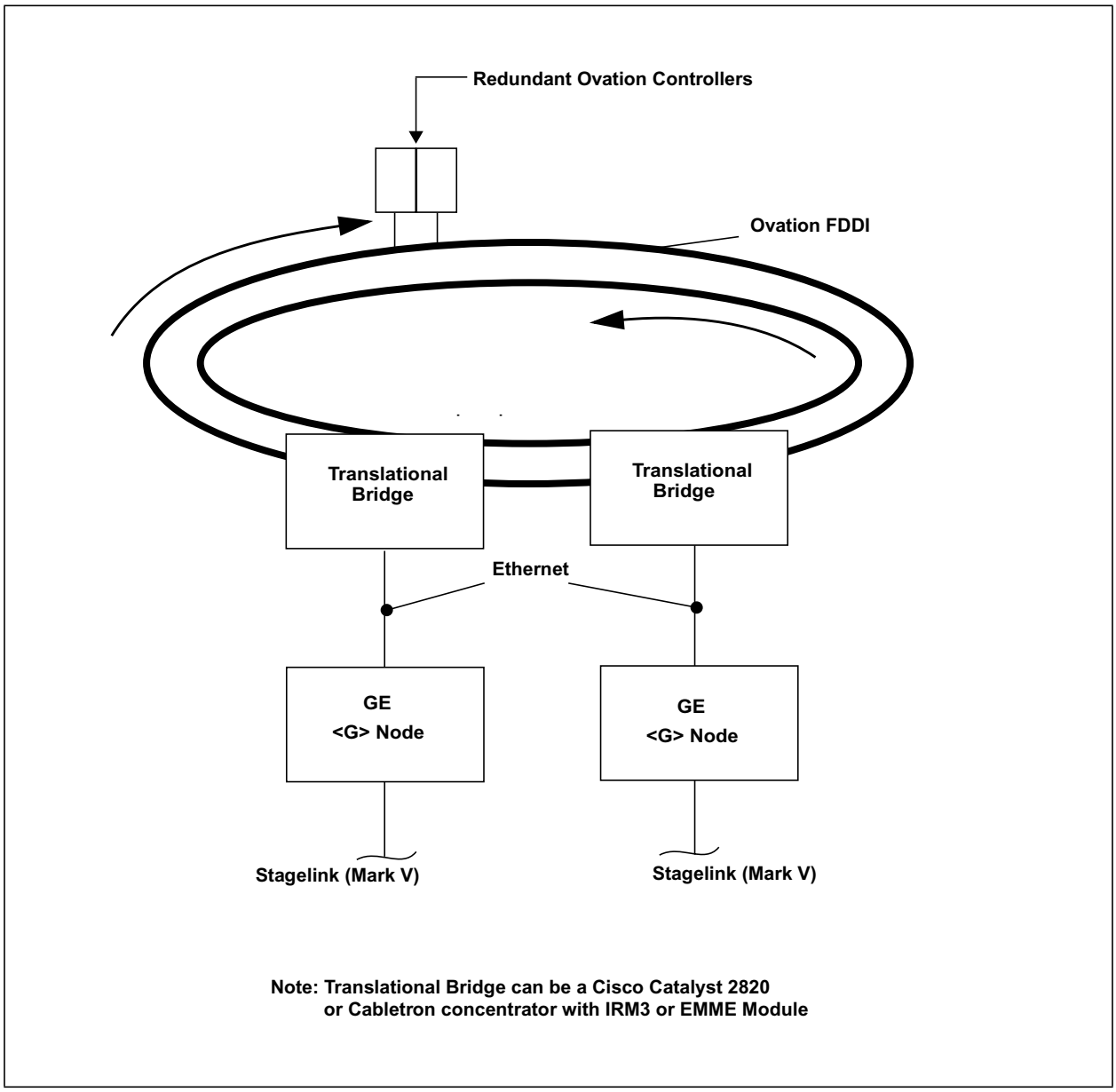

Figure 2-1. Ovation FDDI Mark V via <G> Node

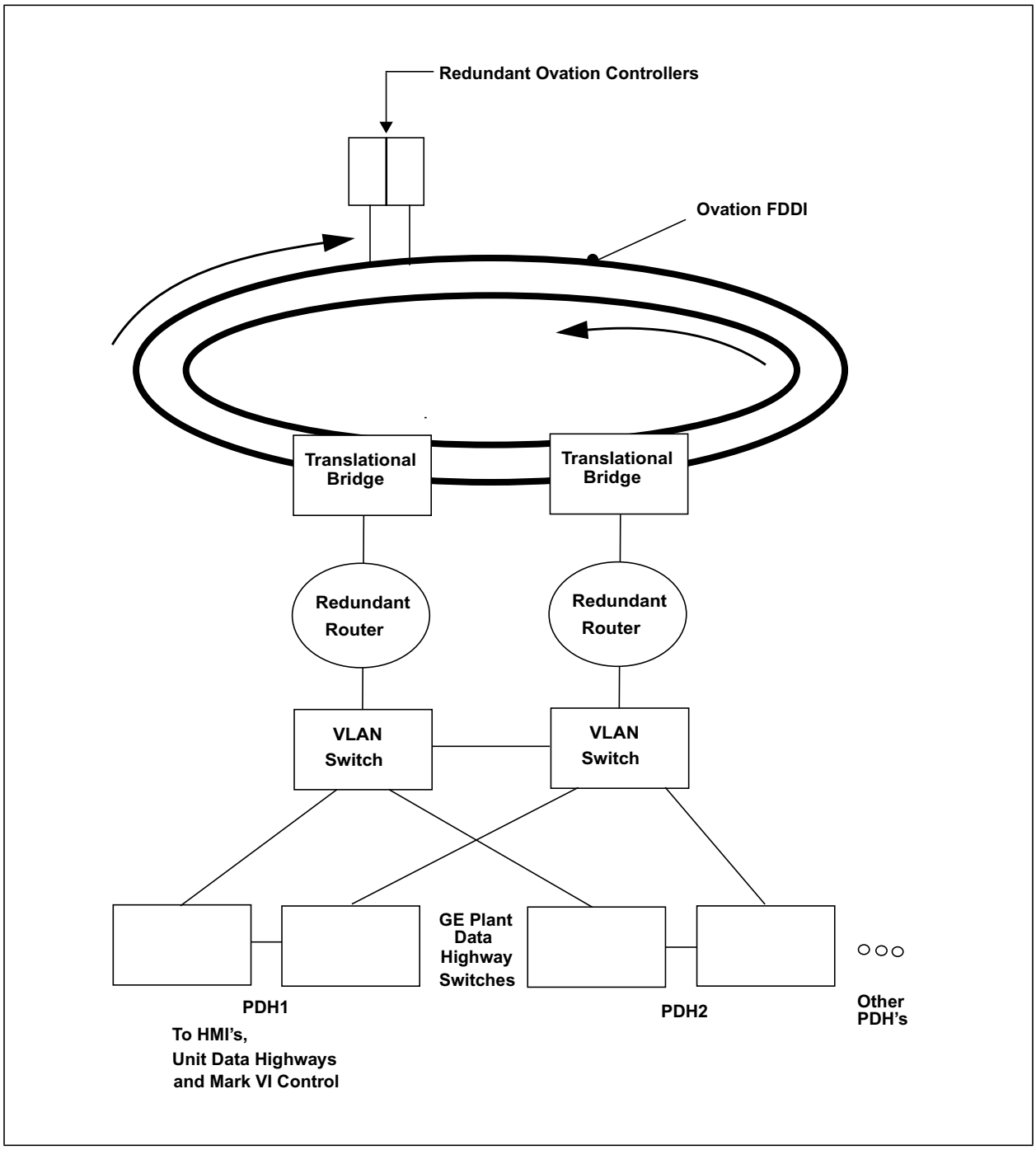

Figure 2-2. Ovation FDDI Mark V or Mark VI via HMI

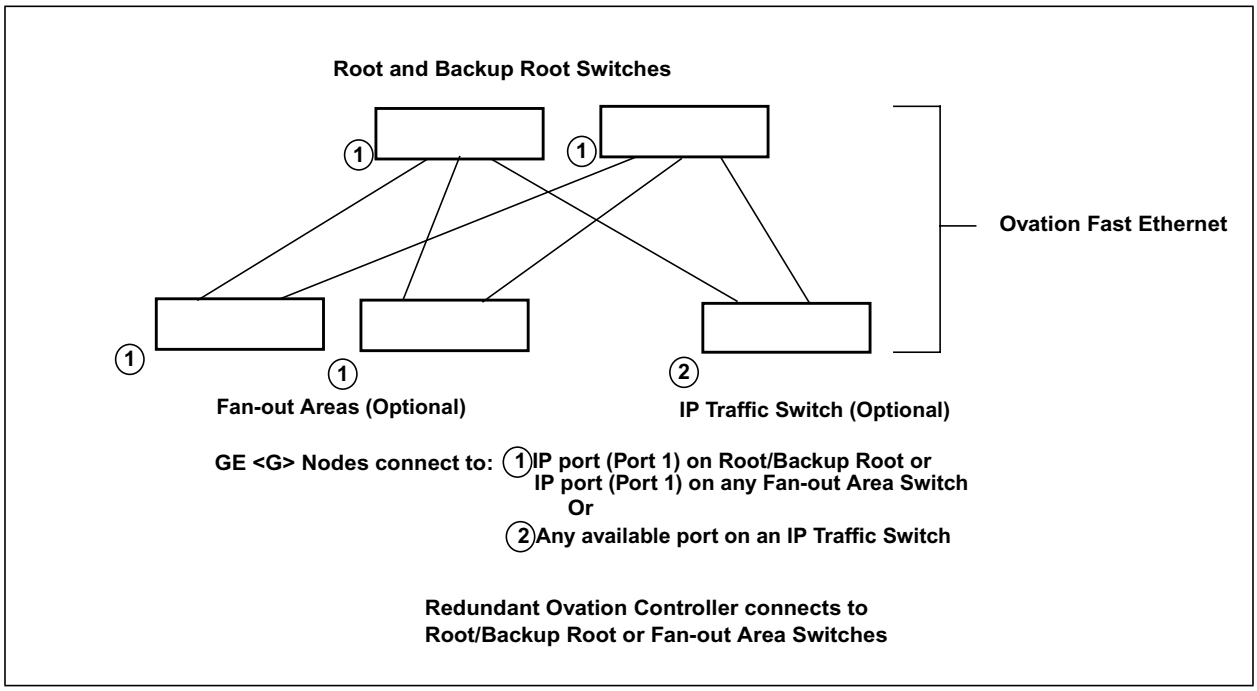

Figure 2-3. Ovation Fast Ethernet, Mark V via <G> Node

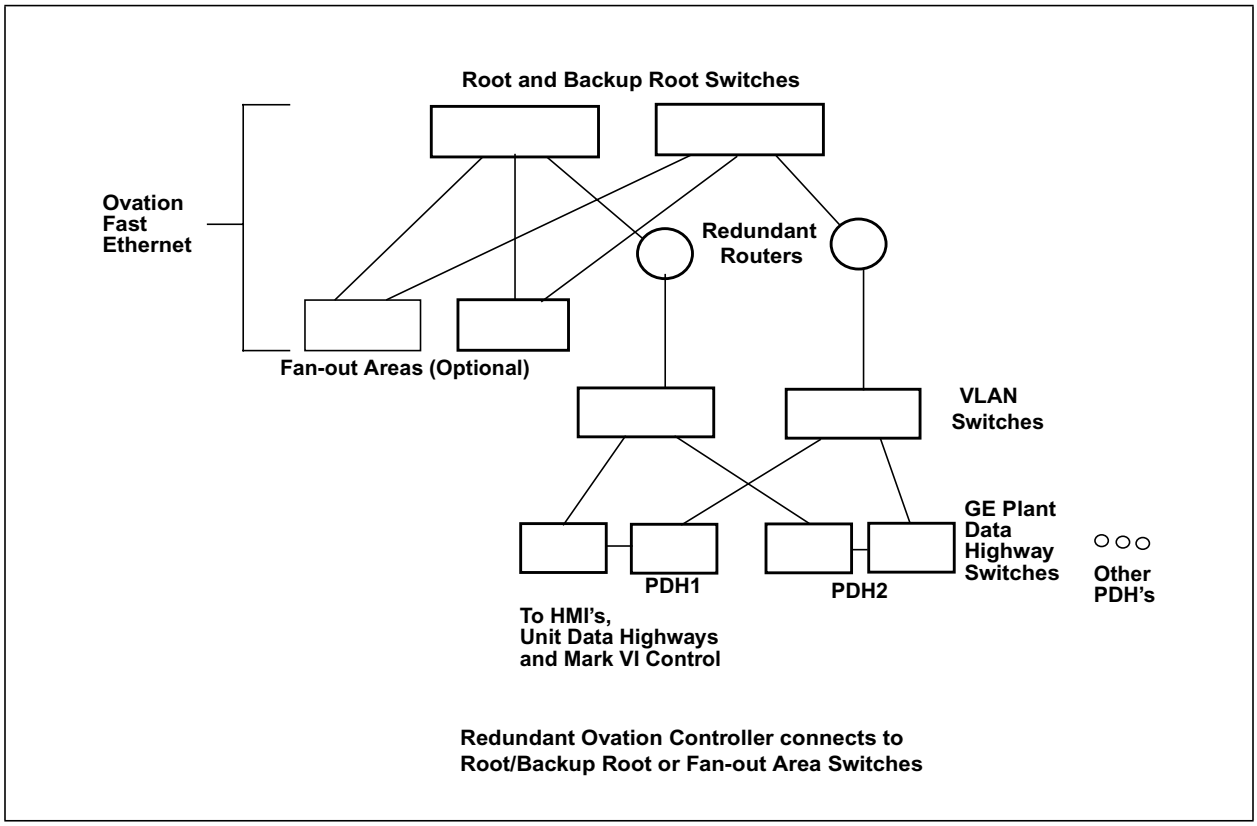

Figure 2-4. Ovation Fast Ethernet Mark V or Mark VI via HMI

2-3. General Electric Hardware

The General Electric hardware required for the Mark V/VI Interface is:

- <G> node or HMI (either may be referred to as Gateway)
- Connecting cable (10Base2 Ethernet cable)
- Mark V/VI communication processor

A <G> node communicates with the Mark V Controller over the General Electric Stagelink network. An HMI (Human Machine Interface) communicates with the Mark VI Controller over the General Electric Unit Data Highway (UDH).

2-4. Hardware Configuration

On the Westinghouse side, the Mark V/VI Interface is configured to use redundant Controllers. The interface normally communicates with the primary Controller. If the primary Controller is unable to communicate with the Gateway (due to error or failure), then the Primary Controller fails over and the partner Controller picks up communication. The partner continues to communicate until it detects a failure. When the Controller is in backup, it monitors communication and reports a drop fault if it cannot communicate with the Gateway.

The Mark V/VI Interface can be configured with one non-redundant Controller; however, non-redundant configuration is not recommended for systems that will be performing control.

On the General Electric side, the Mark V/VI Interface can be configured as a fully redundant system, or partially redundant, depending on which elements are redundant. Configuration variations include the following:

- Fully redundant system (Section 2-4.1)
- Redundant system with non-redundant General Electric Stagelink or UDH cable (Section 2-4.2)
- Redundant system with non-redundant <G> node or HMI and General Electric Stagelink or UDH cable (Section 2-4.3)
