WOODWARD

Product Manual 36122
(Revision A)
Original Instructions

MicroNet TMR® 5009 Digital Control System

Use in place of manual 85580V4 for part numbers 1790-111, 1790-223, and 9927-083

HMI Interface Manual

General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

Revisions

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, on the *publications page* of the Woodward website:

www.woodward.com/publications

The latest version of most publications is available on the *publications page*. If your publication is not there, please contact your customer service representative to get the latest copy.

Proper Use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

Translated Publications

If the cover of this publication states "Translation of the Original Instructions" please note:

The original source of this publication may have been updated since this translation was made. Be sure to check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, to verify whether this translation is up to date. Out-of-date translations are marked with ⚠. Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

Woodward reserves the right to update any portion of this publication at any time. Information provided by Woodward is believed to be correct and reliable. However, no responsibility is assumed by Woodward unless otherwise expressly undertaken.

Copyright © Woodward 2002
All Rights Reserved

Contents

Illustrations and Tables

Warnings and Notices

Important Definitions

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER**—Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING**—Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION**—Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE**—Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT**—Designates an operating tip or maintenance suggestion.

⚠WARNING

Overspeed / Overtemperature / Overpressure

The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

⚠WARNING

Personal Protective Equipment

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:

- **Eye Protection**
- **Hearing Protection**
- **Hard Hat**
- **Gloves**
- **Safety Boots**
- **Respirator**

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

⚠WARNING

Start-up

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

⚠WARNING

Automotive Applications

On- and off-highway Mobile Applications: Unless Woodward's control functions as the supervisory control, customer should install a system totally independent of the prime mover control system that monitors for supervisory control of engine (and takes appropriate action if supervisory control is lost) to protect against loss of engine control with possible personal injury, loss of life, or property damage.

NOTICE

Battery Charging Device

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electrostatic Discharge Awareness

NOTICE

Electrostatic Precautions

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715*, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Follow these precautions when working with or near the control.

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
   - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

General Installation and Operating Notes

Field wiring must be rated at minimum 75 °C for operating ambient temperatures expected to exceed 50 °C.

Peripheral equipment must be suitable for the location in which it is used.

Wiring must be in accordance with Class I, Division 2 (Zone 2) wiring methods and in accordance with the authority having jurisdiction.

⚠WARNING

EXPLOSION HAZARD—Substitution of components may impair suitability for Class I, Division 2.

Do not disconnect while circuit is live unless the area is known to be non-hazardous.

All test points on the power supply and control boards must not be used unless area is known to be non-hazardous.

Chapter 1.
General Information

Introduction

Woodward's Human Machine Interface (HMI) has been developed for use with the MicroNet TMR® 5009 Digital Governor for steam turbines. This manual includes installation instructions, a description, and operating procedures.

This manual does not contain instructions for the operation of the complete turbine system. For turbine or plant operating instructions, contact the plant-equipment manufacturer.

Part Number Options

The following part numbers are covered in this manual:

Woodward Part Number	Description
1790-111	Panel PC 12 in., InnoScan Comp A/S PCI6000
1790-223	CITECT KEY - 1500 I/O COUNT
9927-083	TMR 5009 - CITECT APPLICATION

General Safety Precautions

Obey the following safety precautions when you install or operate the unit:

- Obey all cautions or warnings given in the procedures.
- Never bypass or override machine safety devices.
- Never jumper or force Input/Output signals while operating the machine.
- Do not change software settings unless completely sure of the consequences of that change.
- Always use sufficiently trained personnel and the correct equipment to operate the machine.

⚠WARNING

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

A "test software" can be included to create a simulation environment for the Woodward engineer. It can be used for software debugging and for HMI demonstration and training purposes without the necessity of using an external test stand. This software represents an attempt to simulate the behavior of all components in the field. It should be realized that it is only a model. This model, if activated by one specific software switch, generates inputs to the control software based upon control software outputs and standard settings. If the test environment is inactive, the input for the control software comes from field devices.

⚠WARNING

Use of this Tester by untrained or unqualified personnel could result in unexpected or undesired control actions. The use of this tester is restricted to Woodward personnel only. Never activate the tester with any other I/O card than a CPU, SIO, or Ethernet card plugged into the chassis.

Identification Plate

The identification plate is located inside the power supply compartment. It contains the following information:

- Part Number
- Serial number
- manufacturing date
- Weight
- Customer name
- Customer
- Power supply information

Always quote the model number and the serial number in any correspondence with Woodward.

Chapter 2.
Description

The Human Machine Interface (HMI) functions as an annunciator and operator control panel for Woodward's MicroNet TMR® 5009 digital control. This workstation allows an operator to remotely view operating points, vary control setpoints, and issue run mode commands. The HMI comprises an industrial PC System based on a single board computer and a Woodward-developed application using the Citect software program. This standard software program allows the HMI to automatically select the correct interface screens based on how the 5009 control has been configured. No field configuration is necessary. The hardware package selected is the PCI6000 from InnoScan Computing A/S Denmark.

The HMI is connected to the communication port of the CPU in Kernel A of the 5009 control. Once communications between the HMI and the 5009 control have been established, the HMI will automatically configure its screens to match the configuration of the control. Depending on how the 5009 control is configured, all 5009 run mode operations can be monitored and performed through the HMI. If the 5009 control is not programmed to accept commands from the respective Modbus® * port, the HMI functions in a system monitor mode only (refer to Chapter 5, Local/Remote section).

*—Modbus is a trademark of Schneider Automation Inc.

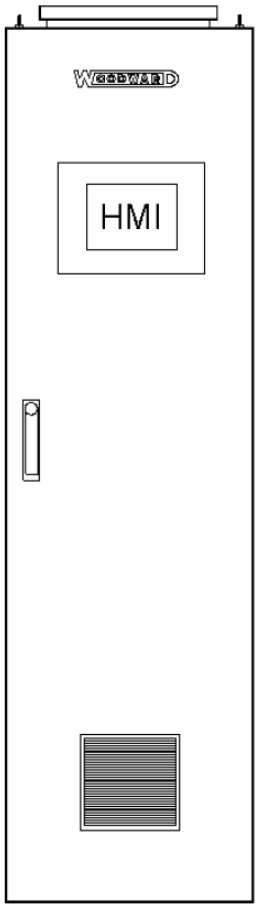


Figure 2-1. 5009 System

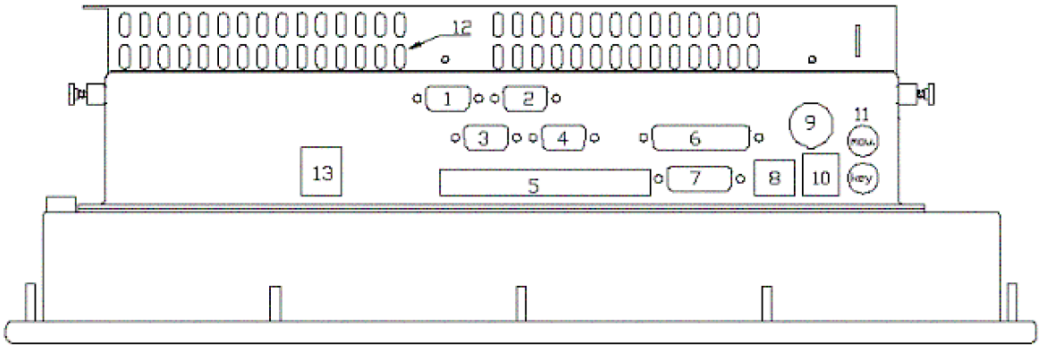
A selection of screens allows operators to monitor, control, and troubleshoot the system. These screens display:

- All controlling parameters
- Starting sequence status
- Turbine-related information
- Generator-related information
- Speed, Extraction, Aux, Casc, and Limiter information
- Analog input/output information
- Discrete input status
- Discrete output status
- System alarm and shutdown information

These screens also allow access to:

- Dynamic Adjustment
- Overspeed test
- Valve calibration
- Controlled shutdown

The HMI provides an alarm log that displays and time tags (with one second resolution) all 5009 alarms and trips. Connection to an optional serial printer provides a hard-copy of the alarm/trip log. Refer to Figure 2-2 for port locations.



1: RS485/RS422 - port 1 D-Sub 9p female (optional)
2: RS232 - port 1 D-Sub 9p male
3: RS485/RS422 - port 2 D-Sub 9p female (optional)
4: RS232 - port 2 D-Sub 9p male
5: CD power / CD Rom 4 pol power / IDC40
6: Printer port D-Sub 25p female
7: Floppy port HD-Sub 26p male
8: Ethernet port RJ45
9: PCI6000 Keyboard port 8pin threaded DIN female
10: USB port USB std. connector
11: PS/2 KBD/Mouse port 6p mini DIN
12: Ventilation holes
13: Mains terminal block 3p screw terminal

Figure 2-2. Bottom View PCI6000

Chapter 3. Installation

Introduction

This workstation is designed for industrial applications for panel mounting.

The unit must be installed in an enclosure or panel mounted so that the back shell of the unit is protected from airborne contaminates. The installation must also provide adequate air flow for the unit. To provide for this, a minimum of two inches must be provided around the sides of the unit to insure proper air flow. When installing the unit, enough room should be left in the back for ease of wiring.

For more information on the environmental restrictions, consult the PCI6000 manual that was included with the hardware package of the HMI.

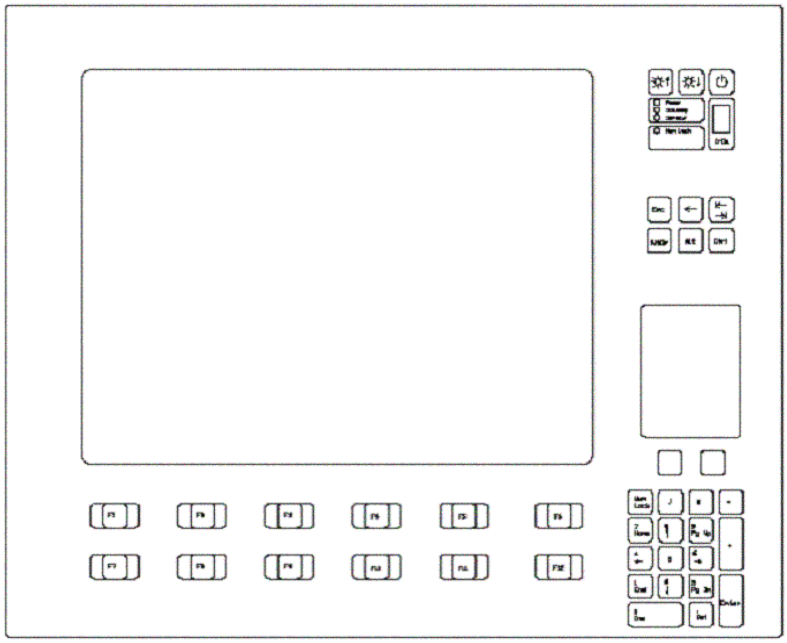


Figure 3-1. Front View

Communications

The PCI6000 has multiple communication ports (see Figure 2-2). The HMI "COM 1" communication port is used for 5009 to HMI communications. The COM 2 is used for the 5009 PC Interface. Both COM ports are configured to communicate with RS-232.

RS-232 communications should not be used if the distance between the devices is more than 15 meters (50 feet). Refer to Figure 3-2 for cabling connection requirements.

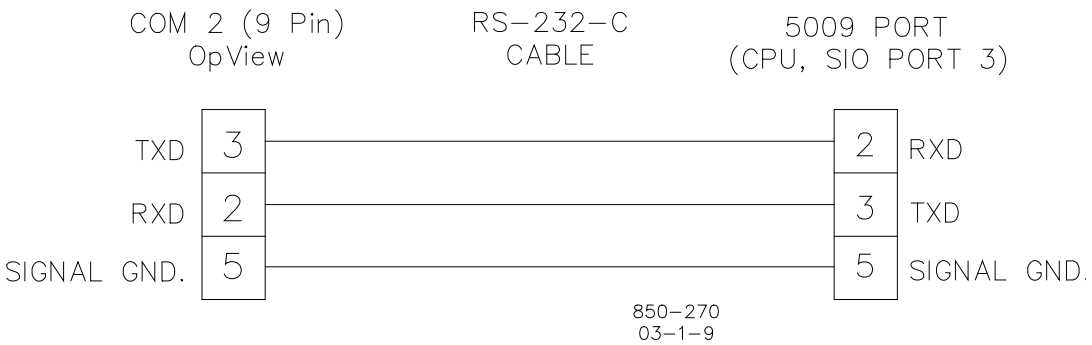


Figure 3-2. RS-232 Communications (HMI COM 1 and COM 2, 9 Pin)

Any 5009 control serial port configured for Modbus communications can be used to communicate with the HMI. For successful Modbus communications the respective 5009 Modbus port settings must configured to match the HMI communication port settings. The HMI “Com 1” port communication settings are defaulted to the following:

- Protocol Type: RTU
- Device Number: 1
- Baud Rate: 19200
- Stop Bits: 1
- Parity: NONE

If the 5009 port settings have been changed from these defaults the HMI will not communicate. Refer to Volume 1 of the MicroNet TMR® 5009 Digital Control Manual for further information on setting the communication ports.

Parallel Printer Port

The Citect hardware protection key must be connected to the parallel printer port of the computer. See Figure 2-2 for location of port. Without the key, the HMI can only run for 15 minutes.

If a parallel printer is to be used with the HMI to print out the alarm log, it must also be connected to the PCI6000’s parallel port. Use a standard IBM based parallel cable to connect the printer to the HMI.

Additional Connections

CD Power / CD Rom	Possibility to connect a CD-ROM Player
Floppy Port	This port is used by a floppy drive
Ethernet Port	Possibility to connect the PC to a network (not configured)
USB Port	Not configured
CRT Connector	Possibility to connect a monitor
KeyBoard Port	Possibility to connect a keyboard
Mouse Port	Possibility to connect a mouse when internal jumpers are replaced. See the PCI6000 Manual for more details.

