Maintenance Manual Edition 6/2008

MAXUM™ edition II
Process Gas Chromatograph

process
GAS CHROMATOGRAPHY

SIEMENS

SIEMENS

Maxum edition II
Process Gas Chromatograph

Copyright Notice

To Contact Us:

Siemens AG
I IA SC PA PM Process Analytics
Oestliche Rheinbrueckenstr. 50
76187 Karlsruhe
Germany

Tel: +49 721 595 3829
Fax: +49 721 595 5211
E-mail: processanalytics@siemens.com

www.siemens.com/processanalytics

Training
Tel: +49 721 595 4035
E-mail: carmen.stumpf@siemens.com

Spares
Tel: +49 721 595 4288
E-mail: hans-peter.schaefer@siemens.com

Support
Tel: +49 721 595 7216
E-mail: niko.benas@siemens.com

Siemens Energy & Automation, Inc.

7101 Hollister Road
Houston, TX 77040
USA

Tel: +1 713 939 7400
Fax: +1 713 939 9050
E-mail: saasales.sea@siemens.com

www.usa.siemens.com/ia

Training
Tel: +1 800 448 8224 (USA)
Tel.   +1 918 662 7030 (International)
E-mail: saatraining.sea@siemens.com

Spares
Tel: +1 800 448 8224 (USA)
Tel: +1 918 662 7030 (International)
Fax: +1 918 662 7482
E-mail: saaspareparts2z.sea@siemens.com

Support
Tel: +1 800 448 8224 (USA)
Tel: +1 918 662 7030 (International)
E-mail: saasupport.sea@siemens.com

Siemens Pte. Limited
A&D PI 2 Regional Headquarters
The Siemens Center
60 MacPherson Road
Singapore 348615

Tel: +65 6490 8702
Fax: +65 6490 8703
E-mail: splanalytics.sgp@siemens.com

www.siemens.com/processanalytics

Siemens Industrial Automation Shanghai

Siemens Process Analytics Ltd., Shanghai
PI and Analytics Technical Service Center
12 workshops, 175 XiMaoJing Road
Export Processing Zone, SongJiang
Shanghai, 201611
Peoples Republic of China

Tel: +86-21-5774 9977
Fax: +86-21-6774 7181
E-mail: pipaservice@siemens.com

www.ad.siemens.com.cn

Trademarks

Maxum and Maxum edition II are trademarks of Siemens

Safety Practices and Precautions

Safety First

This product has been designed and tested in accordance with IEC Publication 1010-1, Safety Requirements for Electronic Measuring Apparatus, and has been supplied in a safe condition. This manual contains information and warnings which have to be followed by the user to ensure safe operation and to retain the product in a safe condition.

Terms in This Manual

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

Terms as Marked on Equipment

DANGER indicates a personal injury hazard immediately accessible as one reads the markings.

CAUTION indicates a personal injury hazard not immediately accessible as one reads the markings, or a hazard to property, including the equipment itself.

Symbols in This Manual

This symbol indicates where applicable cautionary or other information is to be found.

This HOT symbol warns the user of a hot surface and potential injury if touched.

Symbols Marked on Equipment

DANGER - High voltage

Protective ground (earth) terminal

ATTENTION - Refer to Manual

This HOT symbol warns the user of a hot surface and potential injury if touched.

Safety Practices and Precautions, Continued

Grounding the Product

A grounding conductor should be connected to the grounding terminal before any other connections are made.

Correct Operating Voltage

Before switching on the power, check that the operating voltage listed on the equipment agrees with the available line voltage.

Danger Arising From Loss of Ground

Any interruption of the grounding conductor inside or outside the equipment or loose connection of the grounding conductor can result in a dangerous unit. Intentional interruption of the grounding conductor is not permitted.

Safe Equipment

If it is determined that the equipment cannot be operated safely, it should be taken out of operation and secured against unintentional usage.