- Non-redundant system (Section 2-4.4)

2-4.1. Fully Redundant System

In a fully redundant communication system, each side of the system consists of:

- One redundant Controller
- Ovation Network
- One <G> node processor and connecting cable or one HMI and PDH Network
- One Stagelink or UDH cable to the Mark V/VI controls
- All of the Mark V/VI communication processors

In order for full communication to take place, all of the parts for one side of the redundant system must be in place. For example, if one of the Ethernet adapters fails and one of the Gateway processors on the other system fails, then full communication is not possible. The redundancy will only tolerate one failure.

2-4.2. Redundant System with Non-Redundant GE Stagelink or UDH Cable

In a redundant communication system with non-redundant General Electric Stagelink or UDH, each side of the redundant system consists of:

- One redundant Controller
- Ovation Network
- One <G> node processor and connecting cable or one HMI and PDH Network

The non-redundant elements include one Stagelink or UDH cable to the Mark V/VI controls and all of the <C> node processors.

2-4.3. Redundant System with Non-Redundant <G> Node or HMI and General Electric Stagelink or UDH Cable

In a redundant communication system with non-redundant <G> node and General Electric Stagelink or UDH cable, each side of the redundant system consists of:

- One redundant Controller
- Ovation Network

The non-redundant elements consist of one Ethernet cable, one <G> node or HMI processor, and one General Electric Stagelink or UDH cable to the Mark V/VI controls and all of the <C> node processors.

2-4.4. Non-Redundant System

A non-redundant communication system consists of:

- Single Ovation Controller
- Ovation Network
- One <G> node processor and connecting cable or one HMI and PDH Network
- One General Electric Stagelink or UDH cable to the Mark V/VI controls and all of the <C> node processors.