Initial Set-up

Upon power up, the HMI performs a set of diagnostic tests before it switches to its Run mode and is ready for operation. These diagnostic tests take a few seconds. If the HMI is not communicating with the 5009 control, it may take up to 2 minutes before application screens show information.

After all diagnostic tests are passed the application's Main Menu screen will appear. If a "NOT COMMUNICATING" message is displayed across the top of the screen verify that the 5009-to PCI6000 communications cable connections and the 5009 port settings are correct.

When the HMI is in Run Mode, the operator can go to any of the operational screens and view and/or change the 5009 control running parameters. If the 5009 is not communicating with the HMI, the operator will still be able to go to the screens, but will not be able to issue any commands or view 5009 parameters.

It is recommended that the HMI time and date are set as part of the HMI initial set-up. Refer to the next paragraph (Setting the Time and Date) for setting instructions.

Setting the Time and Date

On top of every page the time and date is visible. When one of them is clicked the standard Windows NT date/time properties appear.

Chapter 4.
HMI Program

Introduction

The program used for the HMI is Citect. A Citect project consists of three major elements:

- Graphics Pages
- Configuration Databases
- Cicode Files.

Graphics pages
Graphics pages appear on the computer screen(s), and usually display the status or condition of the plant. Graphics pages can also contain controls and command buttons that enable an operator to control the processes in the plant. The pages can be edited in the Citect Graphic Builder (described in the next section).

Databases
Databases store configuration information (about the plant) that is used in the runtime system to control and monitor the plant. Some databases are linked to specific graphics pages. The most important are:

- Variable.dbf (Modbus addresses)
- Trend.dbf (determines which analogs are trended)
- Digalm.dbf (determines which digitals are displayed on the alarm page)
- Communication databases

The databases can be edited in the Citect Project Editor (described in the next section).

Cicode files
Cicode files store the custom Cicode functions. Cicodes are used to perform commands and actions and extend the functionality of your system. The Cicodes can be edited using the Cicode Editor.

Starting Citect Explorer

To start the Citect Explorer select the **Citect Explorer** item from the HMI screen.

The Citect Explorer Screen

The Citect Explorer is the utility that you use to create and manage your Citect projects. It is also the controlling configuration application, from which you can run the Project Editor, Graphics Builder, and Cicode Editor. Figure 4-1 shows the Citect Explorer screen.

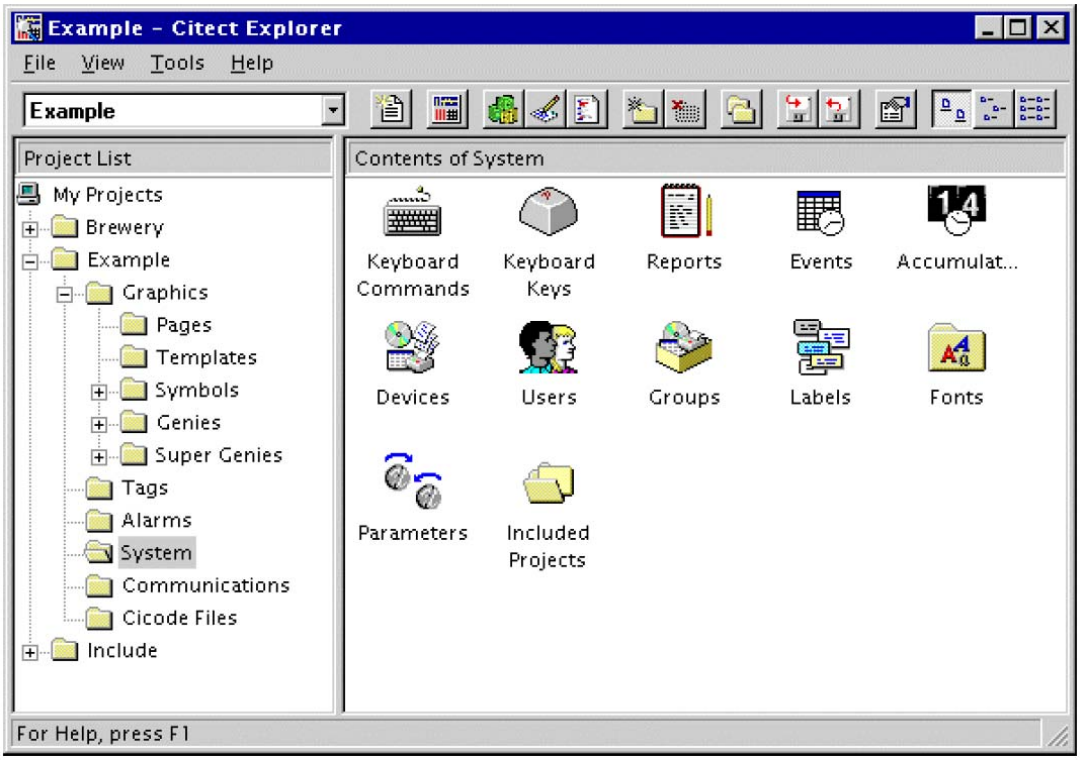


Figure 4-1. Citect Explorer

When you start the Citect Explorer, the Project Editor and Graphics Builder are automatically started and minimized. When you close the explorer, the other Citect applications are shut down.

To find out about the items on the Citect Explorer screen select **Help → Explorer → Help** from the menu.

The Include Project

The **Include** project is installed when Citect is installed and contains pre-defined elements that can be used in your Citect projects. These pre-defined elements include keyboard key definitions, font definitions, genies, super genies and symbol libraries.

You can choose to view or hide the **Include** project in your Project List by toggling the **View → Show → Include → Project** menu item.

IMPORTANT

Do not modify the Citect Include project, because when you upgrade to a newer release of Citect the Include project will be replaced and your modifications will be lost. Create your own include projects for your customized elements, and they will be portable to new Citect releases.

Citect Project Editor

The Project Editor is started and minimized when Citect Explorer is started.

The Project Editor is the editing utility used to create and manage the configuration information of your project. This information is not related to graphics pages. Figure 4-2 shows the Project Editor.

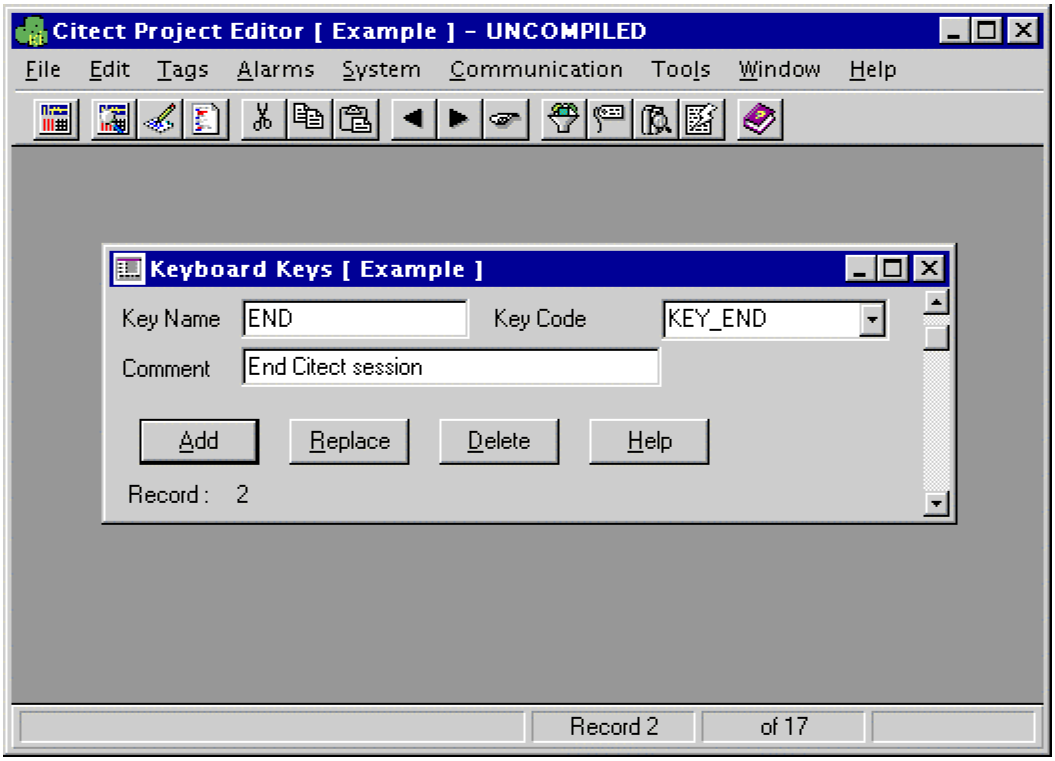


Figure 4-2. Project Editor

The Citect Project Editor uses data entry forms for configuring and managing the Citect project. You can have several forms open at once - each form displaying a separate record, or all forms displaying the same record.

To find out about the Project Editor select **Help → Project → Editor → Help** from the menus.

Citect Graphics Builder

The Graphics Builder is started and minimized when Citect Explorer is started.

The Graphics Builder is an editing utility that you use to create your graphics pages, and the objects that comprise the graphics pages. Figure 4-3 shows the Graphics Builder.

The Graphics Builder is automatically started when you double click on a graphic object in the Citect Explorer.

To find out about the Graphics Builder select **Help** → Graphics Builder → **Help** from the menus.

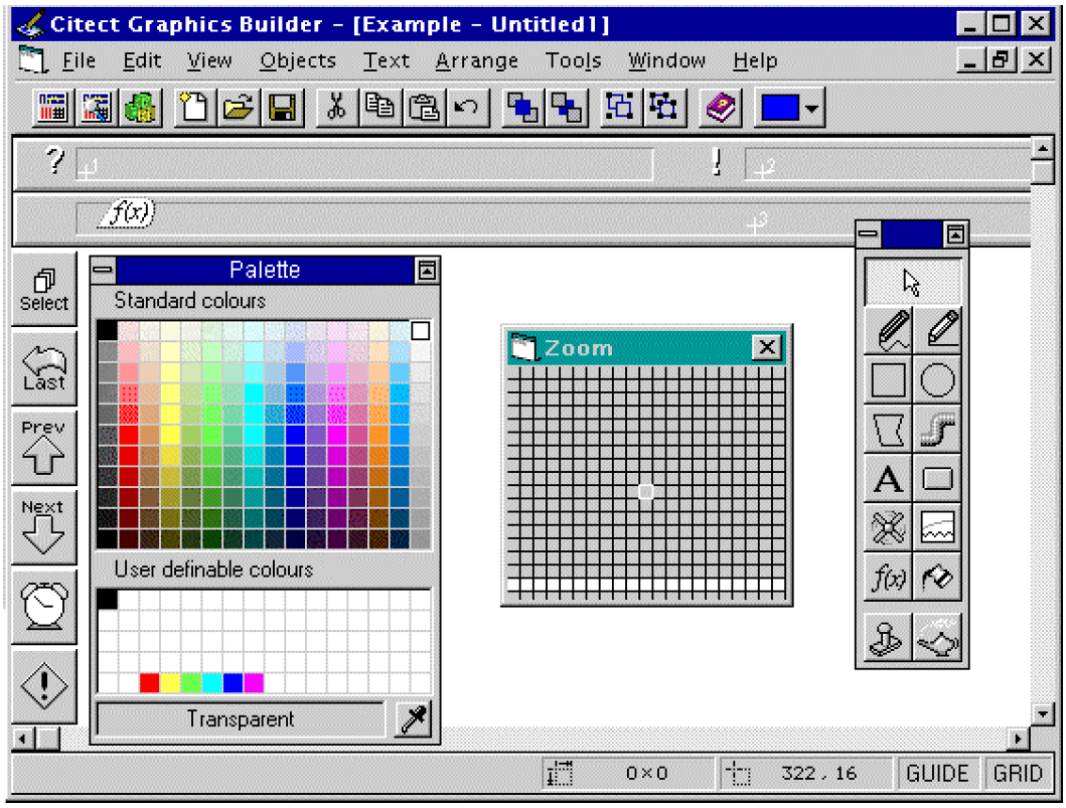


Figure 4-3. Graphics Builder

Cicode Editor

The Cicode Editor can be started by clicking on the Cicode Editor button  or Tools menu. The Cicode Editor (see Figure 4-4) is a fully-integrated programming environment, specifically designed for writing Cicode.

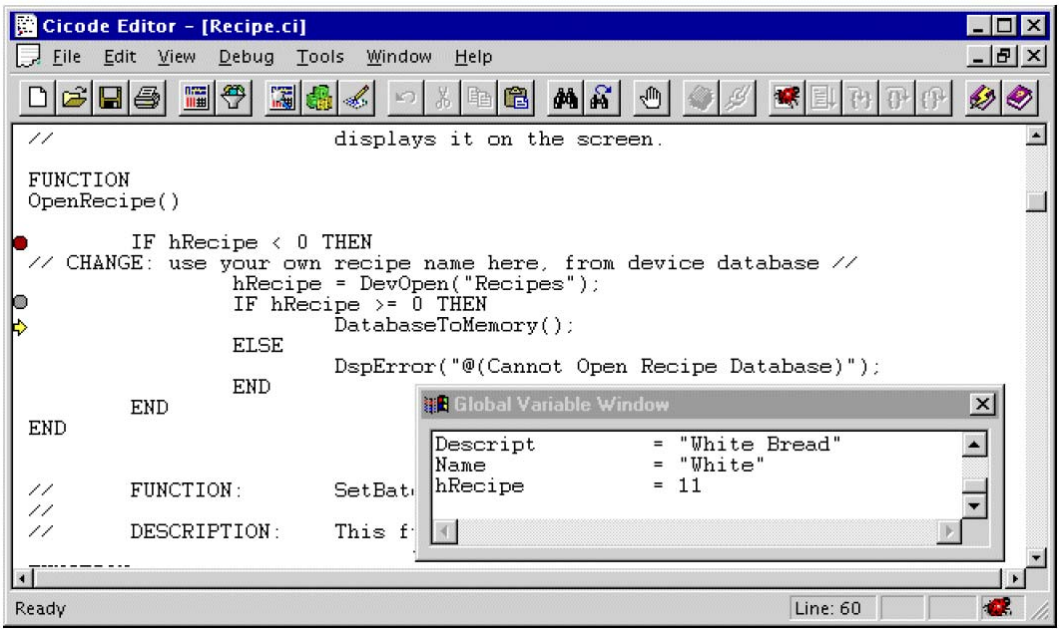


Figure 4-4. Cicode Editor

To find out about the Cicode Editor select **Help** → Cicode Editor → **Help** from the menus.