Use the Proper Fuse

To avoid fire hazard, use only a fuse of the correct type, voltage rating and current rating as specified in the parts list for your product. Use of repaired fuses or short circuiting of the fuse switch is not permitted.

Safety Guidelines

DO NOT open the equipment to perform any adjustments, measurements, maintenance, parts replacement or repairs until all power supplies have been disconnected.

Only a properly trained technician should work on any equipment with power still applied.

When opening covers or removing parts, exercise extreme care "live parts or connections can be exposed".

Capacitors in the equipment can still be charged even after the unit has been disconnected from all power supplies.

CAUTION

Caution should be taken when touching the outside surfaces of the analyzer when installed in ambient conditions above 40°C.

Chapter 1

Knowing Your System

Introduction

Overview

The Maxum edition II   system, hereafter referred to as Maxum II, represents a significant advance in process chromatography. This was accomplished by combining the best of the Siemen's Advance Maxum and PGC 302 gas chromatographs into a single platform analyzer. From oven and electronic components to software and communication networks, the system is modular. Pre-configured application modules are available for many common measurements.

A Maxum II system offers a wide range of detector modules including Thermal Conductivity, Flame Ionization, Flame Photometric, and the Pulsed Discharge Detector (which can operate in Helium Ionization, Photoionization, and Electron Capture modes). All detector modules are available for both air bath and airless ovens. The Maxum II oven is designed so it can be divided into two independently heated isothermal ovens for parallel chromatrography applications. A single air bath oven can accommodate up to 3 detector modules, and an airless oven can house a single detector module in each oven.

The Advance Maxum II Maintenance Panel provides maintenance personnel with access to all maintenance functions and data. In addition, the Maintenance Panel will display both real time and archived chromatograms. A PC based network workstation incorporates EZChrom   industry specific software. This laboratory quality application builder includes custom features designed particularly for the Maxum II.

In this chapter

This chapter covers the following topics:

Introduction, Continued

Important Information

Included with each analyzer is a custom documentation-drawing package. This package provides drawings and information pertinent only to a specific analyzer. Contents of this package are application dependent and will vary for each analyzer. Typical drawings included are:

    System Block and Utility Requirements
    System Outline and Dimensional Drawings
    Sampling System - Plumbing and Spare Parts List
    Sampling System Dimensional Diagram
    Sampling Probe
    Electronic Enclosure Section - Internal Layout
    Applicable Wiring Diagrams
    Oven Plumbing Diagram - Sensor Near Electronics
    Recommended Spare Parts - Analyzer
    Manufacturing Test Charts
    Stream Composition Data
    Data Base

Maxum II Specifications

Configuration

Oven	Single air bath oven or split air bath oven with 2 independent isothermal zones. All air bath configurations available with Vortex cooling for sub-ambient temperature operation.
	Single or dual independent airless ovens. Dual version has two distinct oven compartments for complete operating independence.
Detector Modules	Thermal Conductivity, Flame Ionization, Flame Photometric, Pulsed Discharge (in Helium Ionization, Photoionization, or Electron Capture Mode)
Number of Detector Modules	1, 2, or 3 in any combination of detector module types for air bath oven
	1 or 2 detector modules in any combination for airless oven
Sample/Column Valves	Diaphragm, diaphragm-plunger, and rotating or linear transport, valveless (live column switching), and heated liquid injection valve
Columns	Packed, micro-packed, or capillary
Gas Supply Regulation	Up to 8 electronic pressure controls and up to 6 mechanical pressure controls