Section 3. Software Installation

3-1. Section Overview

This section discusses installation of the Mark V/VI Interface software. It is divided into the following sections:

- Interface Software (Section 3-2)
- Installation Procedure (Section 3-3)

3-2. Interface Software

The GE Mark V/VI Interface consists of the following elements:

- Ovation Software Version 2.1 or later.
- Ovation Controller Expanded Configuration (Refer to "Ovation Controller User Guide" (NT-0055)).
- Ovation – General Electric Mark V/VI Interface Software – Ovation Controller.

3-3. GE Mark V/VI Installation and Configuration

3-3.1. Procedure Overview

In order to configure the GE Mark V/VI the user must first configure the Device. This configuration takes place under **Drop->Configuration->Controller->Devices** in the Studio hierarchy. Next, the user must create a corresponding I/O Device, after which, the GE Mark V/VI I/O points can be created. The drops must then be downloaded and rebooted for the configuration changes to take effect. Finally, the drop must be loaded with the GE Mark V/VI I/O points and the GE Translation Table (file).

This procedure is described in detail in Section 3-3.2 and includes the following:

- Launch Developer Studio
- Insert New Device Numbers (or Open if the device already exists)
- GE Mark V/VI Driver Type Configuration

Note

It is assumed that you have an understanding of the operation of the Ovation Developer Studio. For more detailed information, refer to "NT Developer Studio" (NT-0060).

3-3.2. System Configuration

Launch Ovation Developer Studio

1. Launch the Ovation Developer Studio by double clicking its **icon** located on the Windows desktop at the NT Engineer Station.

   Refer to Figure 3-1 for an example of the Developer Studio interface to show component identifications.

2. Select the **Hardware** Function Bar to display the System Tree within the Developer Studio Overview Window.

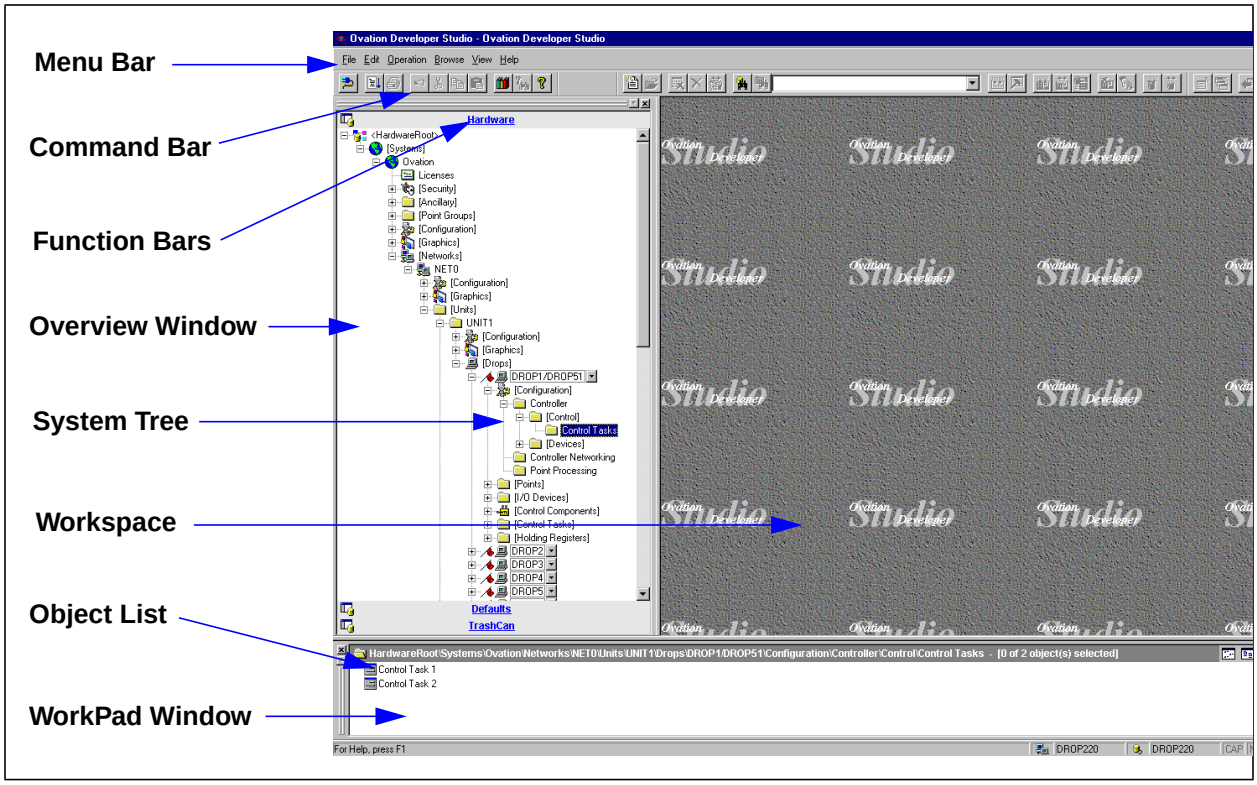

Figure 3-1. Developer Studio Interface

Insert New Device Numbers

3. Use the following path to access the Device Numbers folder (see Figure 3-2):

   Studio System Tree
   System Folder
   Network Folder
   Unit Folder
   Drop Folder
   Configuration Folder
   Controller Folder
   Devices Folder
   Device Numbers Folder

4. If the device is not present, right-click on the **Device Numbers** folder and select the option to **Insert New** from the pop-up menu, otherwise select **Open** and go to Step 9.

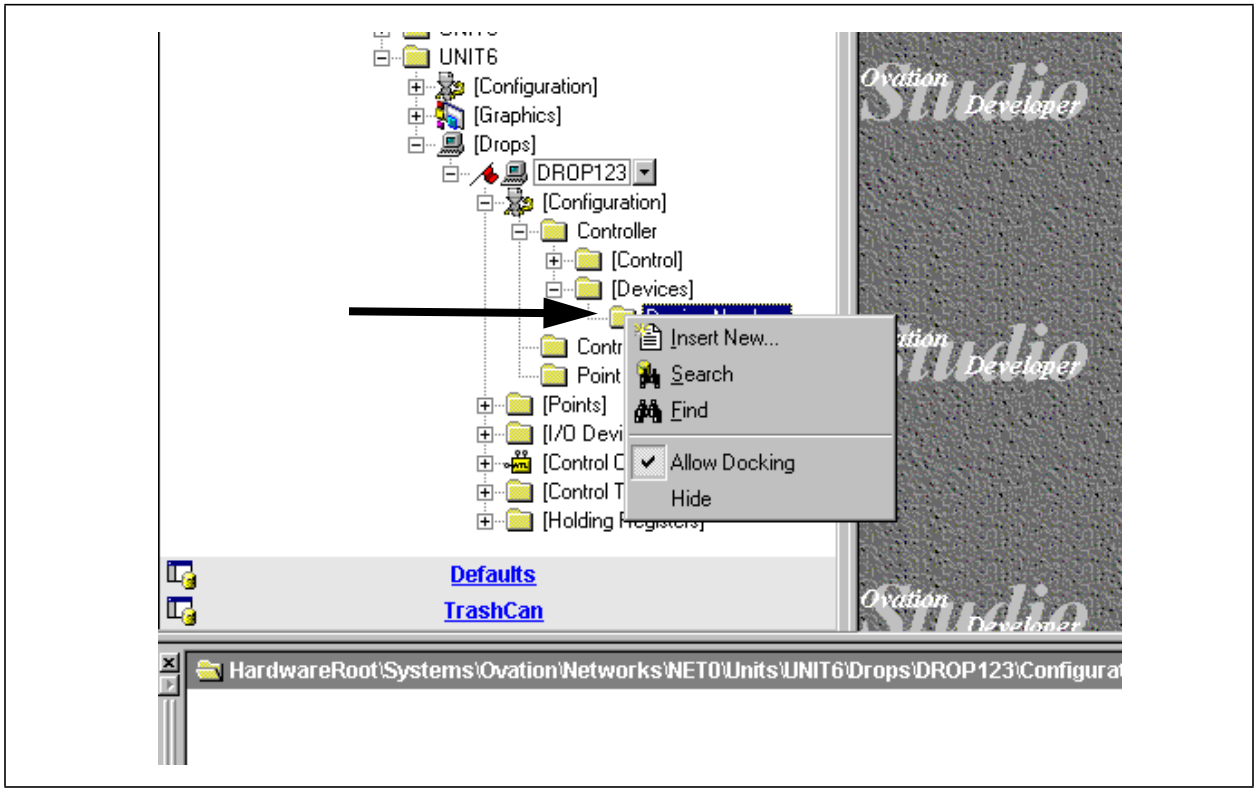

Figure 3-2. Device Numbers Folder

5. The Insert New Device Numbers Wizard appears (see Figure 3-3**).**

   Change the default field value for the new **Device Number** to any unused number sequentially starting at 1 to a maximum of 5. An example would be if 2 devices are to be configured, their Device Numbers would be 1and 2, not 1 and 3 or 4 and 5. This number will be needed when building the Points.