Backup Citect Application

When needed a backup from an application, the following steps must be taken:
1. Start Citect Explorer. See Chapter 5 for the HMI screen.
2. Select Backup from the Tools menu.
3. Select an appropriate backup location (this will normally be A: for backup to floppies) and choose the correct settings (Normally, only Use Compression is checked).

Restore Citect Application

When a new application must be restored into the computer, the following steps must be taken:
1. Start Citect Explorer. See Chapter 6 for the HMI screen.
2. Select Restore from the Tools menu.
3. Select appropriate restore location (this will normally be A: for backups made to floppies) and choose the correct settings (Current/New project, Clear destination before restoring). The application is now restored and, when necessary, the settings can be changed.

NOTICE

When the application is not compiled, and the computer shuts down and will not start up again, see the next section (Citect Shell does not Work) for the correct start-up procedures.

Before returning to the running mode the application has to be successfully compiled in the Citect project editor (Figure 4-2).

Settings Citect

Normally the following settings are correct but if problems occur after installing a new application, the Computer Set-up can be run:
1. In the Citect Explorer “Computer Set-up“ from the Tools menu select “Citect Computer Set-up Wizard“. Select “Custom Set-up“ and click next.
2. In the “Computer Role Set-up“ select “Server and Display Client“ in the field “Stand-alone computer“ and click next.
3. In “Project Set-up“ search for the correct project name and click next.
4. In “I/O Server Set-up“ enable “This computer is an I/O Server“ and click next.
5. In “Alarms Set-up“ enable “This computer is an Alarm Server“ and click next. Change the alarm setting to the required values and enter the correct location in which to save the alarm file. Click next.
6. In “Reports Set-up“ enable “This computer is a Reports Server“ and click next. Enable “Inhibit triggered reports on start-up” and click next.
7. In ”Trends Set-up” enable ”This computer is a Trends Server” and click next. Enable “Inhibit triggered trends on start-up” and click next.
8. In “Events Set-up“ if there are any events available and they have to be activated, copy the event from the left field to the right field using the arrows and “Enable Events on this computer“ then click next.
9. In “Security Set-up“ disable all and click next. Enable “Inhibit screen saver while Citect is running“ when a screen saver Disable “Display Cancel button at start-up“ and click next.

10. In “General Options Set-up“ enter the required setting you need. The trend files will be saved in the “Data directory“. The “Start-up page“ normally has a <Default> location. Click next.
11. In “Citect Computer Set-up“ click Finish.

The Citect computer set-up is now finished.

Set the MODBUS Protocol Parameters:
1. Select “Citect Help Topics“ from the Help menu.
2. Select “Find“. If help has not been used before select “Maximize Search Capabilities“.
3. Find item “Maxbits“ and select “MODBUS Protocol Parameters“.
4. Go to the “Maxbits“ item and change the Default Value from 2000 to 1880 bits.
5. Close the Help menu.

The values in the protdir.dbf (C:\citect\bin\ ) must also be set to 1880. This value is located in the MAX_LENGTH column on the MODBUS row (in the TAG column) (see Figure 4-5).

Table: PROTDIR

TAG	FILE	BIT_BLOCK	MAX_LENGTH	OPTIONS
MEWTOCOL	MEWTOCOL	2000	2000	0x03
MICROD	MICROD	256	256	0x1cf
MICROMAX	MICROMAX	2048	2048	0x04b
MINESCAN	MINESCAN	40	504	0x1083
MININET	MININET	880	1984	0x13cf
MODBUS	MODBUS	400	1880	0x37f
MODBUS1	MODBUS	400	1880	0x37f
MODBUSA	MODBUS	400	1880	0x37f

Figure 4-5. PROTDIR.dbf

To get the correct characters (Like ° or µ) change the parameter **ANSIToOEM** in the C:\windows\citect.ini to:
- [CtEdit]
- ANSIToOEM=1 (or 0)

This is done using Citect help. This parameter indicates whether Windows ANSI characters are converted to OEM characters.

For serial Modbus communication verify the serial port set-up in the application (see Citect Project Editor above, menu **Communication**) is correct and the serial port is defined in Windows and free to use (not used for a serial input device such as a mouse).

NOTICE

Do not change the communication settings in Citect. They have been set up and tested by Woodward for the specific project.

For Ethernet Communication verify that the virtual I/P port set-up in the application (see Citect Project Editor above, menu **Communication**) is correct. Windows Networking should be set-up with TCP/IP and a fixed IP address in the same group as the IP address of the device it is communicating with (for example a NetCon). The NetCon uses 190.005.009.001 and the computer uses 190.005.111.210. Selecting and assigning IP addresses should be done by a system administrator if the HMI is part of a larger network rather than a simple point-to-point connection. When Citect is installed on a stand-alone computer, the primary Network Logon in Windows Networking must be set to Windows Logon.

As is standard when saving trend values, only the first 10 characters of the trend tag are saved as header. Thus to enable longer names the following changes in the Cicode file **C:\citect\user\include\export.ci** must be made:

- In function _**TrnPeriodicExportCSV** on line 120 (Ctrl+G), change 10 to 16
- In function _**TrnEventExportCSV** on line 213, change 10 to 16

Now when saving trend values, select the extension **.CSV.**

Citect Shell does not Work

When Citect displays the message ‘Cannot find project’ at startup, and the startup does not continue, a change was made to the Citect application and compile was not completed. Do this procedure to start the computer:

1. Insert the boot-up floppy into the computer.
2. Restart the computer.
3. When a boot-up floppy you can press CTRL-SHIFT-ESCAPE and the task Manager will appear.
4. Click on ‘New Task’.
5. Enter ‘regedit.exe’.
6. Go to HKEY_LOCAL_MACHINE\Software\Microsoft\WindowsNT\ CurrentVersion\Winlogon\Shell.
7. Change the shell from C:\CITECT\BIN\CITECT32.EXE to ‘EXPLORER.EXE’.
8. Restart the computer.

Chapter 5.
Operating Procedures

General Operating Procedures

This chapter describes the options and features that are available through the HMI. This manual should not be used as an operational manual for the turbine control. Refer to Volume 1 of the MicroNet TMR® 5009 Digital Control manual for more information on the operation and control functions of the 5009 control.

The HMI is based on a Windows NT workstation. Several "screens" with graphics, monitor boxes, and pushbuttons have been set up for ease of turbine operation. The graphics are self-describing and show pictures of valves, turbines and other standard plant equipment. The monitor boxes show references, inputs, outputs and other measurements in easy-to-read numerical format. The pushbuttons are used to raise or lower setpoints, enable or disable functions, or to move from one screen to the another.

If the 5009 control is configured to receive commands from the HMI, all control operations can be performed through the HMI. If not, the HMI can serve as a system monitor.

Notes Regarding this Chapter

The following terms are used in this chapter.

Visibility	This term is used to reference when a gauge or function is displayed on the HMI (such as enable / disable buttons). Visibility largely depends on how the 5009 is configured. For example, if configured for a single valve turbine, no extraction type gauges will appear.
Enable / Disable Buttons	These are 'active' buttons which change once they are pressed, i.e. if the button says ENABLE the function will be enabled when pressed, then the button will then change to DISABLE.
Load Gauges	Load is displayed in kW or MW depending on the 5009 configuration. If the kW Analog input has failed, the gauge will change to percent, which is calculated in the 5009 control.
Remote Setpoints	These only appear on the Turbine Control screen.
Entered Setpoints	These only appear on the Turbine Control screen.

Lost Communication

If the HMI is not communicating with the 5009 a large 'LOST COMMUNICATION' message appears on every screen. The screens can still be paged through, however all control variables will be corrupt and gauges that were previously hidden are displayed.

Upon loss of communications between the HMI and the 5009 control, the 5009 will generate an alarm. Turbine control will not be affected. No commands from the HMI will be executed until the communications link is restored. Once communications have been re-established all commands from the HMI will be accepted except 'entered' values (see Figure 5-7). The 5009 alarm (communications failed) must be reset before 'entered' values are accepted.

Units

The HMI will display the units of measure that have been configured in the Program Mode of the 5009 control for each function.

Local/Remote

The 5009's Local/Remote function allows an operator to disable some or all remote operator panels.

If the 5009 is configured to accept a Local/Remote input from the HMI, a Local/Remote pushbutton will appear on the MAIN MENU and DYNAMICS / TREND MENU screen. It displays the action which will take place if the button is pressed (same as enable / disable buttons). There is also a status indication on all screens (except Trend screens) indicating Local/Remote status.

Refer to Local/Remote status in Volume 1 of the MicroNet TMR 5009 Digital Control Manual and 'CPU Communications' in Volume 3 of the MicroNet TMR 5009 Digital Control Manual for more information.

Emergency Trip

The 5009 control is defaulted to not accept an emergency shut down (ESD) command from the HMI. If the 5009 is configured to accept an ESD from the HMI, the ESD command button is displayed in the top right corner of all screens. The HMI emergency trip utilizes a two-step process to avoid accidental shutdowns. The following procedure explains the two-step emergency trip. Refer to Figure 5-1 for the location of the ESD buttons.

1. Press the Emergency Trip (ESD) button.
2. Press the Verify Emergency Trip button, within five seconds (different screen location).
3. The 5009 will shutdown immediately.

IMPORTANT

The Verify button will appear on top of the screen title. After five seconds, the Verify button will disappear from the screen and the first step will have to be reinitiated.

General Screen Functions

Depending on how the 5009 is configured, complete system control through to simple monitoring can be accomplished at the Click of the mouse. There are basic functions which can be performed or viewed from all of the HMI screens (except where noted).

Detailed Operating Procedures

The following section describes HMI buttons and status indications, their function, and when they appear on the HMI screen (visibility). Items contained under General Screen Functions in the previous chapter are not described in this section. Visibility for all command buttons (buttons which communicate with the 5009 control to perform a function) is dependent on the Modbus being enabled. Refer to Volume 1 and Volume 3 of the MicroNet TMR 5009 Digital Control Manual for additional information on Modbus addresses and enabling / disabling the Modbus (local / remote).

Main Menu

The Main Menu screen is used as a starting point to access the other screens. In most cases it is necessary to return to the Main Menu to proceed to another screen. It contains pushbuttons to access other screens and the Dynamics / Trend menu.

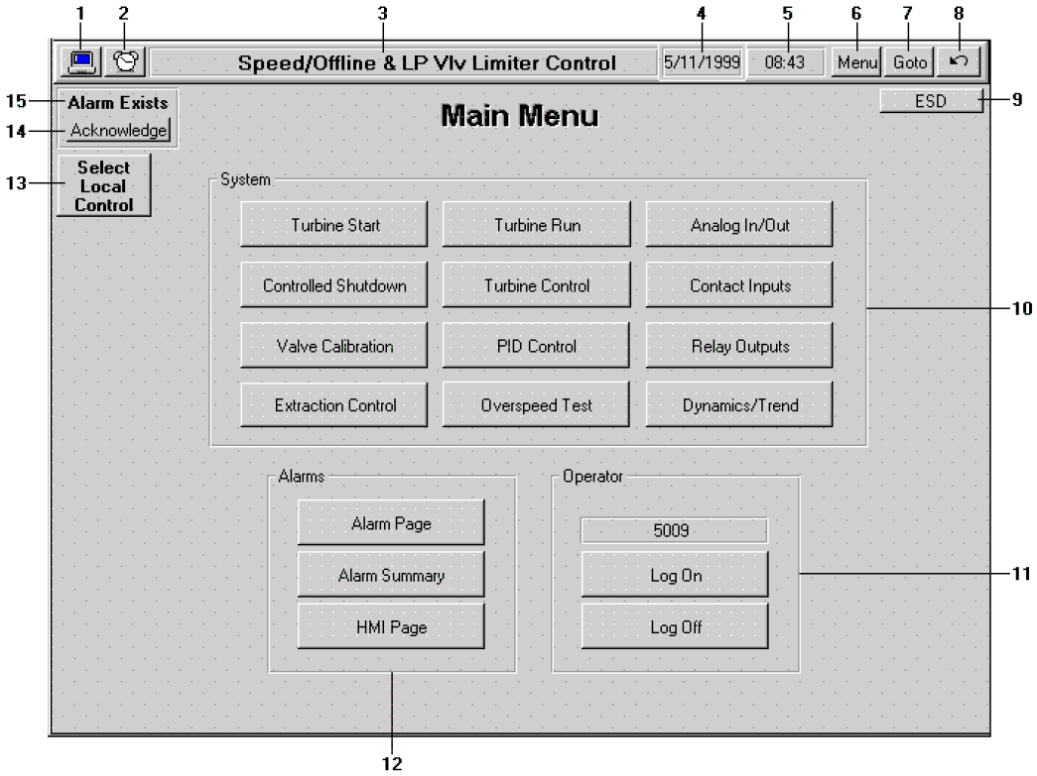


Figure 5-1. Main Menu

Table 5-1. Main Menu Functions

No.	Button / Display	Function	Visibility
1	HMI Screen	Link to the HMI Screen	Always
2	Alarm Screen	Link to the Alarm Screen	Always
3		Display Controlling Parameter	Always
4	Date	Change Time & Date	Always
5	Time	Change Time & Date	Always
6	Menu	Link to the Main Menu	Always
7	Goto	Pops up a screen selection	Always
8	Previous Screen	Go to the previous opened screen	Always
9	ESD	Issues emergency shutdown command	Configured for ESD from Modbus
10	Change Screen	Changes to the specified screen	Always except: Extraction, Admission, Extr/Adm based on configuration. Controlled Shutdown - Modbus enabled
11	Configure Password	Displays pop-up keypad for password entry	Always
12	Alarms	Links to the Alarm Screens	Always
13	Local / Remote	Toggles Local / Remote function	Local / Remote Configured
14	Acknowledge	Alarm Acknowledge	When an alarm or trip exist and not latched
15	Alarm Exist	Alarm / Trip status	When an alarm or trip exist

The Configure Password generates a pop-up keypad which is used to enter the password for the Tuner and supervisory mode.