Performance

Minimum Range (general)*	Thermal Conductivity: 0-500 ppm
	Flame Ionization: 0-1 ppm
Repeatability (general)*	± 0.5% of full scale for full scale ranges from 2-100%;
	± 1% of full scale for full scale ranges from 0.05-2%;
	± 2% of full scale for full scale ranges from 50-500 ppm;
	± 3% of full scale for full scale ranges from 5-50 ppm;
	± 5% of full scale for full scale ranges from 0.5-5 ppm;
	(All values expressed at 2 times standard deviation.)
Cycle Time	15 sec to 3 hr (application dependent)
Sensitivity*	± 0.5% of full scale
Linearity*	± 2% of full scale
Oven Temperature Range	40 to 440°F (5 to 225°C) (Dependent on T Rating)
Temperature Control	± 0.05°F (± 0.02°C)
Ambient Temperature Effect	Negligible with electronic pressure control
	Varying effect with mechanical pressure control
Vibration Effect	Negligible
Mean Time To Repair	1 hour
Mean Time Between Failures*	3 years excluding consumables

*Confirm with application

Communication Options

Serial Output	RS232, RS485
Ethernet	Standard 10BaseT Ethernet with RJ45 connectors
DataNET	Proprietary high speed TCP/IP communication network (redundant pair cable)
Data Hiway	Proprietary serial communication network (redundant pair cable)

Maxum II Specifications, Continued

I/O Options

Standard I/O	2 analog outputs; 4 digital outputs (1 indicates system error, 3 are user configurable); 4 digital inputs; 1 serial output. These I/O options are available to be wired externally. Other I/O exist which are used internally to the Maxum II.
Board Slots for Optional I/O	2 of 4 existing slots can be configured for I/O boards. Up to 10 additional I/O boards can be added using a CAN Extension Unit
I/O Boards	AO 8: 8 electrically isolated analog output channels
	D IO: 4 digital inputs and 4 digital outputs
	A I/O: 2 digital inputs, 2 digital outputs,
	4 analog inputs (2 current based and 2 voltage based),
	and 2 analog outputs
Digital Inputs	Optocoupler with internal 12-24 VDC power supply, switchable with floating contacts;
	Alternative: switchable with external 12-24 VDC supply (floating relay contacts only), external power supply negative terminal connected to common for specific digital input being used.
Digital Outputs	Floating double-throw contacts, maximum contact load rating 1 A at 30 VDC. Diode shunt suppression should be used for inductive loads. A DO should not drive more than a 0.5A inductive load. Dry contact DOs (I/O boards and SYSCON) can not be used with line voltages. The PECM has SSRs which may be controlling line voltage for the particular application
Analog Inputs	-20 to +20 mA into 50 ohms or -10 to +10 V R_{in} = 1 M ohm, mutually isolated to 10 V
Analog Outputs	0/4 to 20 mA into 750 ohms maximum, common negative pole, galvanically separated from ground, freely connectable to ground
Termination	Screw compression terminal strip for braided or solid cable with maximum section of 16 AWG or 1.5 mm^2

Gas Sample Requirements

Sample Flow	50-200 cc/min (application dependent)
Sample Filtration	5 micron
Minimum Sample Pressure	2 psig (14 kPa), lower pressure optional
Maximum Sample Pressure	75 psig (517 kPa), standard; higher pressure optional
Maximum Sample Temperature	250°F (121°C) standard; higher temperature optional
Material in Contact with Sample	Stainless steel, Teflon, and polyimide; other material optional

Liquid Sample Requirements

Sample Flow	5-20 cc/min (application dependent)
Sample Filtration	5 micron
Minimum Sample Pressure	5 psig (35 kPa), lower pressure optional
Maximum Sample Pressure	300 psig (2070 kPa) standard; higher pressure optional
Maximum Sample Temperature	250°F (121°C) standard; higher temperature optional
Material in Contact with Sample	Stainless steel and Teflon, other material optional

Maxum II Specifications, Continued

Installation

Configuration Dimensions	Single unit with multiple enclosures
	Height: 39 ¾" (1010 mm)
	Width: 26 1/16" (662 mm)
	Depth: 16 3/16" (451 mm)

CAUTION

⚠️

When mounting the analyzer on a wall, care should be taken to ensure that the wall (vertical mounting surface) can withstand four times the minimum weight of the analyzer when mounted with the appropriate hardware. In some cases, it is recommended that brackets, such as Unistrut or angle iron be added to the mounting surface to help distribute the weight.