Note

The Device Number represents the physical devices that can communicate with the Controller (for example, IOIC card or Allen-Bradley PLC).

6. After completing the appropriate change, click **Finish**.

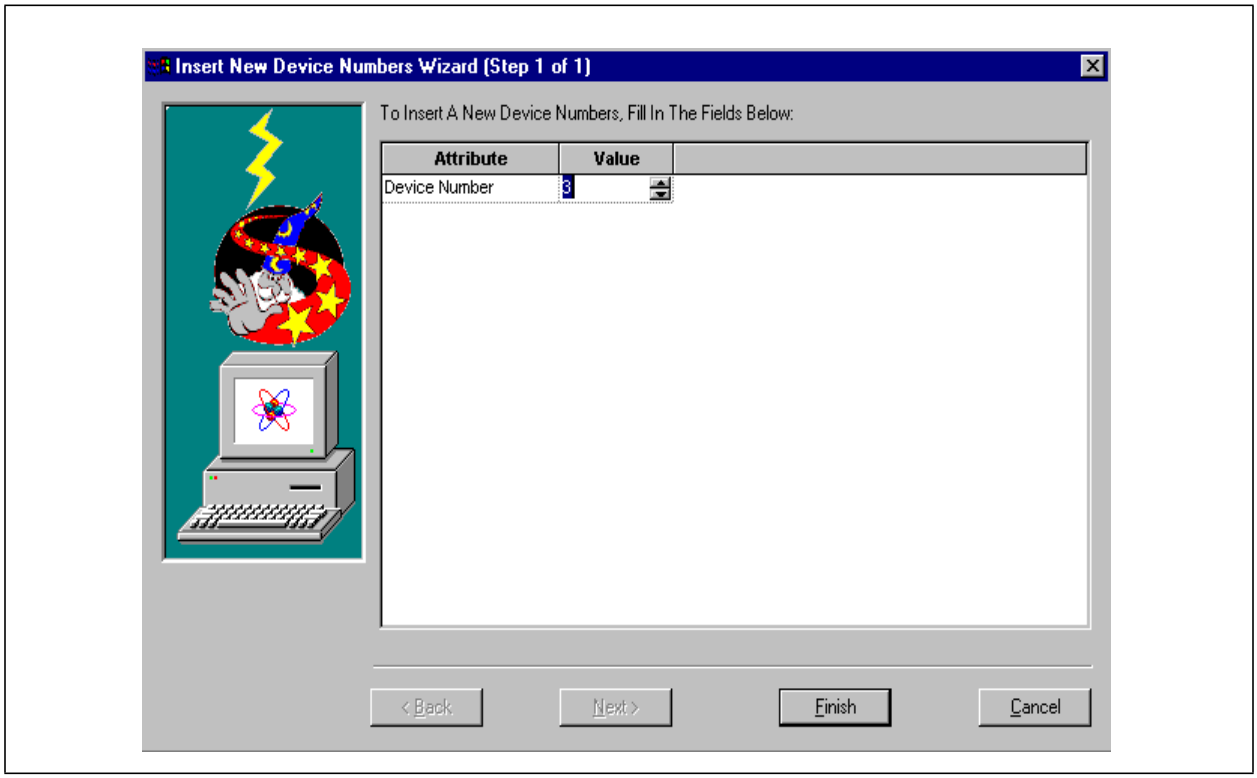

Figure 3-3. Insert New Device Numbers Wizard

7. The Controller Driver Parameters tab within the New Device Numbers dialog box appears (see Figure 3-4).

8. Choose GE Mark V/VI from the **I/O Driver Type** pull-down.

   Refer to Table 3-1 for descriptions of the parameters.

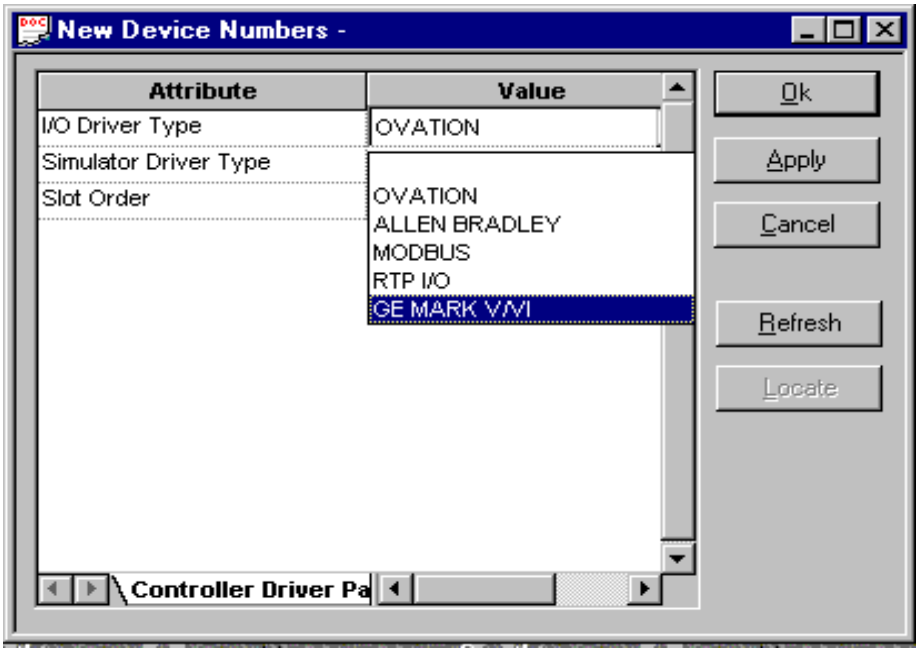

Figure 3-4. Controller Driver Parameters Tab (Default)

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Table 3-1. Controller Driver Parameters Tab (Default)

Field	Description
I/O Driver Type	Selects the I/O Driver for the selected device. **Default = None** Choices for selecting Driver Types: I/O Driver Type = **GE Mark V or GE Mark VI** Simulator Driver = **None** **Note** A maximum of one GE PCI device per Controller is allowed. **Note** The user must have an Ovation I/O Driver Type defined and an associated PCI hardware device (for example, PCRL, PCRR, or PCQL).
Simulator Driver Type **Note** Typical Ovation systems do not have a Simulator function. If your system does have a Simulator, refer to "Ovation Simulator User's Guide" (NT-0056) for information.	Selects the Simulator Driver for the selected device. **Default = None**
Slot Order	Selects the card slot (one or two) in the Controller chassis associated with the selected device. Parameter is grayed out if device selected is not an IOIC card and has an external connection (for example, Allen Bradley). **Default = One**

GE Mark V/VI Driver Type Configuration

9. Make any desired changes to the parameters in the window.

   The GE Mark V/VI driver is used to communicate with a GE Mark V/VI Turbine Control. The GE Mark V/VI allows the I/O data to be accessed over a TCP/IP ethernet socket connection.

   Refer to Table 3-2 for descriptions of the parameters.

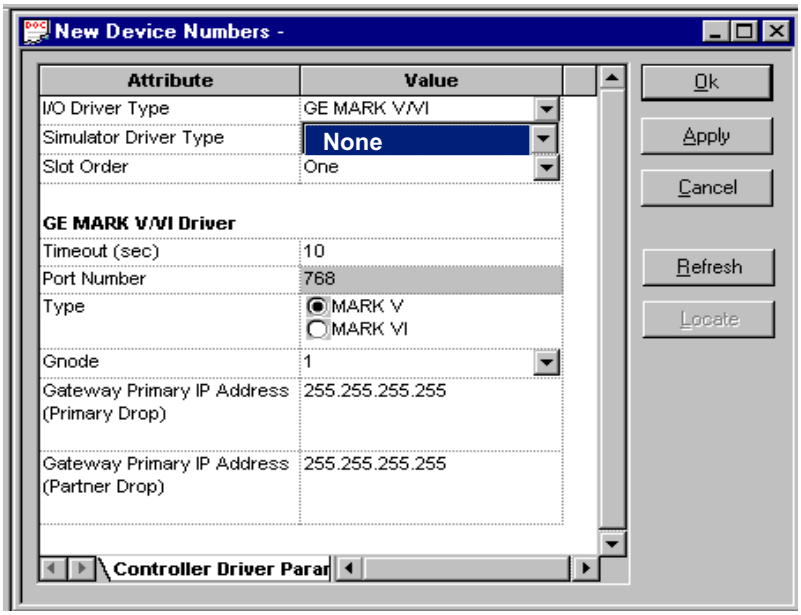

Figure 3-5. Controller Driver Parameters Tab (GE Mark V/VI)

Table 3-2. Controller Driver Parameters Fields (GE Mark V/VI)

Field	Description
Timeout (sec.)	Defines the message response timeout in seconds. This is how long the driver will wait for a response from the GE Mark V/VI before declaring an error. **Default = 10 sec**
Port Number	Default to 768. It is not modifiable by the user.
Type	Select GE driver type. **GE Mark V** **GE Mark VI**
Gnode	Up to 2 gateways can be monitored by one driver.
Gateway Primary IP Address (Primary Drop)	Assigns a Primary IP address for the selected GNODE. This address must be programmed into the IOBC6700 using its loader software. **Address = 255.255.255.255**
Gateway Primary IP Address (Partner Drop)	Assigns a Primary IP address for the selected GNODE. This address must be programmed into the IOBC6700 using its loader software. **Note** This field is only accessed only when using a redundant drop **Address = 255.255.255.255**

10. After the Controller Driver Parameters Configuration is acceptable, click the **Apply** button to save these settings without closing the window, or click the **Ok** button to save the settings and close the window.