The Alarm Summary button links to the alarm summary page in which older alarms are displayed. The link only exists on the Main Menu and Alarm screen.

Turbine Start Screen

This screen is used to start the turbine and ramp to rated speed or the minimum controlling speed. The Turbine Start screen displayed will be different depending on the Idle To Rated Routine programmed in the 5009 control. The three Start Screen options are Idle/Rated, No Idle Used (Manual Raise / Lower Only) and Auto Start Sequence.

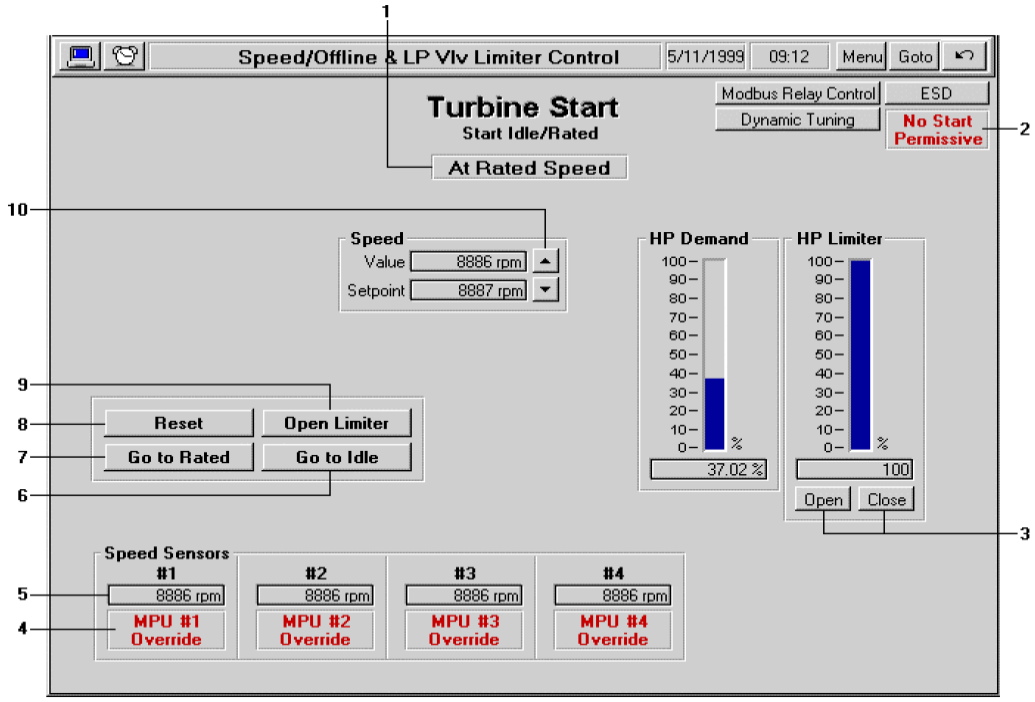


Figure 5-2. Turbine Start (Idle / Rated)

Table 5-2. Turbine Start Functions

No.	Button / display	Function	Visibility
1	Status*	Indicates status of configured start sequence	Always
2	No Start Permissive	Indication of start permissive contact input	Start perm configured & turbine not started
3	Open / Close Valve Limiter	Opens and closes HP/V1 valve limiter	Turbine run initiated
4	MPU Override	Indicates speed sensor override	Based on 'Zero Speed Override'
5	Speed Sensors	Displays speed sensed by each speed sensor	Based on how many speed sensors configured
6	Go to idle*	Selects idle	Turbine started & Idle Permissible
7	Go to rated*	Selects rated	Turbine started & Rated Permissible
8	Reset	Reset 5009 alarms / trips	Shutdown exists
9	Open Limiter	Automatically increases HP/V1 valve limiter	Ready for Open Limiter (turbine started, initial V1 position configured and limiter at initial value) & HP/V1 limiter not at max
10	Raise / Lower	Raise or Lower Speed Setpoint	Speed Raise / Lower permissible
	Resume Auto Seq*	Continues Auto Start Seq.	Auto Start Seq. is halted and not completed, HP/V1 limiter is not at minimum and turbine not shutdown
	Start	Initiates a start command	Turbine not started & shutdown does not exist
	Halt Auto Seq*	Halts Auto Start Seq.	Auto Start Seq. is not halted or completed, HP/V1 limiter is not at minimum and turbine not shutdown
	Auto Seq Graphic *	Link to Auto Start Seq. graphic screen	Configured for Auto Start Sequence

* Based on 5009 configuration.

Auto Start Sequence Graphic

This screen is available if the Auto Start Sequence is configured in the 5009 control and accessed by pressing the 'Auto Seq Graphic' button on the Turbine Start screen. It shows the Auto Start Sequence in a graphical form and contains most of the same functions of the Turbine Start page.

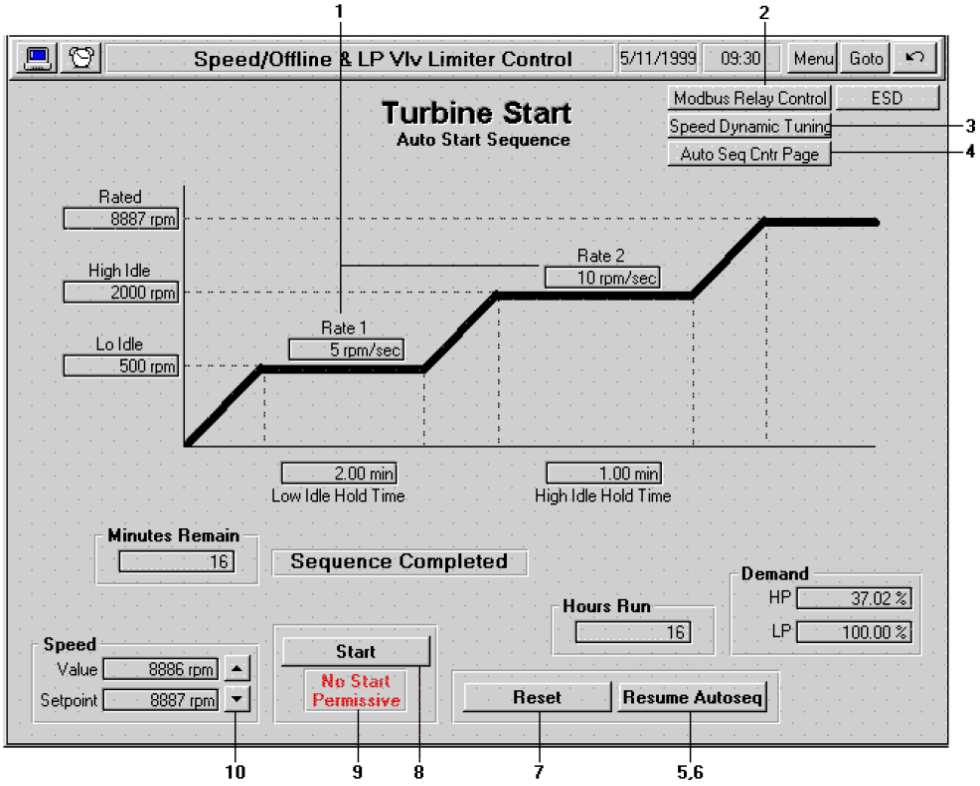


Figure 5-3. Auto Start Sequence Graphical

In addition to start sequence status and speed, the graphical screen displays ramp rates and Idle Hold times as calculated in the 5009 control. To move back to the Auto Start screen push the AUTO SEQ CNTRL PAGE button. Access to the Speed Dynamic tuning screen is available by pushing the SPEED DYNAMIC TUNING button.

Table 5-3. Auto Start Sequence Functions

No.	Button / display	Function	Visibility
1	Rate 1 Rate 2	Calculated rate of increase	Always
2	Modbus Relay Control	Link to Modbus Relay Control	Modbus relays configured
3	Speed Dynamic Tuning	Link to Speed Dynamics screen	Always
4	Auto Seq Cntrl Page	Link to Auto Start Sequence screen	Always
5	Resume Auto Seq	Continues Auto Start Sequence	Auto Start Seq. is halted and not completed, HP/V1 limiter is not at min and turbine not shutdown
6	Halt Auto Seq	Halts Auto Start Seq.	Auto Start Seq. is not halted and not completed, HP/V1 limiter is not at min and turbine not shutdown
7	Reset	Reset 5009 alarms/trips	Shutdown exists
8	Start	Initiates a start command	Turbine not started & shutdown does not exist
9	No Start Permissive	Indication of start permissive contact input	Start perm configured & turbine not started
10	Raise / Lower	Raise or Lower Speed Setpoint	Speed Raise/Lower permissible

Turbine Run Screen

A graphic representation is displayed according to turbine type and application as configured in the 5009. Setpoints can be adjusted and control functions may be enabled and disabled from this screen. This screen gives indication of all configured setpoints and inputs as well as breaker status (generator config.), valve demand(s) and hours run / tripped. Frequency arm / disarm, synchronizer and load share functions also appear on this page.

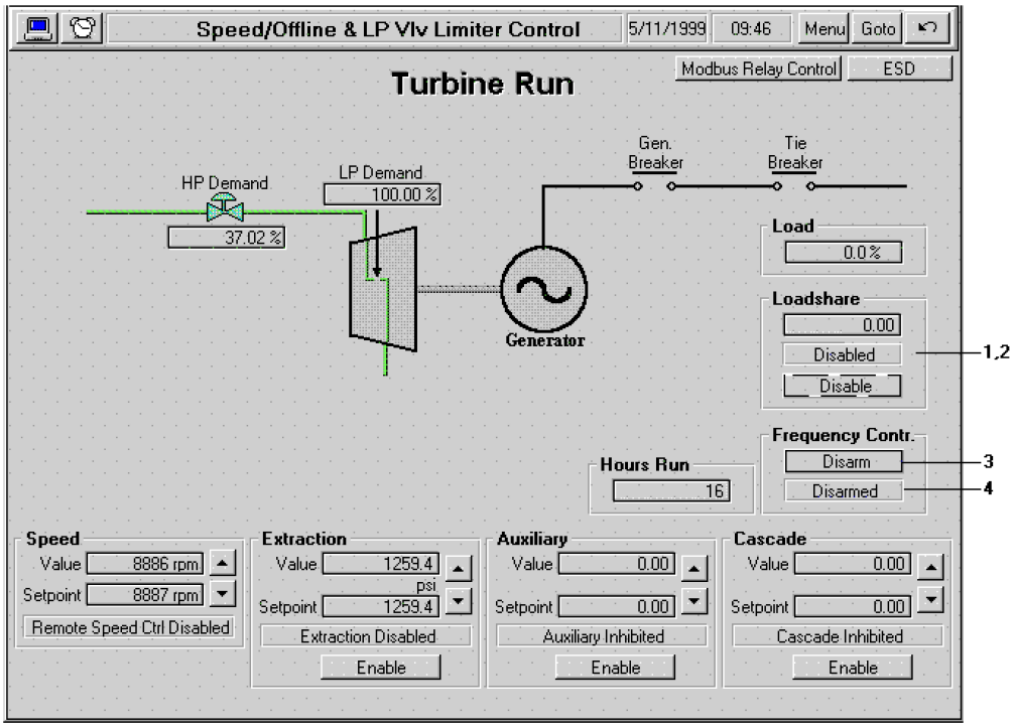


Figure 5-4. Turbine Run (Extraction & Generator configured)

Table 5-4. Turbine Run Functions

No.	Button / Display	Function	Visibility
1	Enable / Disable	Enable / disable bias from loadshare input	Configured for loadshare and tie breaker not closed
2	Enable / Disable	Enable / disable bias from synchronizer	Configured for sync input and generator breaker not closed
3	Arm / Disarm	Frequency Control arm / disarm	Frequency control arm/disarm configured
4	Frequency Control Status	Current status of frequency control	Frequency control arm/disarm configured

Analog Input / Output Screen

The Analog Input/Output screen is a monitor screen which displays configured analog inputs and outputs in units and mA format, and speed sensors and actuator drivers. This screen is very useful for troubleshooting.