Mounting	Wall mount: center to center 44" (1120 mm)
	Left side clearance: 18" (460 mm) from wall or other equipment
	Front side clearance: 25 ¾" (654 mm) from wall with APU mounted
	Right side clearance: 18" (460 mm) in all cases
Weight	170 lb (77 kg) – typical, dependent on application
Enclosure Rating	NEMA 3, IP54 (outdoor with weather protection)
	Pollution Degree 2
EMI/RFI Rating	CE Compliance; certified to 89/336/ECC (EMC directive)
	CE Compliance; certified to 73/23/EEC (Low Voltage directive)
	Tested per EN 61010-1 / IEC 61010-1
Hazardous Class	Standard Configurations:
	Certified by CSA C/US for use in Class I, Division 2, Groups B,C,D
	Suitable for use in European Zone 2, Group IIB+H2 with local approval
	Suitable for use in general purpose and non-hazardous areas.
	Optional Configurations:
	Certified by CSA C/US for use in Class I, Division 1, Groups B,C,D with air or nitrogen purge
	Certified by CENELEC/ATEX as EEx pedmib IIB + H2 with air or nitrogen purge and purge control for Zone 1 or Zone 2
Important	General Purpose, Division 2 and Zone 2 applications require environmental purge of Electronic Enclosure (EC) to maintain operation integrity and performance.
Altitude	Up to 2000m (6561 ft.) for analyzers using 230 VAC Supply
	Up to 3000m (9842 ft.) for analyzers using 115 VAC Supply