Download Drops

11. Right-click on the Drop folder and select the option **Download** from the pop-up menu, this will download the generated information to the Controller.
    .

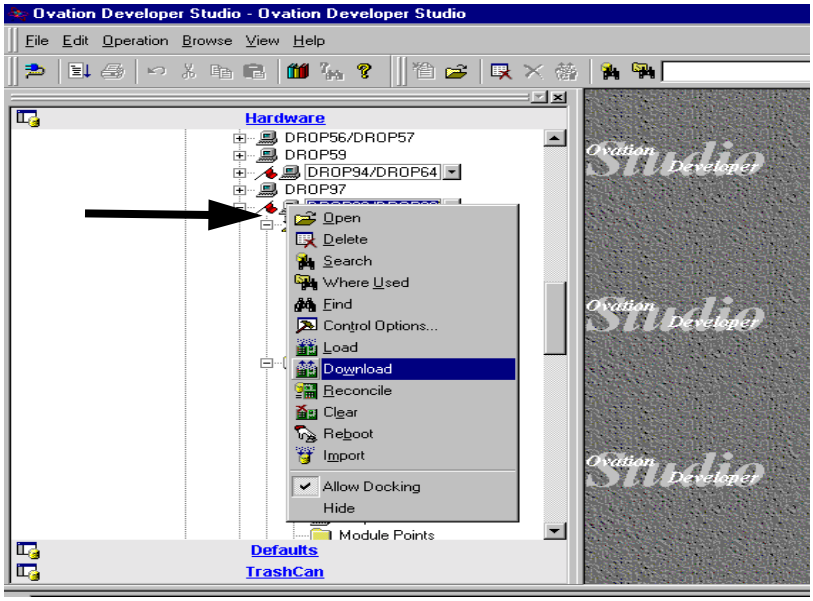

Figure 3-6. Download Drops

12. Reboot the Controller to allow the configuration changes to take effect.

I/O Device Set-up

13. Use the following path to access the I/O Devices folder:

    Studio System Tree
    System Folder
    Network Folder
    Unit Folder
    Drop Folder
    I/O Devices Folder

14. Right-click on the **I/O Devices** folder and select the option to **Insert New** from the pop-up menu.

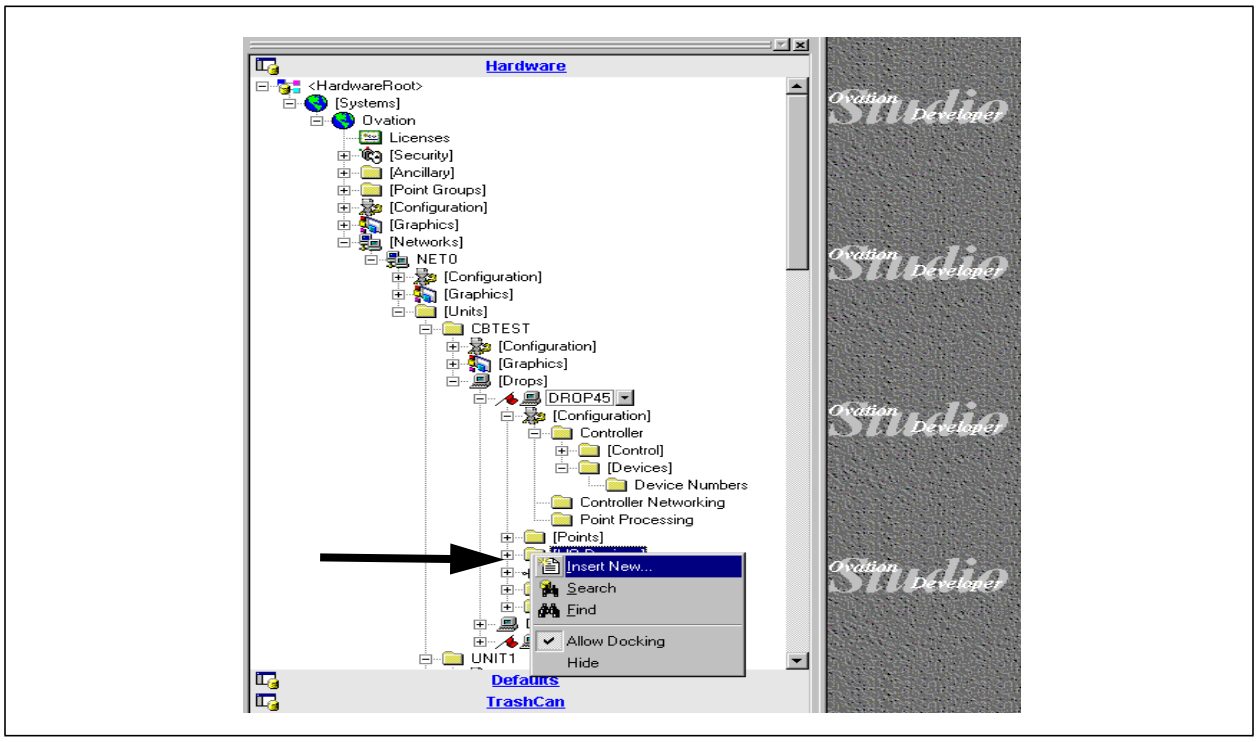

Figure 3-7. I/O Devices Folder

15. The Insert New I/O Devices Wizard appears (see Figure 3-8**).**

    Make sure that the I/O Device number equals the one picked in New Device Number section Step 5. In the I/O Device Type pull-down, choose the proper GE Mark V or VI selection. Select **Finish**. Select **Apply/OK** in the New I/O Devices window.

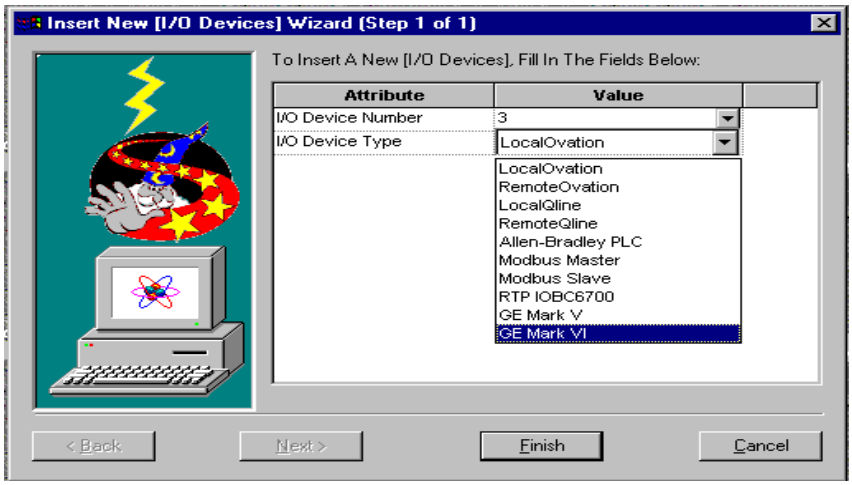

Figure 3-8. Insert New I/O Devices Wizard

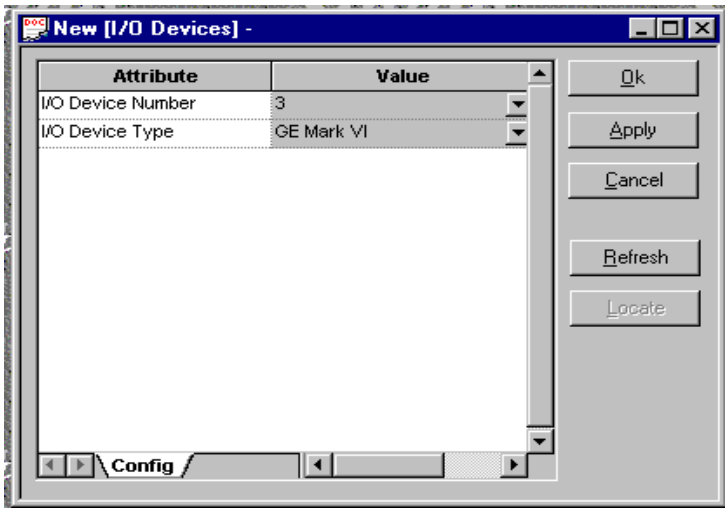

Figure 3-9. New I/O Device Set

Points Configuration

16. Use the following path to access the Points:

    Studio System Tree
    System Folder
    Network Folder
    Unit Folder
    Drop Folder
    Points Folder
    Point Icon

17. Right-click on the appropriate **Points** icon (Analog, Deluxe Analog, Digital, or Deluxe Digital) listed under the **Points** folder for the type of points to be built, and select the option to **Insert New** from the pop-up menu.