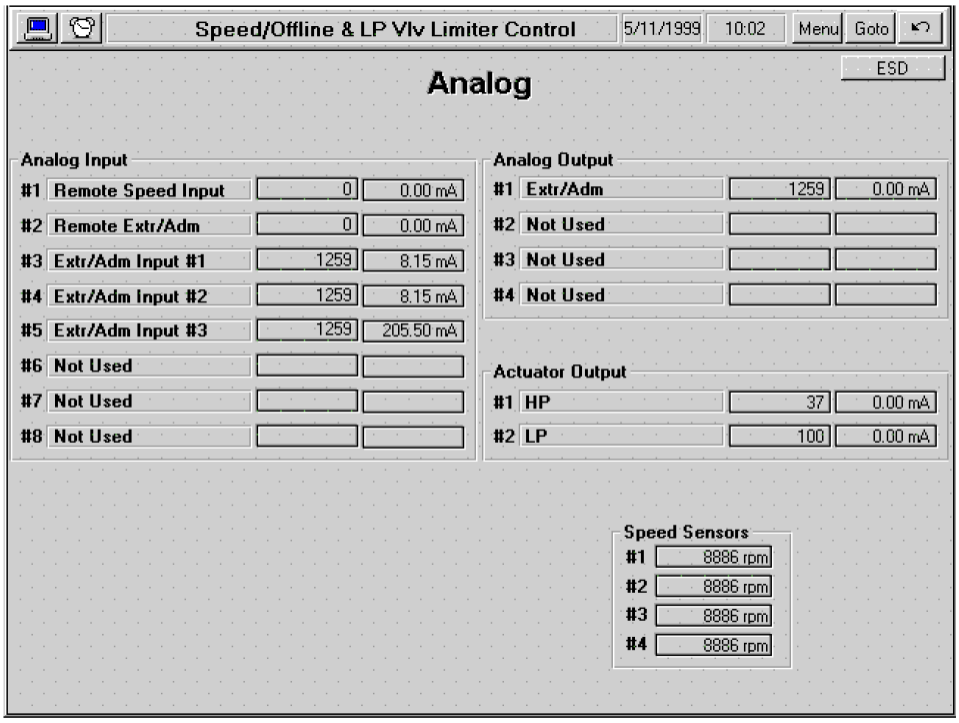


Figure 5-5. Analog Input/Output

Controlled Shutdown Screen

The operator can initiate, monitor and abort the 5009 controlled shutdown sequence from this screen.

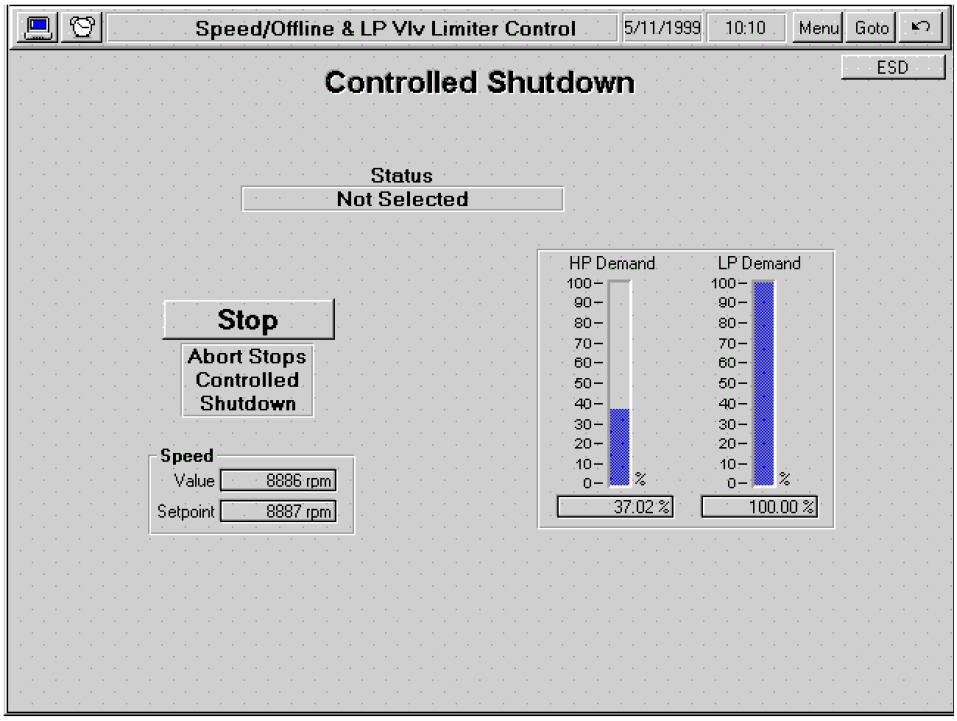


Figure 5-6. Controlled Shutdown

Turbine Control Screen

Setpoints can be adjusted and control functions may be enabled and disabled from this screen. Setpoints may also be directly 'entered' through this screen using a pop-up keypad. This is screen is used to monitor and enable / disable all remote setpoints. Valve demands, load or first stage pressure may also appear on this page depending on configuration.

Entering a Setpoint:
1. Press the set button. A keypad will pop-up.
2. Enter the desired setting.
3. Press OK. The setpoint will ramp to the entered setting (defaulted to the 'slow rate') and the keypad will disappear.

This process can be aborted by pressing the cancel button on the keypad. When, after entering a new value, the old value returns, the new value is out of range.

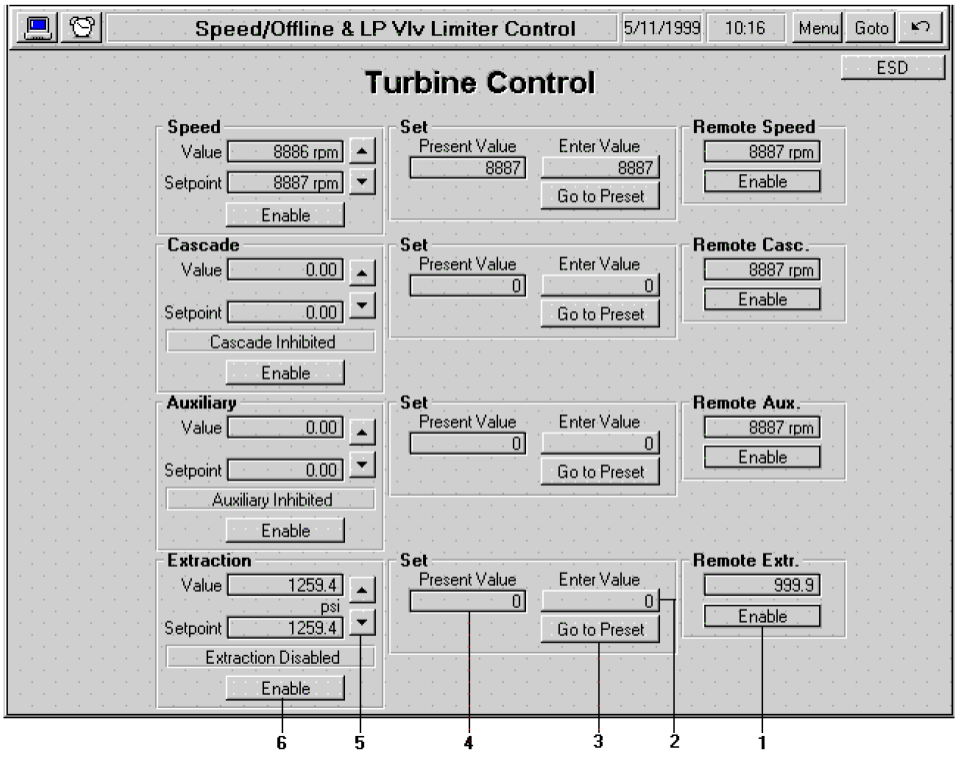


Figure 5-7. Turbine Control

Table 5-5. Turbine Control Functions

No.	Button / Display	Function	Visibility
1	Enable / Disable	Enables or Disables remote setpoints for the respective function	Function not inhibited
2	Entered Value	Displays last entered value & pops up a keypad to enter in a specific setpoint.	Setpoint adjustment permissible
3	Goto Preset	When pressed the setpoint will ramp at the 'entered rate' to the value displayed in present setpoint gauge.	Setpoint adjustment permissible
4	Present Value		Setpoint adjustment permissible
5	Raise / Lower	Raise or Lower the setpoint	Setpoint adjustment permissible
6	Enable / Disable	Enables or disables the respective function	Function not inhibited

Controllers (speed, ext, auxiliary, cascade) have the highest priority display on the Turbine Control and PID screen. If one of these controllers is not used then load, FSP, or valve demand(s) may be displayed on this screen.

Contact Input Screen

On this screen the contact input configuration and status is displayed. This screen is very useful for troubleshooting.

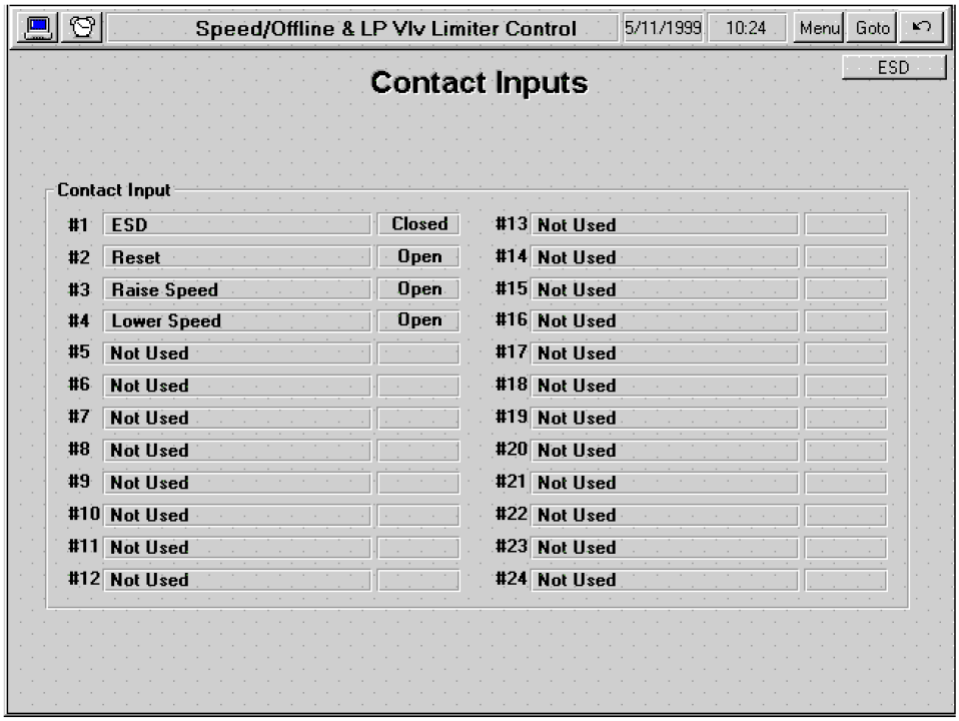


Figure 5-8. Contact Input

Valve Calibration

The valves can be calibrated / stroked from this screen as long as system permissives are met and the calibration password has been entered.

In order that the actuator valves can be calibrated, several permissives must be met. The 5009 control must be in shutdown mode and the speed of the turbine must be less than 1000 RPM. The calibration ENABLE button(s) remain hidden until the Calibration Password is entered. Optionally, the 5009 can be configured to not allow valve calibration through the Modbus. Refer to Volumes 1 and 3 of the MicroNet TMR 5009 Digital Control Manual for more information about valve stroke procedures.

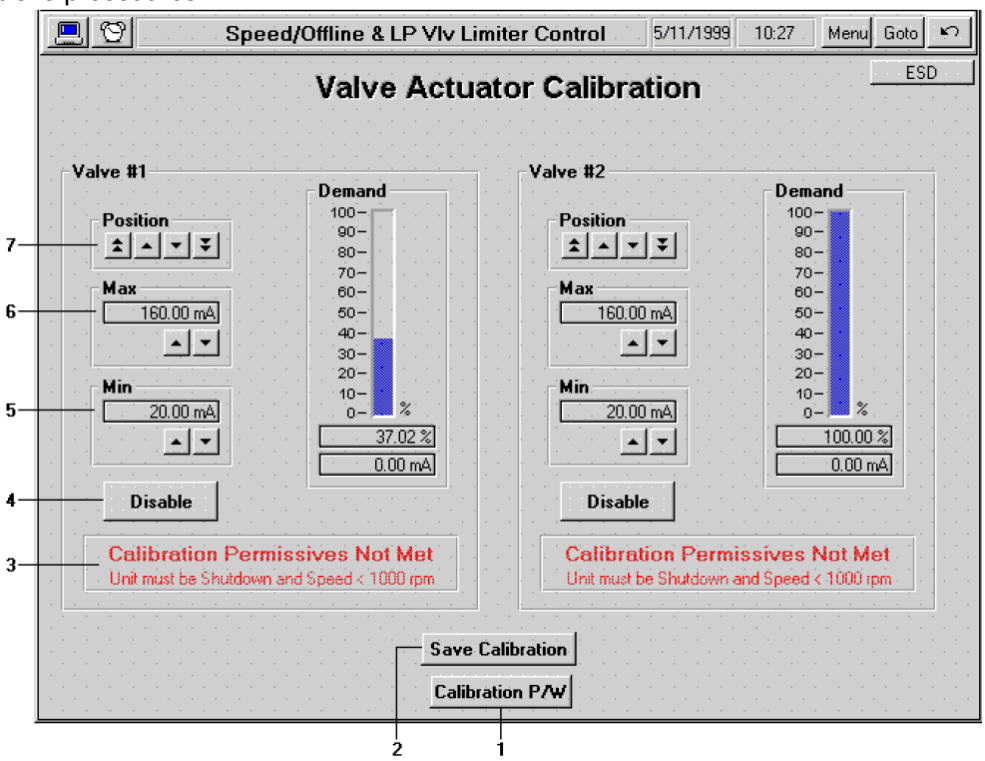


Figure 5-9. Valve Calibration

Table 5-6. Valve Calibration Functions

No.	Button / Display	Function
1	Calibration Password	Allows entry of the calibration password
2	Save Calibration	Saves changes made to calibration settings
3	Calibration Perms	Displays calibration Perms
4	Enable / Disable	Enables / disables calibration mode
5	Min	Minimum mA setting
6	Max	Maximum mA setting
7	Position	Increase or decrease the Valve Demand Fast or Slow rates

If the permissives are met the control can be taken into calibration mode by pressing ENABLE. The SLOW and FAST buttons labeled "Position" will adjust the valve from the minimum stop to the maximum stop with respect to the controlling output. By raising and lowering the Min and Max mA settings for each output, the valve can be adjusted to its minimum stop setpoint (normally zero steam flow at 0%) and at its maximum stop setpoint (normally full steam flow at 100%). Once the valve has been calibrated, the SAVE CALIBRATION button will store the new values into the 5009 control. Once the DISABLE button is pushed calibration is complete and normal operation can continue. Also, the password should be returned to the 5009 user level to prevent unauthorized valve calibration.