Maxum II Specifications, Continued

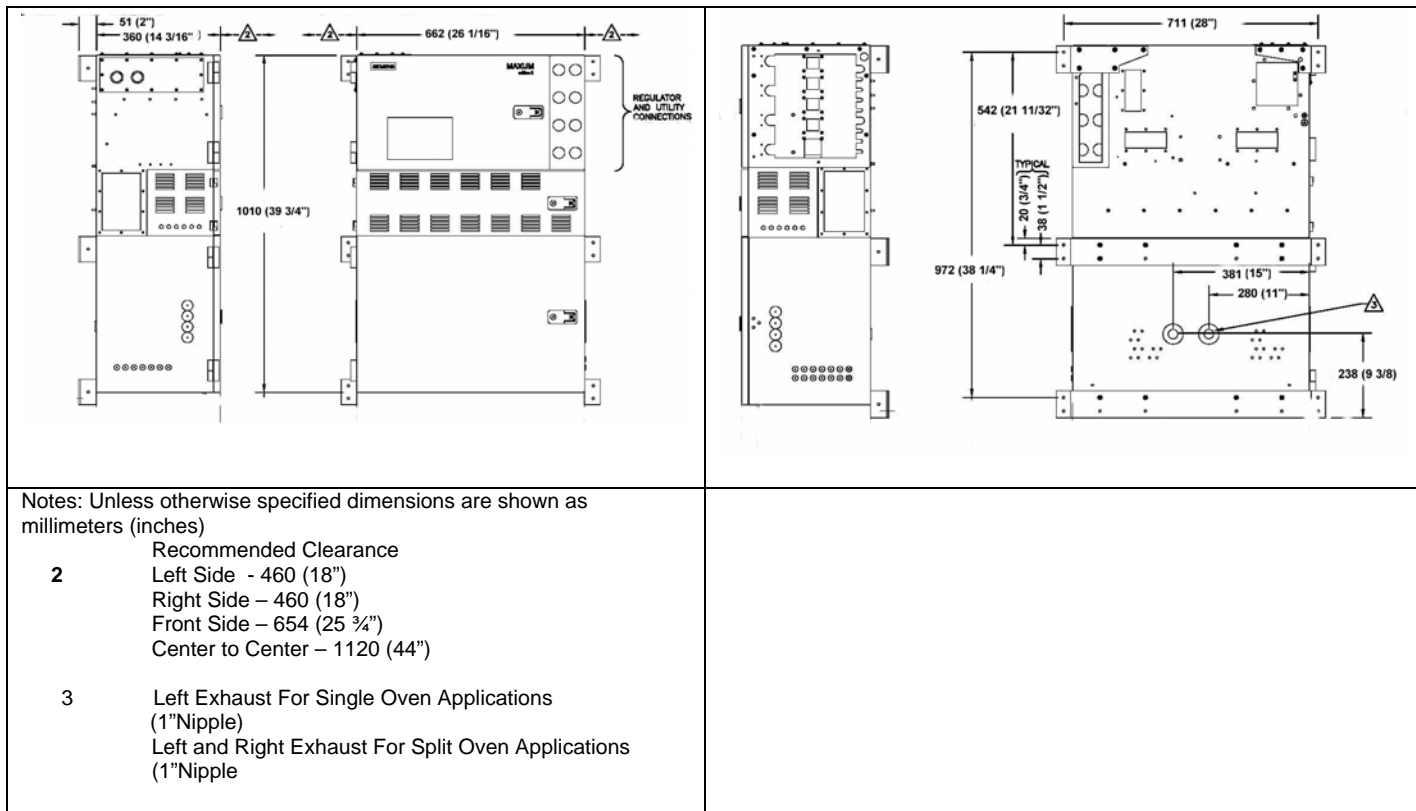|	

Ambient Temperature and Humidity (for Normal Operation, Storage, and Transport)	Minimums - 0°F (-18°C) and 0% Humidity
	Maximums -
	    Up to 104°F (40°C) at 50% relative humidity
	    Up to 86°F (30°C) at 80% relative humidity
	
	Operational Maximums – The Maxum II may be operated at ambient conditions of up to 122°F (50°C) and 95% relative humidity provided the electronic doors are not opened and the electronics compartment is purged with clean, dry instrument air. The instrument air must be dry enough to prevent humidity condensation inside the electronics enclosure.
	
	Note: If the Maxum II is exposed to high condensing humidity with the electronics open or without dry purge air applied, then it must be allowed to re-stabilize at the above stated conditions for at least 8 hours before electrical power is applied.

AC Power	100-130 VAC or 187-264 VAC (configuration dependent); 47-63 Hz., single phase Transient Overvoltage – Category II (IEC 60364-4-443) Single oven: 14 A maximum (at 115 V or 7 A at 230 V) Dual oven: 2 circuits, 14 A maximum per oven To meet European Standards, customer provided power cables should be double insulated (unless both power and signal wiring are rated for 600 volts, in which case basic insulation is sufficient) Wiring should be rated for 80°C or higher.

AC Power Consumption for Common Components	The maximum expected power consumption for an analyzer can be estimated by adding the maximum consumption of the components that are equipped.
	
	Ovens:
	Airbath Heater Oven (High Wattage)
	    1400 W per heater (One heater equipped per oven side)
	Airbath Heater Oven (Medium Wattage)
	    650 W per heater (One heater equipped per oven side)
	Airless Heater Oven
	    500 W per oven side (Two 250 W heaters equipped per oven side)
	
	Other components:
	FID/FPD Heater Element – 80 W
	SLIV Heater Element – 100 W
	MAT Valve Heater Element – 200 W
	Methanator (Purged) Heater Element – 200 W
	Electronics Enclosure Devices – 100 W

Instrument Air	50 psig (350kPa) minimum for units using Model 11 or Valco valves 120 psig (825 kPa) minimum for units using Model 50 valves Airbath Oven: 25 psig (175 kPa) minimum; 3 scfm (85 Lpm)/ oven Airless Oven: No instrument air for heating (may be used for electronics purge).