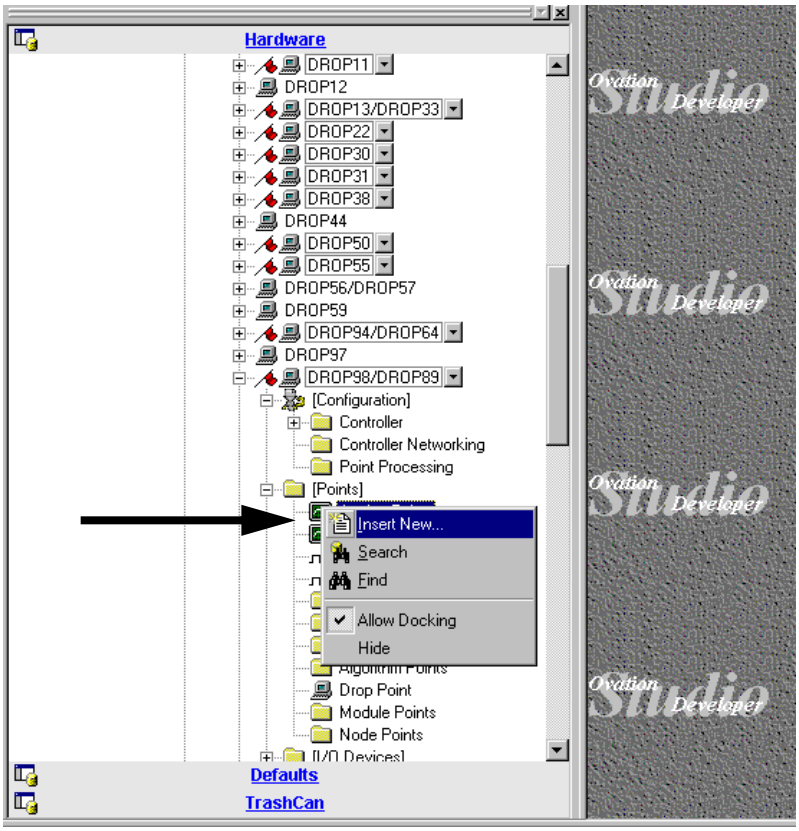

Figure 3-10. Opening Points

18. The Insert New <Points Type> Points Wizard appears (see Figure 3-11**).** Fill in the Point Name and Frequency (**S**-Slow (1 sec.), **F**-Fast (0.1 sec.), or **A**-Aperiodic (as needed), then click **Finish**.

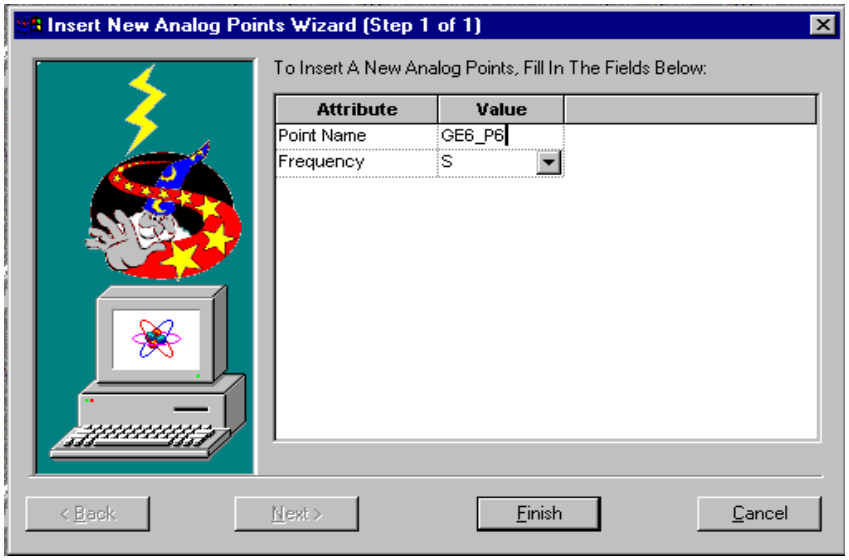

Figure 3-11. Insert New Points Wizard

19. Fill out all pertinent information in the Points window. Be sure to complete the Hardware tab in order to define this point as a GE Mark V/VI I/O Point. In the Hardware tab, make sure to choose "Third Party" in the **IO type** section, and the appropriate GE Mark V or VI in the **IO module** section.

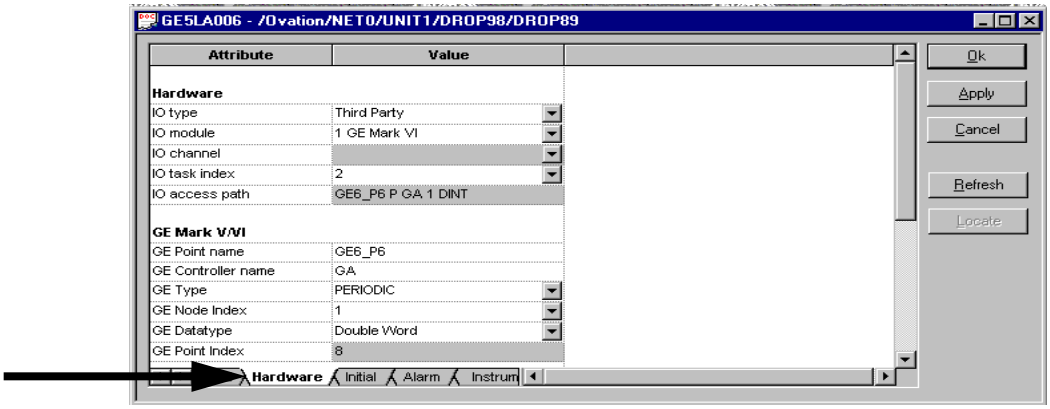

Figure 3-12. GE <Points Name> Fill in Tabs

The following are examples of the format used in the I/O access path field for a GE Mark V third party point:

L41BKRC_CPB PUSHBUTTON GA 1 S

or

DWATT PERIODIC GA 1 S

where:

DWATT or L41BKRC_CPB = GE Point Name

PUSHBUTTON or PERIODIC = Point Type.

Valid types are ALARM, EVENT, SWEVENT, PUSHBUTTON SETPOINT, PERIODIC (see Table 3-3)

GA = GE Mark V Controller Name.

1 = Gnode Number from Admin Tool.

S = Used for analog periodic point type as a (S)igned or (U)ndersigned value (default is Signed).

The following are examples of the format used in the I/O access path field for a GE Mark VI third party point.

L41BKRC_CPB PUSHBUTTON GA 1 SINT

or

DWATT PERIODIC GA 1 SINT

where:

DWATT or L41BKRC_CPB = GE Point Name

PUSHBUTTON or PERIODIC = Point Type.

Valid types are ALARM, EVENT, PUSHBUTTON SETPOINT, PERIODIC (see Table 3-3)

GA = GE Mark VI Controller Name.

1 = HMI Number from Admin Tool.

SINT = Valid Data types are USINT, SINT, INT, UINT, DINT, UDINT, REAL, BOOL (see list below). Needed for Periodic and Setpoint types only.

USINT = Unsigned 8 bit integer

SING = Signed 8 bit integer

UINT = Unsigned 16bit integer

INT = Signed 16 bit integer

UDINT = Unsigned 32 bit integer

DINT = Signed 32 bit integer

REAL = 32 bit floating point

BOOL = Digital

The High and Low Sensor Limits do not apply in this application; however, for all **Periodic Analog Points,** the High Sensor Limit must be greater than 65536, and the Low Sensor Limit must be less than -32769. For 32-bit floating points, the high and low sensor limits must be outside the normal operating engineering units. For example, if the normal operating engineering unit range for a point is 0 through 500 psi, the high sensor limit must be greater than 500 and the low sensor limit must be less than 0. These limits are set under the Instrumentation tab in the Point Window.