PID Control Screen

The PID Control screen shows all of the configured 5009 PID outputs and setpoints in a bar graph. Setpoints can be adjusted and control functions can be enabled and disabled. This screen is particularly useful in viewing how the different control loops interact with one another.

Bar graphs display process value (PV), setpoint (SP) and load or valve demand(s). The bar graph has a percentage scale. The numerical display on the bottom of the gauge is actual units for control parameters and percentage for valve demands. The OP gauge displays the PID's output.

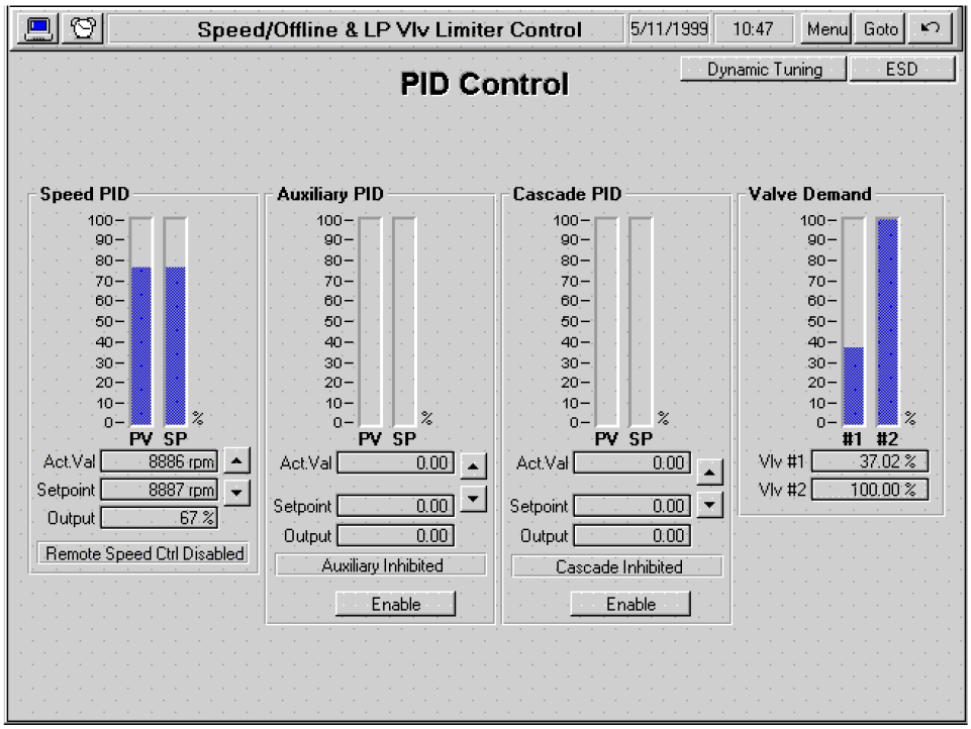


Figure 5-10. PID Control

Relay Output Screen

This screen configuration and status displays relay. The 5009 control can be configured to allow an external DCS to control any of the 10 configurable Relays through a Modbus communication port. If Modbus relays are programmed the Modbus Relay screen can be accessed from this screen.

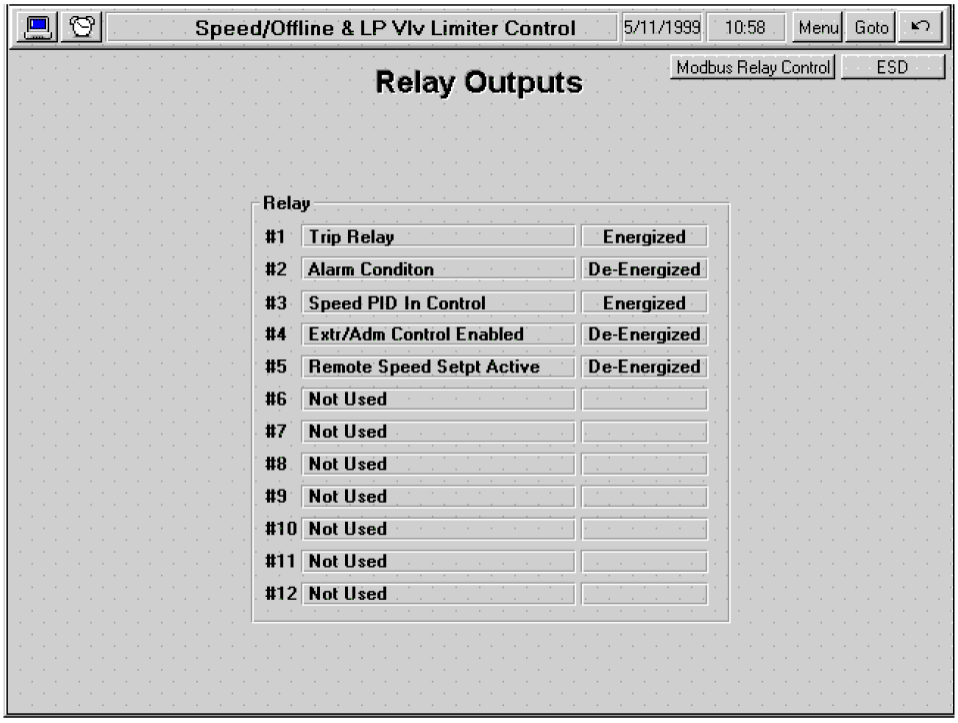


Figure 5-11. Relay Outputs

Modbus Relay Control Screen

Each configured Modbus relay can be energized or de-energized (or momentarily energized) from this screen. The status of each Modbus Relay is shown.

IMPORTANT **Access for this screen is located on Turbine Start, Turbine Run and Relay Outputs screens if Modbus relays are configured).**

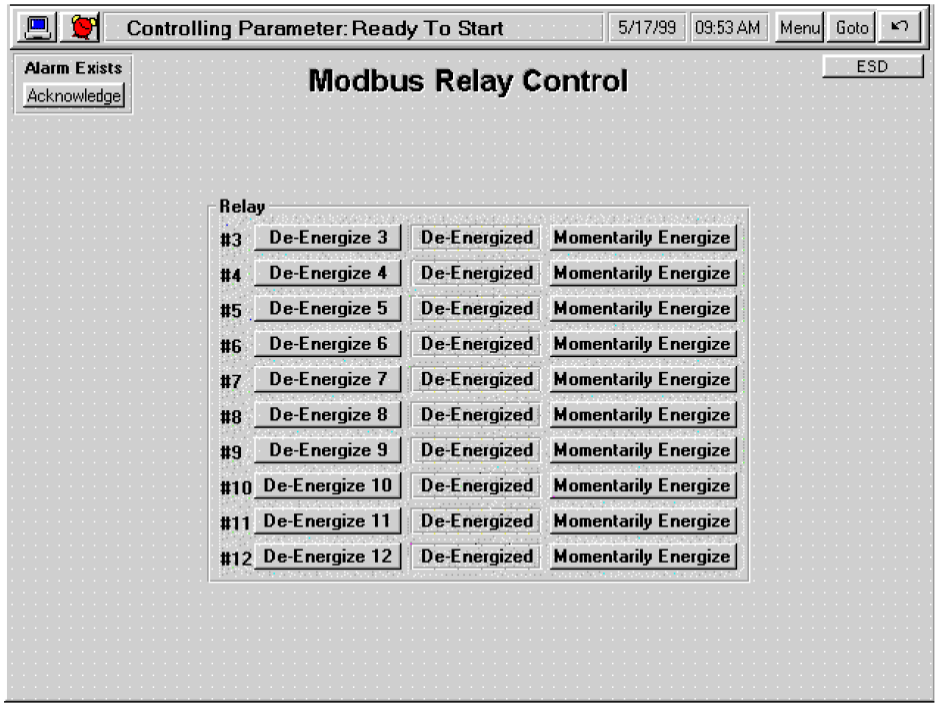


Figure 5-12. Modbus Relay Control

Extraction, Admission, EXTR/ADM Control (If programmed for Extraction and/or Admission) Screen

This screen contains functions used when enabling extraction, admission, or extr/adm (depending on configuration). Priority select is also used on this screen (if configured for priority switching).

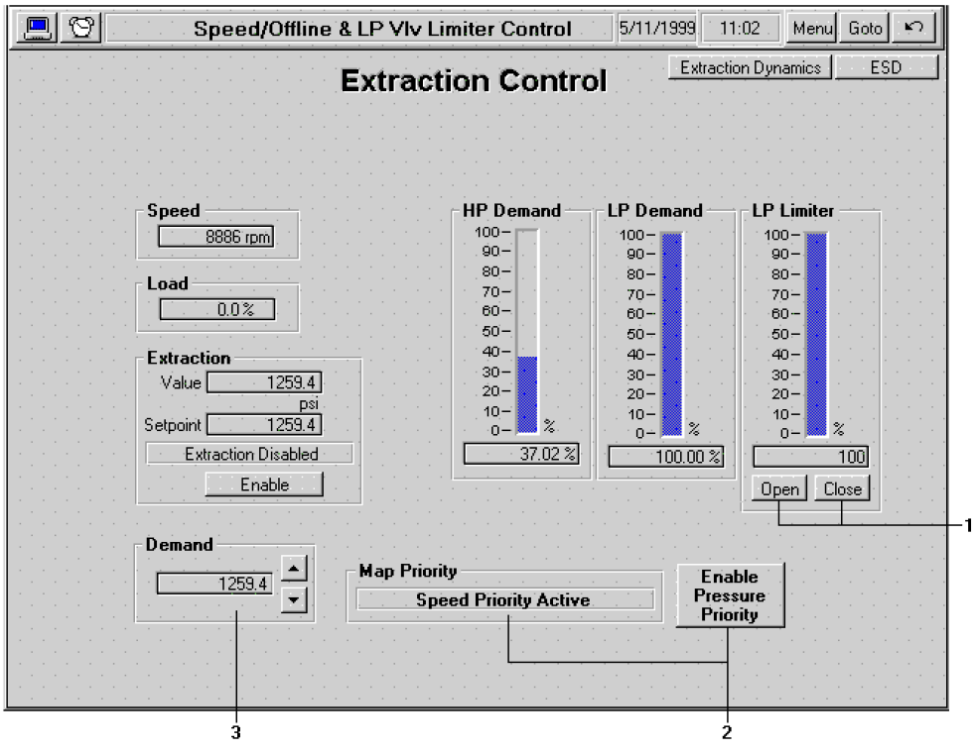


Figure 5-13. Extraction, Admission, EXTR/ADM Control

Table 5-7. Extraction Control Functions

No.	Button / Display	Function	Visibility
1	Open Close	LP valve limiter open / close	Open Close permissives met
2	Priority Transfer	Selects map priority	Configured for priority transfer
3	Demand	Admission demand setting	Configured for any admission

Overspeed Test Screen

Testing of the mechanical and electrical overspeed devices can be done from this screen.

In order to initiate the test, the speed setpoint must be at the maximum controllable setpoint as configured in the 5009 control. The turbine must be in speed control, and all other control functions must be disabled. At that time, four buttons will appear:

Disable Trip
Pushing the button at any time will cause the speed set point to ramp down to the maximum controllable setpoint. Changing the speed setpoint is done by pushing the arrow buttons to the right of the speed and speed setpoint.

Test 5009 Trip
Pushing the button will allow the speed setpoint to be raised to the electrical overspeed setpoint as configured in the 5009 control. Once the speed reaches the electrical overspeed set point the 5009 will trip the turbine.

Test External Trip
Pushing the button will allow the speed setpoint to be raised to the maximum overspeed setpoint as configured in the 5009 control. The mechanical or external overspeed protection of the turbine should trip during this test. The speed of the turbine can not be increased past the overspeed setpoint limit as configured in the 5009.

If the speed setpoint is not changed within 60 seconds during either of the tests, the control automatically discontinues the overspeed test. If the speed of the turbine is above the electrical overspeed setpoint, the turbine will trip. If it is below the electrical trip setpoint it will ramp down to the maximum controllable setpoint.

Reset Peak Speed
Peak Speed is shown that displays the highest speed the turbine has attained since the button was pushed.

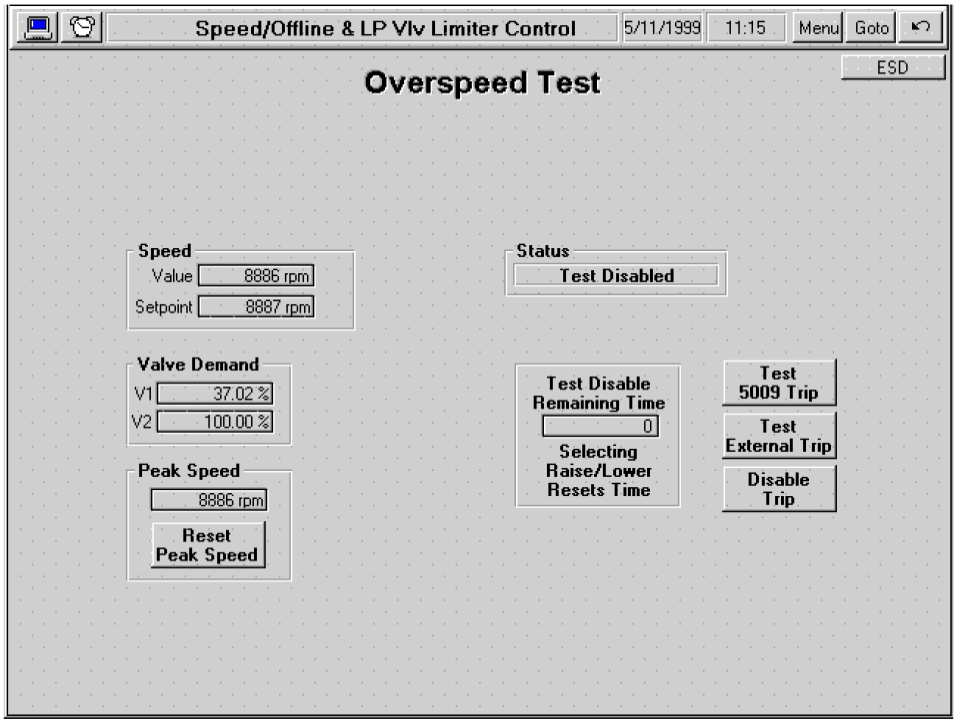


Figure 5-14. Overspeed Test

Dynamics / Trend Menu Screen

This menu (similar to Main Menu) contains buttons to access PID settings and trend screens for configured PIDs.