Maxum II Specifications, Continued

Carrier Gas	Cylinder nitrogen, helium, or argon at 99.998% purity, or hydrogen at 99.999% purity depending on application Typical consumption – 180 scf/month/detector module (5100 liters/month/detector module)
Flame Fuel	Hydrogen at 99.999% purity with no more than 0.5 ppm total hydrocarbons Typical consumption – 70 scf/month/detector module (2000 liters/month/detector module)
Flame Air	Zero grade air (< 1ppm THC, O_2 content 20-21%). Supplied from instrument air with catalytic purifier (optional). Typical consumption – 900 scf/month (26,000 L/month)
Corrosion Protection	Stainless steel oven liner Painted steel exterior (epoxy powder coat) Dry air purge to protect electronics. To maintain optimum performance, the analyzer electronics must be kept clean and dry. If the atmosphere in the installation environment contains condensing liquids or corrosive gases, the electronics compartment should be purged with clean, dry air

Calibration

Type	Manual or automatic
Zero	Automatic baseline correction
Span	Standard sample cylinder

Notes: Unless otherwise specified dimensions are shown as millimeters (inches)

2   Recommended Clearance
Left Side - 460 (18")
Right Side – 460 (18")
Front Side – 654 (25 ¾")
Center to Center – 1120 (44")

3   Left Exhaust For Single Oven Applications
(1"Nipple)
Left and Right Exhaust For Split Oven Applications
(1"Nipple

About The Maxum II

Description

The Advance Maxum II™ GC is completely enclosed in an air-purgable, metal cabinet with hinged doors. Mounted above the isothermal oven is the electronics enclosure and regulator panel. The analyzer may be mounted on a wall, in a rack or on a floor stand.
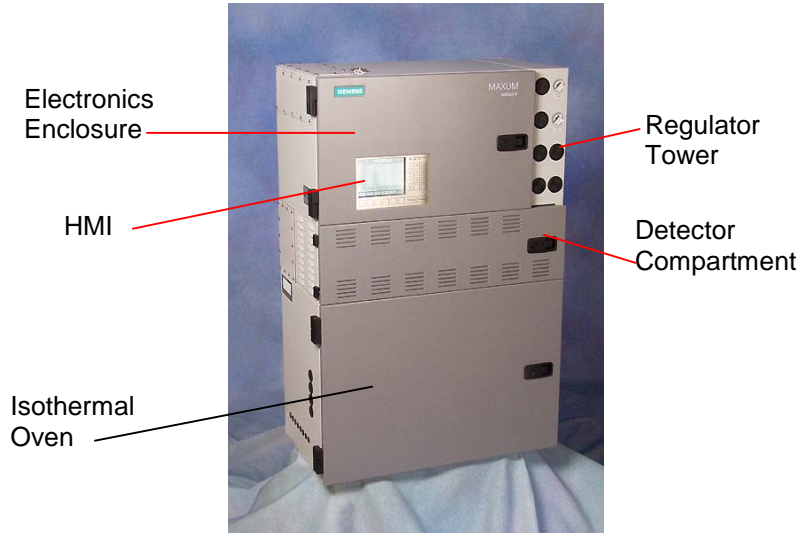