Table 3-3. Valid Ovation Record Types

Point Type	Record Type	Notes:
ALARM	Digital Point (LD, DD) Records	Default point is not SOE. To define the point as an SOE point, select the SOE box under the Config tab on the Point Builder.
EVENT	Digital Point (LD, DD) Records	Default point is not SOE. To define the point as an SOE point, select the SOE box under the Config tab on the Point Builder.
SWEVENT	Digital Point (LD, DD) Records	Mark V only.
PUSHBUTTON	Digital Point (LD, DD) Records	For both MarkV and Mark VI, the digital values must be true for at least two seconds to ensure being sent to GE.
SETPOINT	Analog Point (LA, DA) Records	For scaling of setpoints, use Top Output Scale and Bottom Output Scale for INT and UINT. For other data types (USINT, SINT, UDINT, DINT, REAL), scaling is always one to one.
PERIODIC	Analog (LA, DA) and Digital (LD, DD) Records	For Gain and Bias on the Analog points, use the Conversion Coefficients (under the Instrumentation tab) to assign the information to the point. For all Mark V Analog points, the incoming value can be interpreted as either signed two's complement values or unsigned values. If not signified, then the default is signed.

20. After the Points parameter configuration is acceptable, click the **Apply** button to save these settings to the Oracle database without closing the window, or click the **Ok** button to save the settings and close the window.

Load Drops

21. Right-click on the Drop folder and select the option **Load** from the pop-up menu, this will load the application information such as point and control sheets to enable the system to understand and use the new additions correctly.

Note

The Load operation will also send the GE Translation Table file to the target drop.

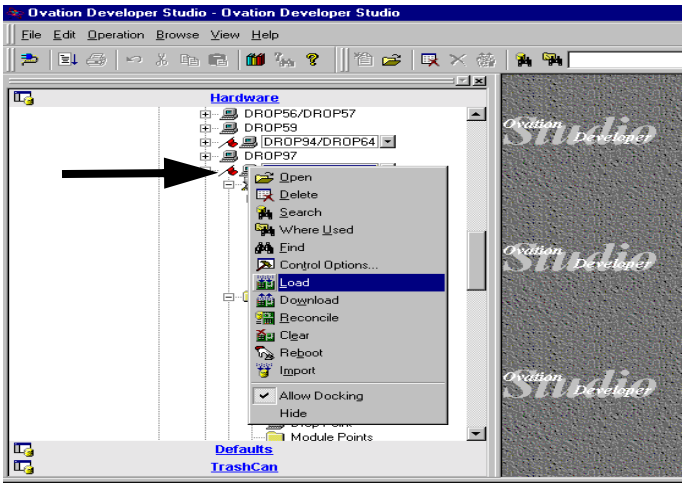

Figure 3-13. Load Drops

Section 4. Software Startup and Operation

4-1. Section Overview

This section discusses the startup and operation of the Controller Ethernet Mark V/VI Interface software. It is divided into the following sections:

- Software Operation (Data Exchange Functions) (Section 4-2)
- Error Reporting (Section 4-3)

4-2. Software Operation (Data Exchange Functions)

4-2.1. Periodic Data from General Electric to Ovation

The Ovation system can request that values in the General Electric system be sent periodically to the Ovation system. The minimum time period is one second, and the maximum is 600 seconds (10 minutes). Values are then sent from the General Electric system to the Ovation system once every defined time period. Values received by Ovation are then written into process point values which are broadcast over the Ovation network.

These points are now available to other drops in the system. Optionally, the values can be written to other attribute fields of the process points, such as the High Limit or Low Limit fields. This allows these fields to be calculated by the General Electric system. Sixteen lists can be defined for each Mark V/VI control in the General Electric system.

If no values for a list are received for the time specified in the Driver Configuration (see Section 3), the points in the list are set to Bad quality. If the Backup drop is alive, it will fail over. If the Backup drop is not alive, it will re-request the lists.

4-2.2. Sequence of Events (SOE) from General Electric to Ovation

Both the General Electric and Ovation systems can accurately time tag selected events. Messages are generated on each system to indicate the time of occurrence of the event. The messages generated on the General Electric system can be sent to the Ovation system, so that important messages are collected in a central location.

For the messages which are sent to the Ovation system, a Sequence of Events message is sent over the Ovation highway, and the General Electric event appears as an Ovation event would appear on the SOE log. Also, the value of an Ovation digital point is set to follow the current state of the General Electric point.

The General Electric Time Tag Values will be used for all SOE and alarm times.

4-2.3. Software Generated Events from General Electric to Ovation (Mark V only)

Hardware I/O scan within the General Electric controls generates logic variables. Messages can be sent to the Ovation system when a General Electric logic variable changes state. Ovation can put the values of the logic variables in Ovation digital points. These points are broadcast on the Ovation highway as digital points. They are also broadcast over the Ovation highway for use in other drops.

4-2.4. Commands from Ovation to General Electric

The General Electric system accepts two types of inputs from the Ovation system, pushbutton commands and setpoint target commands. Commands are sent when the Ovation point associated with the command changes state. The General Electric system allows no more than 10 commands to be sent to it in one second. If more than 10 points change, the driver will throttle the commands.

Pushbutton

On a FALSE to TRUE transition of specified Ovation digital points, the Ovation system can send a message to the General Electric system, so that the General Electric system behaves as if an operator pushed a button at a General Electric console. Start/Stop and other pushbutton type commands can also be sent from the Ovation system in this manner.

Setpoint Targets

General Electric commands other than pushbutton commands can also be sent from Ovation. These commands include setpoint target commands, logic commands and enumerated state commands. When the value of the Ovation point changes, a message is sent to update the corresponding General Electric command point. The Ovation points can be analog or digital. Digital points are used to write to logic commands.

An INT and UINT analog point can be configured with a gain. The gain is used to scale the value that was sent.

4-2.5. Alarms and Alarm Management

When transition in an alarm state or alarm acknowledge status occurs on the General Electric system, a message is sent from the General Electric system to the Ovation system. An Ovation digital point can be set to follow the alarm state of a General Electric alarm, which causes an Ovation alarm to be generated when a General Electric alarm is generated.

For alarms to be processed properly, the “returns to list” parameter on any drop that functions as an Operator Station should be set to list alarm returns. In the General Electric Mark V/VI system, the alarm state is always TRUE or 1; therefore, the alarm state of the Ovation points in the [alarm-in] section should be 1.

Ovation Managing General Electric Alarms

When an Ovation digital point following a General Electric alarm is alarm acknowledged, messages are sent from Ovation to the General Electric system to acknowledge, silence, or reset the General Electric alarm, depending on the state of the alarm. This allows Ovation to manage the General Electric alarms in a manner similar to its own alarm management.

Table 4-1 describes what normally occurs when the Ovation system manages its own alarms, and when it manages General Electric alarms with connection between the two systems through the Mark V/VI Interface.

Table 4-1. Alarm Management from Ovation to General Electric

Case No.	Ovation Managing Alarms	With Mark V/VI Interface
1	Ovation digital point goes into alarm state.	General Electric alarm which is mapped to Ovation digital point goes into alarm state. Interface sets Ovation digital point to same state as General Electric alarm point. Point goes into alarm.
	Operator acknowledges Ovation alarm at operator's station.	Operator acknowledges Ovation alarm at operator's station. Interface sends acknowledge message to Mark V/VI.
	Ovation alarm leaves alarm state.	General Electric alarm leaves alarm state. Interface sets Ovation point to same state.
	Operator acknowledges Ovation alarm return at operator's station.	Operator acknowledges Ovation alarm return at operator's station. Interface sends request message to Mark V/VI to reset alarm from alarm queue.
2	Ovation digital point goes into alarm state.	General Electric alarm which is mapped to Ovation digital point goes into alarm state. Interface sets Ovation digital point to same state as General Electric alarm point. Point goes into alarm.
	Ovation point leaves alarm state.	General Electric alarm leaves alarm state. Interface sets Ovation point to same state.
	Operator acknowledges Ovation alarm return at operator's station.	Operator acknowledges Ovation alarm return at operator's station. Interface sends request message to Mark V/VI to reset alarm from alarm queue.

Alarms from General Electric to Ovation

Table 4-2 describes what normally occurs when the General Electric system manages its own alarms, and when it sends alarm state or alarm acknowledge status messages to the Ovation system with connection between the two systems through the Mark V/VI Interface.