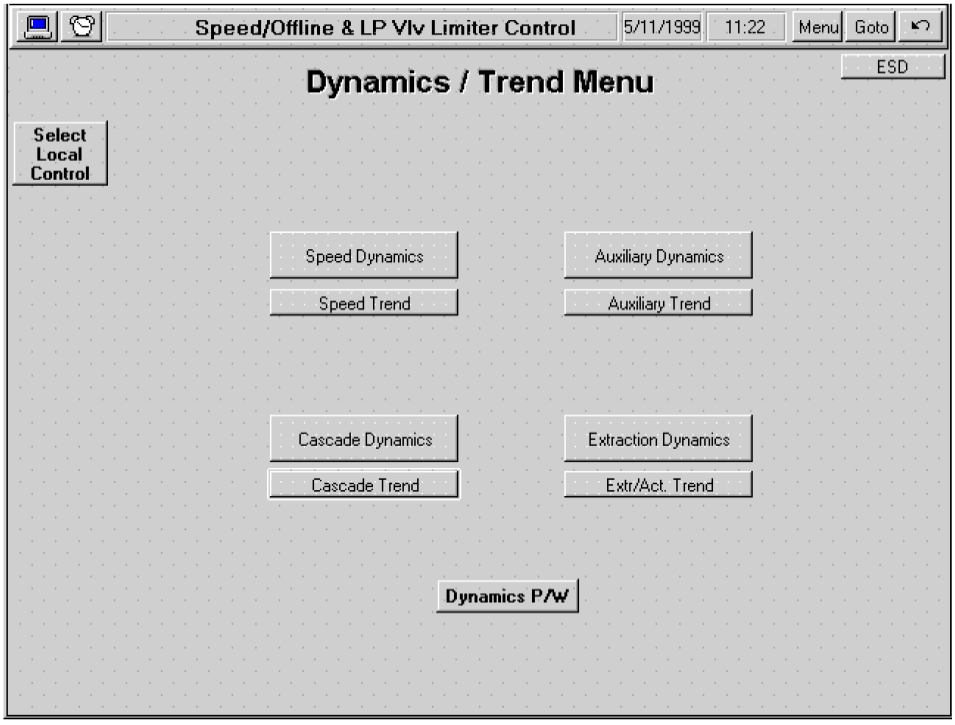


Figure 5-15. Dynamics / Trend Menu

Dynamics Adjustment

Adjustment to each controller's PID settings may be performed through the HMI. Each dynamic and trend screen may be viewed at all times, although PID adjustments remain hidden until the dynamics password has been entered. Optionally, the dynamics adjustments may be locked through the UPCI. Refer to Volume 3 of the MicroNet TMR 5009 Digital Control Manual for more information on the UPCI.

Each dynamic screen is formatted using the same method. Each contains adjustments to the Proportional, Integral, and Derivative Ratio settings as well as setpoint, controller enable / disable buttons and a link to the associated Trend screen. Setpoint, control input, valve demand(s) and controller status are also found on the dynamics screen.

When dynamic adjustments have been completed, press the SAVE DYNAMIC CHANGES button to store the PID settings in the 5009 control. Return the dynamics password to the 5009 user level to prevent unauthorized dynamic adjustments.

To learn more on how to dynamically tune a steam turbine, refer to Volume 1 of the MicroNet TMR 5009 Digital Control Manual - Dynamic Adjustments.

Speed Dynamics Screen

The Speed PID has two sets of dynamics: Off-Line and On-Line. The dynamics mode currently in use is displayed on the HMI. When the 5009 changes from Off-Line to On-Line mode the HMI will also change to reflect the current mode. On-Line or Off-Line dynamics can be viewed and adjusted by selecting the desired mode through the HMI - this does not change which mode the 5009 control is currently using, only which set of dynamics is adjusted. If dynamic settings do not produce any change in control action, ensure that the correct set of dynamics is being adjusted.

Refer to Volume 1 of the MicroNet TMR 5009 Digital Control Manual for information on tuning as well as On-Line vs. Off-Line mode.

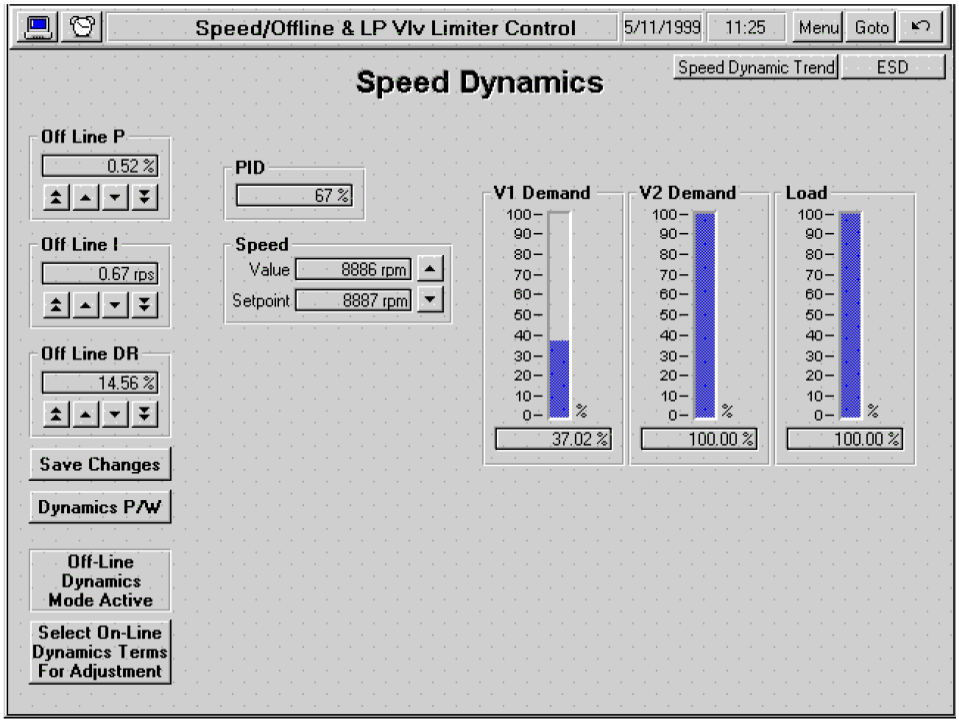


Figure 5-16. Speed Dynamics Tuning Screen

Trend Screens

Trend screens provide a one-minute trend of setpoint, PID output, and control input captured at a one second scan rate. This screen also contains most of the parameters and adjustments on the corresponding dynamics screen. Display buttons, found below the trend graph, are used to show all or one of the available parameters. The color of the text on the display button is also the color of the trend. Data is provided in a percentage format, i.e. If the extraction input ranged from 0 to 1,000; 500 would be displayed as 50%. The PID raise / lower buttons utilize the slow rate of adjustment as seen on the Dynamics screen. If configured for a generator, load is also provided on the Speed Trend screen.

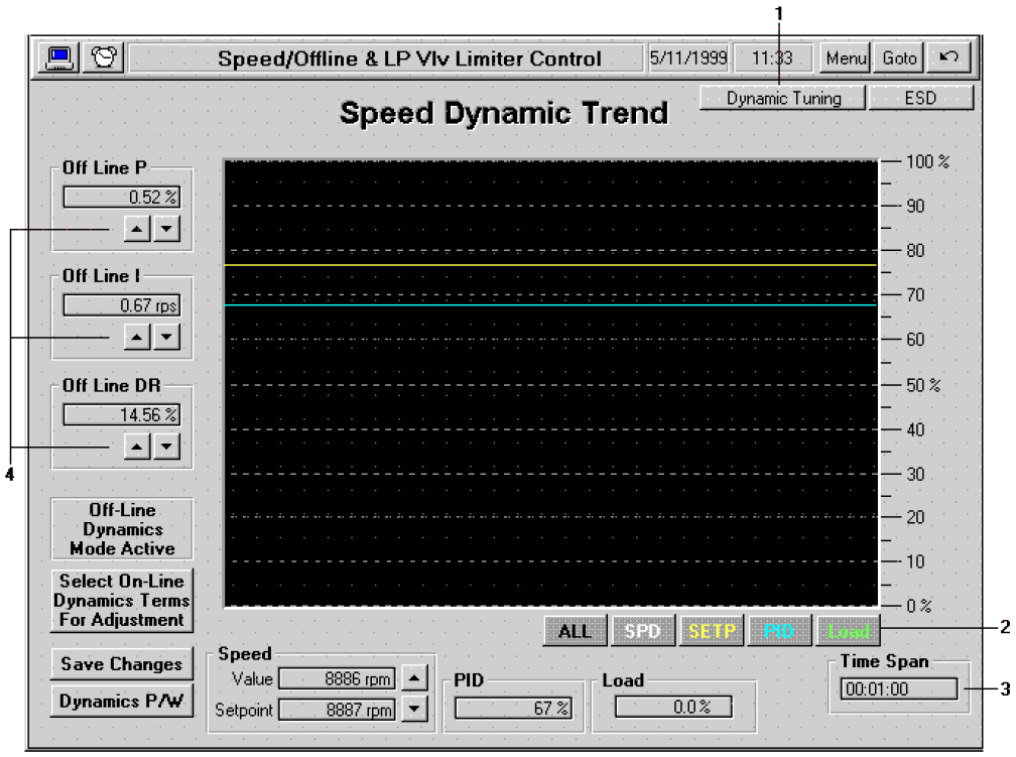


Figure 5-17. Speed Trend Screen

Table 5-8. Trend Functions

No.	Button / Display	Function	Visibility
1	Dynamic Tuning	Returns to the Dynamic Menu	Always
2	Display buttons	Select which parameter is to be displayed	Always, except Load: (when configured for generator)
3	Time Span	Increases or decreases the resolution (seconds) of the displayed trend	Always
4	PID raise / lower	Raises or lowers the corresponding PID setting	Dynamics adjustment permissible

Alarm Screen

The Alarm screen displays 5009 alarms and trips and program errors. The RESET button operates in the same way as the reset contact input. Once an alarm has been acknowledged and reset, it is removed from the Alarm screen. The arrow buttons on the right of the Ackn. Page button are used to scroll up and down the list of alarms.

The Alarm Categories show the category of the alarm displayed. It also displays a pop-up to select the desired category.

The last 10 days of alarms and trips and program errors are stored in the Alarm Log.

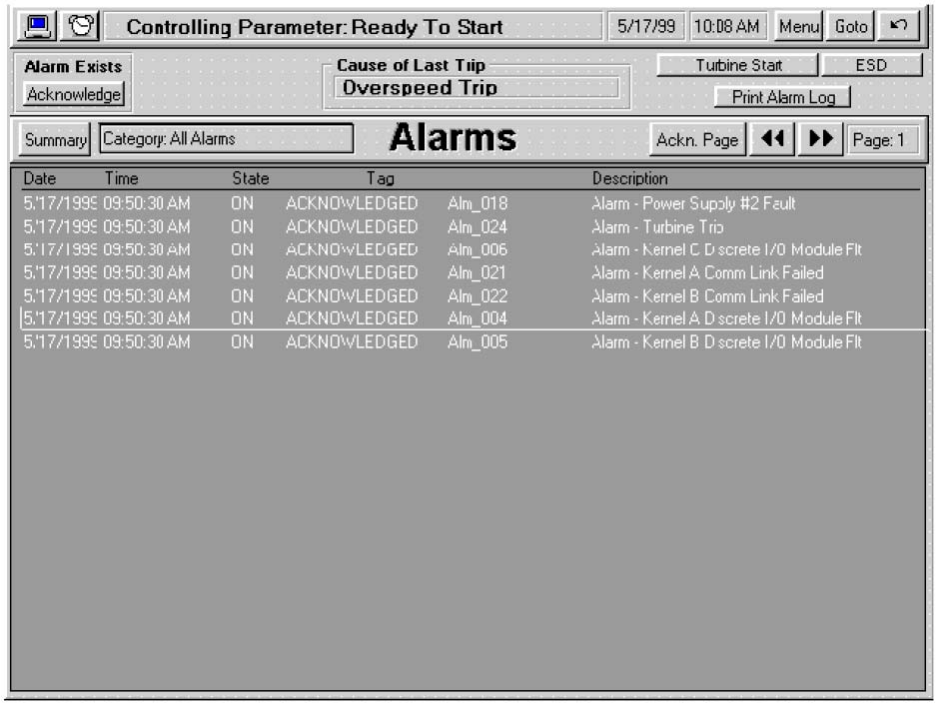


Figure 5-18. Alarm Screen

Table 5-9. Color Layouts for Alarms

Alarm	Acknowledged	Alarm	Trip	Program Error
On	No	Flashing Yellow	Flashing Red	Flashing Cyan
On	Yes	White	White	White
Off	No	Yellow	Red	Cyan
Off	Yes	Black	Black	Black

The Alarm Log can be sent to a printer via the parallel port on the PCI6000 (see Figure 2-2) and can be activated by the button Print Alarm Log. When pressed, a pop-up appears and a selection of days to print can be made (maximum 10 days).

Alarm Summary Screen

The Alarm Summary screen displays 5009 alarms, trips and program errors. This screen can only be accessed from the alarm screen.