Electronics Enclosure

HMI

Regulator Tower

Detector Compartment

Isothermal Oven

Figure 1-1: Maxum II Process Gas Chromatograph

Electronics Enclosure

The Electronics Enclosure houses all the electronics and pneumatic modules required for performing all temperature, valve control and analysis functions. The Electronics Enclosure modules are interconnected using simple cable connections made to each module. All modules can be easily removed and replaced. The Maxum II software recognizes each Maxum II's application, hardware components and network configurations.
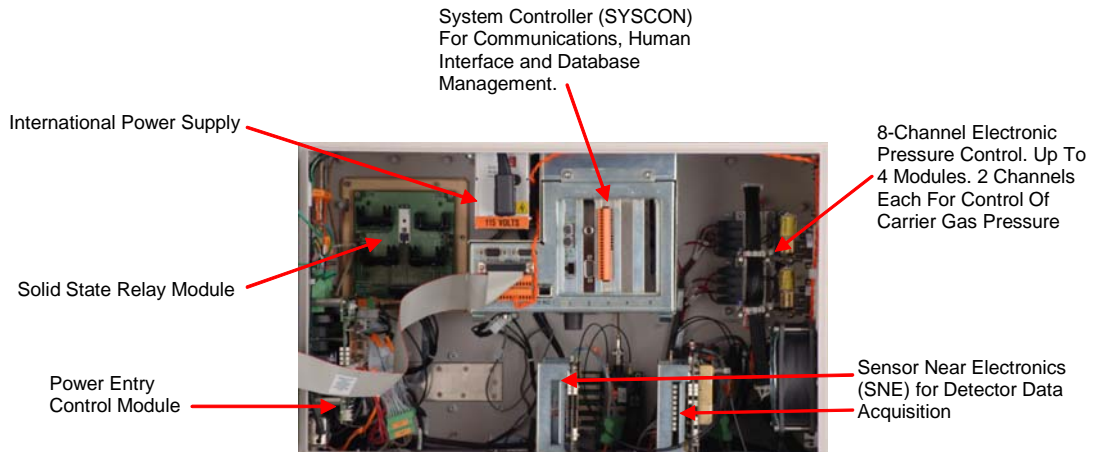

System Controller (SYSCON) For Communications, Human Interface and Database Management.

International Power Supply

8-Channel Electronic Pressure Control. Up To 4 Modules. 2 Channels Each For Control Of Carrier Gas Pressure

Solid State Relay Module

Power Entry Control Module

Sensor Near Electronics (SNE) for Detector Data Acquisition

Figure 1-2: Maxum II Electronics Enclosue

About The Maxum II, Continued

Regulator Panel

The regulator panel contains space for seven gauges and regulators. The base Maxum II comes with two standard regulators and an electronics enclosure fast purge. See the custom documentation drawing package that was shipped with the analyzer to see which gauges and regulators are mounted on the analyzer.

Isothermal Oven

The Maxum II has a wide variety of isothermal oven configurations. Both air bath and airless ovens are available. All air bath configurations are available with Vortex cooling for sub-ambient temperature operation. A program temperature oven option is available for Maxum II applications where isothermal, multi-dimensional chromatography is not practical. Typically the program temperature Maxum II is used for Motor Gasoline (ASTM 3710) & Simulated Distillation (ASTM 2887) applications.

Oven Configurations

Split Airless: Fully independent dual ovens with separate oven doors. The oven uses cartridge heaters in each side to heat the oven enclosure and its components.

Single Air Bath: Large, spacious compartment for complex applications and for ease of maintenance.

Programmed Temperature Air Bath

Dual Air Bath: Split Oven Configuration: Offers two temperature zones for one or more applications.

**Switching and Sample Valves**

The type of valves used in an Advance Maxum II is application dependent.

Application	Model	Description
Vapor Samples	Model 50	10-port plunger-less diaphragm. Contains no moving parts. It will operate over 10 million cycles on clean samples and can operate on carrier gas or other bottled inert gas with negligible consumption. It does the work of two Model 11 valves and is half the size.
Vapor or Liquid Samples	Model 11 and Model 11 LDV	6-port diaphragm–plunger valve high reliability and life. Used as a liquid or vapor sample valve, column switching valve or a column back flush valve. Process lines, columns and valve-to-valve tubes can be connected directly to the caps of the Model 11 LDV (Low Dead Volume) version of the valve.
Vapor or High Pressure Liquid Samples	Model 20	The air-pressure actuated, diaphragm valve provides, uniform sample volume, low internal volume, high pressure up to 1500 psi, 10350 kPa, fast switching (in milliseconds), reliability, and durability. It functions equally as a liquid or vapor sample valve, column switching valve, or column back flush valve.
Liquid Sample	LIV	The liquid injection valve can be used to automatically inject a constant quantity of liquid sample followed by fast, complete vaporization. Small gas quantities can also be injected using the valve.
Vapor	Valveless Live Column Switching	The device has no parts to fail or wear out and exhibits essentially zero dead volume for fast column switching and sample injection with capillary columns.