Table 4-2. Alarm Management from General Electric to Ovation

Case No.	General Electric Managing Alarms	With Mark V/VI Interface
1	General Electric digital point goes into alarm state.	General Electric alarm which is mapped to Ovation digital point goes into alarm state. Interface sets Ovation digital point to same state as General Electric alarm point.
	At <G> node or HMI, operator acknowledges General Electric alarm.	At <G> node or HMI, operator acknowledges General Electric alarm. Interface acknowledges Ovation alarm.
	General Electric point leaves alarm state.	General Electric alarm leaves alarm state. Interface sets Ovation point to same state.
	At <G> node or HMI, operator resets General Electric alarm from alarm queue.	At <G> node or HMI, operator resets General Electric alarm from alarm queue. Interface acknowledges Ovation return.
2	General Electric digital point goes into alarm state.	General Electric alarm which is mapped to Ovation digital point goes into its alarm state. Interface sets the Ovation digital point to the same state as General Electric alarm point.
	General Electric point leaves alarm state.	General Electric alarm leaves alarm state. Interface sets Ovation point to same state.
	At <G> node or HMI, operator acknowledges General Electric alarm.	At <G> node or HMI, operator acknowledges General Electric alarm. Interface acknowledges Ovation return.
	At <G> node or HMI, operator resets General Electric alarm from alarm queue.	At <G> node or HMI, operator resets General Electric alarm from alarm queue. Interface does nothing.

4-2.6. Sequence of Events Timing Considerations

In order for Sequence of Event messages from two systems to be meaningful, the clocks on the two systems must be very close.

In order for the clocks to have the same time, both systems must synchronize to a common clock signal. If the two systems synchronize to a common clock signal (such as IRIG-B), the clocks would be within 1 msec of each other. Refer to "True Time Clock Interface Unit (CIU) User's Guide" (U0-2111) for more information.

4-3. Error Reporting

When the Mark V/VI Interface is running, it reports errors in the Error Log and via the System Status diagram. Section 4-3.1 discusses the GE Mark V/VI error codes.

4-3.1. GE Mark V/VI Error Codes

Error strings that are displayed in the Error Log have the following format and are identified by **Fault Code**, **Fault ID**, and **Fault Parameter # <FP#>**, as shown in the example below:

```
                                    (Fault Code)          (Fault ID)
Mar 10 03:18:41 drop 28 <5> Controller Error : Hardware Error :
GE Data Link Warning   :   0x4   :   0x2   :   0x0   :   0x1
        (Parameter 1)          (Parameter 2)  (Parameter 3)  (Parameter 4)  (Parameter 5)
```

Where <**FP2**> = Fault Parameter #2. These are defined as:

0x1: Operating System Error (Fatal).

0x2: Subscription Error

0x3: Communication Error

0x4: GSM Timeout Error

0x5: Fail-over Error

0x6: Alarm Semaphore Error

Each of the above major function codes are further qualified with the Fault Parameter 3 <**FP3**> in the error message. In Table 4-3, the Fault Parameter 2 <**FP2**> codes are described along with the associated Fault Parameter 3 <**FP3**> codes.

Note

The Fault Code for Table 4-3 is 66 which indicates a Controller error, and the Fault ID is B (hex) which indicates a hardware error.

Refer to "Ovation Error Codes and Messages"(R3-1145) for more information.

Table 4-3. GE Mark V/VI Fault Code 66 (Controller) Errors

Fault ID (Hex)	Fault ID Description			Suggested User Response
B	**GE Mark V/VI Error Codes**			
	Fault Param 1 (Hex)	**Fault Param 2 (Hex)**	**Definition**	
	3 (Error)	1	Operating System Error – fatal error that will cause the Controller to be placed in failed mode.	Report all parameters to Westinghouse service.

Table 4-3. GE Mark V/VI Fault Code 66 (Controller) Errors (Cont'd)

Fault ID (Hex)	Fault ID Description			Suggested User Response
B	**GE Mark V/VI Error Codes**			
	Fault Param 1 (Hex)	**Fault Param 2 (Hex)**	**Definition**	
	4 (Warning)	2	Subscription Error – indicates that an error occurred related to subscribing to data from the GE Speedtronic system. **Fault Parameter 3** 1 = Supported unit request timeout 2 = Periodic data timeout 3 = Software event subscription request timeout (Mark V only) 4 = Digital input event subscription timeout 5 = Alarm subscription request timeout 6 = Alarm dump request timeout 7 = Error received event data request 8 = Error sending output to GE 9 = Error received from periodic data request	

Table 4-3. GE Mark V/VI Fault Code 66 (Controller) Errors (Cont'd)

Fault ID (Hex)	Fault ID Description			Suggested User Response
B	**GE Mark V/VI Error Codes**			
	Fault Param 1 (Hex)	**Fault Param 2 (Hex)**	**Definition**	
	4 (Warning)	3	Communication Error – general loss of communication error posted when the actual TCP/IP connection between the Controller and the GE system is lost. **Fault Parameter 3** 1 = Error connecting to GE gateway 2 = Connection lost while subscribing to GE data list(s) 3 = Connection lost while receiving data from GE 4 = Connection lost while requesting available units 5 = Connection lost while sending output value(s) 6 = Connection lost while sending alarm output 7 = Error occurred while polling GE communication port 8 = Error occurred while reading from GE communication port 9 = Error occurred while writing to GE communication port	

Table 4-3. GE Mark V/VI Fault Code 66 (Controller) Errors (Cont'd)

Fault ID (Hex)	Fault ID Description			Suggested User Response
B	**GE Mark V/VI Error Codes**			
	Fault Param 1 (Hex)	**Fault Param 2 (Hex)**	**Definition**	
	4 (Warning)	4	GSM Timeout Error – indicates that either an expected periodic data message or the response to a supported unit request message (or both) was not received by the Controller within the timeout period. The Controller sends a supported unit request message to the GE system every two second. If the Controller does not receive a response within the user-defined time (see Section 3), an error will be posted and the drop will attempt to fail-over. **Fault Parameter 3** 1 = Supported unit request timeout 2 = Periodic data timeout 3 = Software event subscription request timeout (Mark V only) 4 = Digital input event subscription request timeout 5 = Alarm subscription request timeout 6 = Alarm dump request timeout 7 = Error received event data request 8 = Error received from periodic data request	
	4 (Warning)	5	Fail-Over Error	
	3 (Error)	6	Alarm Semaphore Error	

Appendix A. Guidelines for System Integration

A-1. Section Overview

This section suggests methods to use when solving some common system integration problems. It includes the following section:

Common Integration Problems (Section A-2)

The following topics are discussed:

- How to calculate scale gains and biases for analog periodic inputs and setpoint-out commands.
- Enumerated state variables.

A-2. Common Integration Problems

A-2.1. How to calculate scale gains and biases for analog periodic inputs and setpoint-out commands

Open the UNITDATA.DAT and SCLEDATA.DAT configuration files. These are configuration files in the GE Mark V/VI control system. They can be found on the hard disk of either the <I> node, <G> node, or HMI. The GE project manager will be familiar with these files.

For each point, do the following:

1. Find the point in UNITDATA.DAT. Each line in this file looks like this:

```
TNH          4634  002  0068  0000  0000  0001  0060  1434
TNH_RPM   6025  002  0088  0000  0000  0001  0060  1F12
```

   where:

```
TNH      =  GE point name
4634     =  point number (not needed here)
002      =  point type (002 is analog - two-byte integer)
0068     =  scale code type  (important for this)
```

2. Get the scale code type from the line. This is 68 for TNH.

3. Find the scale code type in SCLEDATA.DAT. Each line in this file looks like this:

```
#scale_data   68   128.000000    0.000000   2   %      PCT
#scale_data   88  8192.000000    0.000000   0   rpm    RPM
```

   where:

```
68     =  scale code type  (important for this)
128.0 =  full scale value of the point (max)
0.000 =  zero scale value of the point (zero)
```

4. Compute the gain and bias from the max and zero.

   For analog inputs (in the [periodic] section):

   bias = zero
   gain = (max - zero)/fullscale

   For the example of TNH as an input:

   fullscale = 32767
   max = 128.0
   zero = 0.0

   Therefore,

   bias = 0.0
   gain = (128 - 0)/32767 = .0039064

   For the example of TNH_RPM as an input:

   fullscale = 32767
   max = 128.0
   zero = 0.0

   Therefore,

   bias = 0.0
   gain = (8192 - 0)/32767 = .25

   For analog outputs, use Top Output Scale and Bottom Output Scale.

A-2.2. Enumerated State Variables

Certain points on the GE side are categorized as enumerated state variables. Enumerated state variables have multiple states for a given condition. For example, the fuel type might be GAS, MIXED, or OIL, where GAS would correspond to a value of 0 for fuel type, MIXED would be equal to a 1, and OIL would be equal to a 2. The ASCII text string which corresponds to the specific enumerated state variables can be found in the GE Mark V/VI system as the file “ENUMDATA.DAT. This file is necessary to the Ovation graphics programmer if any enumerated state variables are to be displayed on the Ovation side.

Enumerated state variables are integer type and can be received in the [periodic] section for display purposes. The values can be read into analog or GP points.

P

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S

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U

V

W