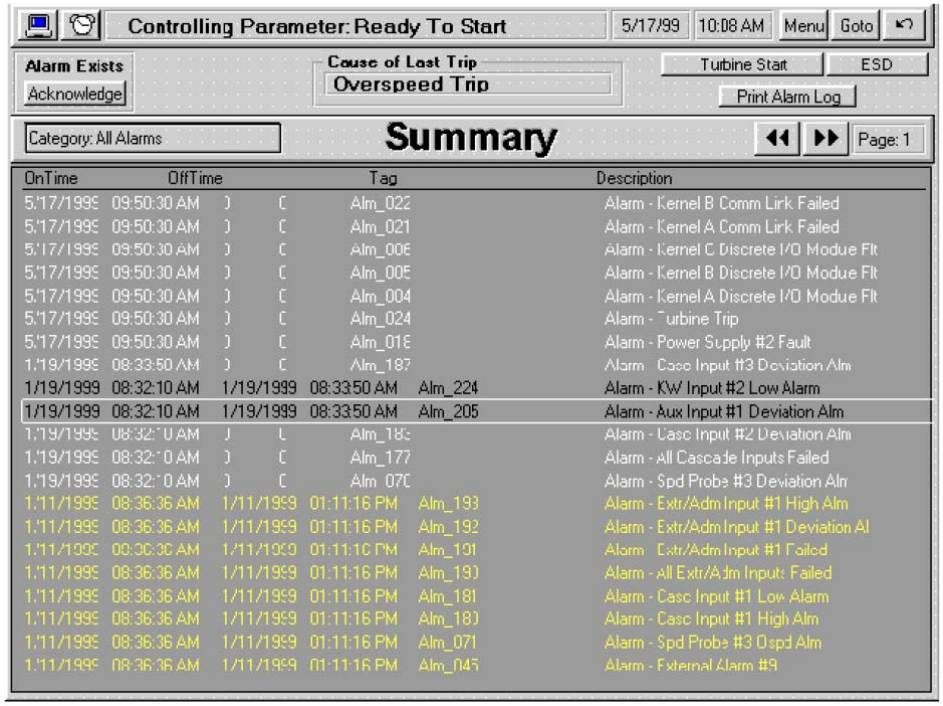


Figure 5-19. Summary Screen

This screen is almost the same as the alarm screen, only the layout is different and the data remarks longer on the screen before it is removed.

The last 10 days of alarms trips and program errors are stored in the Alarm History.

HMI Screen

On the HMI page, function errors from Citect are displayed.

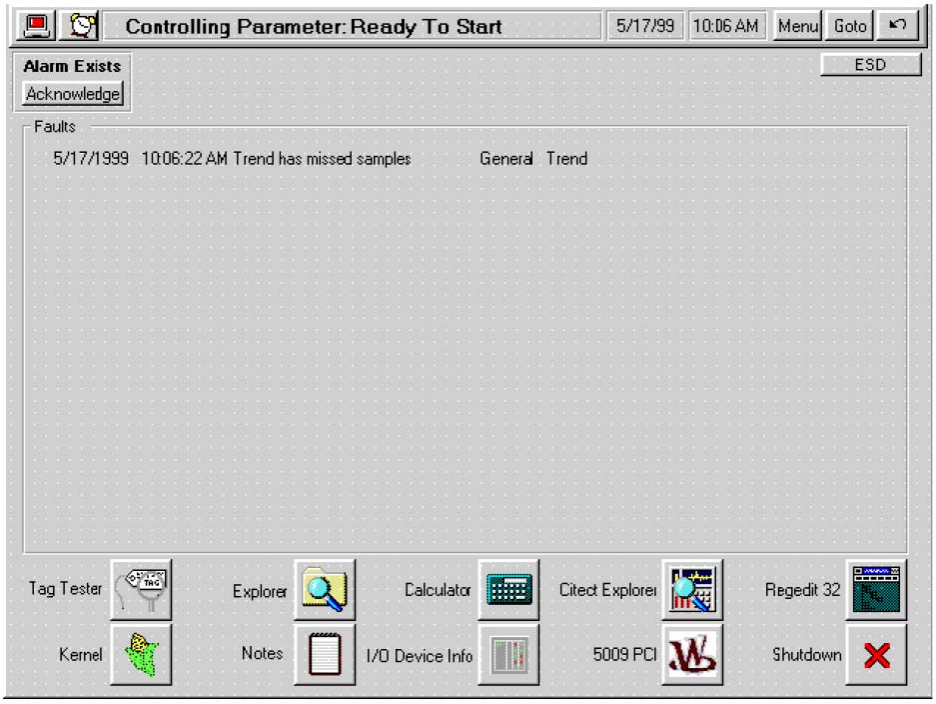


Figure 5-20. HMI Screen

Some additional functions are also on this page which can be entered with the correct permissives.

Tag Tester: Displays a dialog which allows you to select from a list of all the configured variable tags in your system. Once you have selected a tag, you can either press the Read button to get the tag's current value, or change the value by entering a new one, and pressing the Write button. This function is useful for debugging or commissioning.

WARNING

1. **You should be experienced with Citect and Cicode before attempting to use the Kernel as these facilities are very powerful, and if used incorrectly, can corrupt your system.**
2. **You should only use the Kernel for diagnostics and debugging purposes, and not for normal Citect operation.**
3. **It is important to restrict access to the Kernel, because once you are in the Kernel, you can execute any Cicode function with no privilege restrictions. You (or anyone using the Kernel) have total control of Citect (and consequently control of your plant and equipment).**

 **Kernel:** The Citect Kernel provides a window into the core of Citect. By using the Kernel, you can perform low-level diagnostic and debugging operations, for runtime analysis of your Citect system. You can use it to display all the low level data structures, run time databases, statistics, debug traces, network traffic, I/O Device traffic and other useful information. You can also call any in-built Cicode function or user-written Cicode function from the Kernel.

 **Explorer:** Gives access to the Windows Explorer.

 **Notes:** Gives access to Notepad.

 **Calculator:** Gives access to Windows Calculator.

 **I/O Device Information:** Gets information about a specified I/O Device.

 **Citect Explorer:** Displays the Citect Explorer.

 **Regedit:** Opens the Registry Editor From Windows NT.

 **Shutdown:** Shutdown the Citect application.

Chapter 6.
Password Information

The HMI requires a password to change between the two different user levels, supvar, tuner / valve calibration, and 5009. The user levels are used to limit the access of unauthorized or untrained personnel from accessing functions. Passwords may be entered using a pop-up key pad that appears when one of the password buttons is pressed. The user level can also be changed from the application manager screen by pressing Change User and inputting the relevant password. It is recommended to return the password to the 5009 user level during normal operation to prevent unauthorized access to protected screens and adjustments.

Supvisor Level Password
The password for your HMI is: 1113
Used to access the Application Manager.

Tuner / Valve Calibration Level Password
The password for this level is: 1111
Used to access dynamic adjustments and valve calibration adjustments.

5009 Level Password
The password for your HMI is: 5009

Chapter 7.
Service Options

Product Service Options

If you are experiencing problems with the installation, or unsatisfactory performance of a Woodward product, the following options are available:

- Consult the troubleshooting guide in the manual.
- Contact the manufacturer or packager of your system.
- Contact the Woodward Full Service Distributor serving your area.
- Contact Woodward technical assistance (see "How to Contact Woodward" later in this chapter) and discuss your problem. In many cases, your problem can be resolved over the phone. If not, you can select which course of action to pursue based on the available services listed in this chapter.

OEM and Packager Support: Many Woodward controls and control devices are installed into the equipment system and programmed by an Original Equipment Manufacturer (OEM) or Equipment Packager at their factory. In some cases, the programming is password-protected by the OEM or packager, and they are the best source for product service and support. Warranty service for Woodward products shipped with an equipment system should also be handled through the OEM or Packager. Please review your equipment system documentation for details.

Woodward Business Partner Support: Woodward works with and supports a global network of independent business partners whose mission is to serve the users of Woodward controls, as described here:

- A **Full Service Distributor** has the primary responsibility for sales, service, system integration solutions, technical desk support, and aftermarket marketing of standard Woodward products within a specific geographic area and market segment.
- An **Authorized Independent Service Facility (AISF)** provides authorized service that includes repairs, repair parts, and warranty service on Woodward's behalf. Service (not new unit sales) is an AISF's primary mission.
- A **Recognized Engine Retrofitter (RER)** is an independent company that does retrofits and upgrades on reciprocating gas engines and dual-fuel conversions, and can provide the full line of Woodward systems and components for the retrofits and overhauls, emission compliance upgrades, long term service contracts, emergency repairs, etc.
- A **Recognized Turbine Retrofitter (RTR)** is an independent company that does both steam and gas turbine control retrofits and upgrades globally, and can provide the full line of Woodward systems and components for the retrofits and overhauls, long term service contracts, emergency repairs, etc.

You can locate your nearest Woodward distributor, AISF, RER, or RTR on our website at:

www.woodward.com/directory

Woodward Factory Servicing Options

The following factory options for servicing Woodward products are available through your local Full-Service Distributor or the OEM or Packager of the equipment system, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is originally shipped from Woodward or a service is performed:

- Replacement/Exchange (24-hour service)
- Flat Rate Repair
- Flat Rate Remanufacture

Replacement/Exchange: Replacement/Exchange is a premium program designed for the user who is in need of immediate service. It allows you to request and receive a like-new replacement unit in minimum time (usually within 24 hours of the request), providing a suitable unit is available at the time of the request, thereby minimizing costly downtime. This is a flat-rate program and includes the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205).

This option allows you to call your Full-Service Distributor in the event of an unexpected outage, or in advance of a scheduled outage, to request a replacement control unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. You replace your field control unit with the like-new replacement and return the field unit to the Full-Service Distributor.

Charges for the Replacement/Exchange service are based on a flat rate plus shipping expenses. You are invoiced the flat rate replacement/exchange charge plus a core charge at the time the replacement unit is shipped. If the core (field unit) is returned within 60 days, a credit for the core charge will be issued.

Flat Rate Repair: Flat Rate Repair is available for the majority of standard products in the field. This program offers you repair service for your products with the advantage of knowing in advance what the cost will be. All repair work carries the standard Woodward service warranty (Woodward Product and Service Warranty 5-01-1205) on replaced parts and labor.

Flat Rate Remanufacture: Flat Rate Remanufacture is very similar to the Flat Rate Repair option with the exception that the unit will be returned to you in “like-new” condition and carry with it the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205). This option is applicable to mechanical products only.

Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned for repair, please contact your Full-Service Distributor in advance to obtain Return Authorization and shipping instructions.

When shipping the item(s), attach a tag with the following information:

- return authorization number;
- name and location where the control is installed;
- name and phone number of contact person;
- complete Woodward part number(s) and serial number(s);
- description of the problem;
- instructions describing the desired type of repair.

Packing a Control

Use the following materials when returning a complete control:

- protective caps on any connectors;
- antistatic protective bags on all electronic modules;
- packing materials that will not damage the surface of the unit;
- at least 100 mm (4 inches) of tightly packed, industry-approved packing material;
- a packing carton with double walls;
- a strong tape around the outside of the carton for increased strength.

NOTICE

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Replacement Parts

When ordering replacement parts for controls, include the following information:

- the part number(s) (XXXX-XXXX) that is on the enclosure nameplate;
- the unit serial number, which is also on the nameplate.

Engineering Services

Woodward offers various Engineering Services for our products. For these services, you can contact us by telephone, by email, or through the Woodward website.

- Technical Support
- Product Training
- Field Service

Technical Support is available from your equipment system supplier, your local Full-Service Distributor, or from many of Woodward's worldwide locations, depending upon the product and application. This service can assist you with technical questions or problem solving during the normal business hours of the Woodward location you contact. Emergency assistance is also available during non-business hours by phoning Woodward and stating the urgency of your problem.

Product Training is available as standard classes at many of our worldwide locations. We also offer customized classes, which can be tailored to your needs and can be held at one of our locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability.

Field Service engineering on-site support is available, depending on the product and location, from many of our worldwide locations or from one of our Full-Service Distributors. The field engineers are experienced both on Woodward products as well as on much of the non-Woodward equipment with which our products interface.

For information on these services, please contact us via telephone, email us, or use our website: **www.woodward.com**.

How to Contact Woodward

For assistance, call one of the following Woodward facilities to obtain the address and phone number of the facility nearest your location where you will be able to get information and service.

Electrical Power Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany	+49 (0) 21 52 14 51
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

Engine Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany	+49 (711) 78954-510
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
United States	+1 (970) 482-5811

Turbine Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

You can also locate your nearest Woodward distributor or service facility on our website at:

www.woodward.com/directory

Technical Assistance

If you need to telephone for technical assistance, you will need to provide the following information. Please write it down here before phoning:

Your Name	
Site Location	
Phone Number	
Fax Number	
Engine/Turbine Model Number	
Manufacturer	
Number of Cylinders (if applicable)	
Type of Fuel (gas, gaseous, steam, etc)	
Rating	
Application	
Control/Governor #1	
Woodward Part Number & Rev. Letter	
Control Description or Governor Type	
Serial Number	
Control/Governor #2	
Woodward Part Number & Rev. Letter	
Control Description or Governor Type	
Serial Number	
Control/Governor #3	
Woodward Part Number & Rev. Letter	
Control Description or Governor Type	
Serial Number	

If you have an electronic or programmable control, please have the adjustment setting positions or the menu settings written down and with you at the time of the call.

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 36122A.

PO Box 1519, Fort Collins CO 80522-1519, USA
1000 East Drake Road, Fort Collins CO 80525, USA
Phone +1 (970) 482-5811 • Fax +1 (970) 498-3058

Email and Website—www.woodward.com

**Woodward has company-owned plants, subsidiaries, and branches,
as well as authorized distributors and other authorized service and sales facilities throughout the world.**

Complete address / phone / fax / email information for all locations is available on our website.

2013/1/Colorado