About The Maxum II, Continued
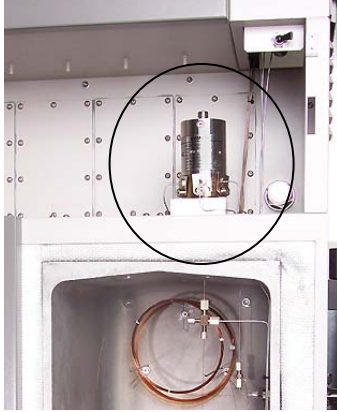
Detectors

Several different types of detector modules are available for the Maxum ll. All of the detector modules can be used in conjunction with both air bath and airless ovens. Depending upon the application requirements, an Advance Maxum II can include up to three detector modules in a single air bath oven, or up to 2 detector modules, one for each oven, in an airless oven.

With the exception of the thermal conductivity detectors, the detector modules are mounted in the detector compartment. The detector compartment is located between the electronics enclosure (EC) and the oven. The detector compartment houses the detector modules and provides a safe path for the electrical connections between the detector modules and the detector personality module (DPM). It also allows the detector to easily connect to the analytical components in the oven. All wiring meets hazardous and safety requirements. Mineral insulated cable provides the flameproof path for detector cabling from the oven to the electronic enclosure.

Simplicity of the detector design allows the detectors to be easily serviced. The thermal conductivity and filament detectors can be serviced without removing the detectors from the oven.

Type	Description
Thermal Conductivity Detector (TCD)	TCD is a concentration response detector for moderate sensitivity of most components. Thermistor TCD: 8-cell thermistor includes six independent measurement cells and two reference cells. Filament TCD: 2-cell filament TCD can be used as an Inter-column Detector (ITC) in conjunction with a FPD or FID application.
Flame Ionization Detector (FID)	FID is low mass detector for combustible hydrocarbons. The components from the separation column are burned in a hydrogen flame that produces ions. The resultant ionization current is converted to a measurement signal.

About The Maxum II, Continued

Detectors, cont'd

Type	Description
Flame Photometric Detector (FPD)	FPD is a selective detector used to detect substances containing sulfur. The column effluent is fed to a fuel rich hydrogen flame. Optical emissions are generated with wavelengths specific to the sulfur. An optical filter passes only these wavelengths characteristic for sulfur to a photomultiplier where the measurement signal is generated.
Valco Pulsed Discharge Detector	The Valco Model D-2 Pulsed Discharge Detector (PDD) is manufactured by Valco Instrument Co. Inc. The PDD uses a stable, low powered, pulsed DC discharge in helium as an ionization source. This provides the advantage that the need for a radioactive source is eliminated. However, performance of the PDD is comparable to detectors with conventional radioactive sources. Three variations of the PDD are available for use in the Maxum II Process Chromatograph. These are Helium Ionization (PDHID), Photoionization (PDPID), and Electron Capture (PDECD). For more information regarding this detector and its applicable operating modes refer to the Pulsed Discharge Detector Models D-2 and D-2-I Instruction Manual available from Valco Instruments Co. Inc.

Maintenance Panel
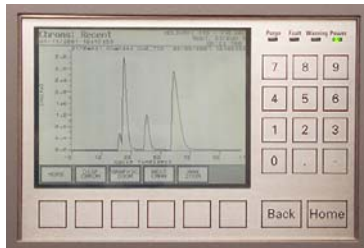
The Maintenance Panel displays all maintenance functions and data in a graphical display. In addition it eliminates the need for strip-chart recorder because it can also display both real-time and stored chromatograms. The real-time chromatograms include zoom and pan features. The stored grams include voltages and cycle times for future comparison. All of the GCs operational and daily routine maintenance tasks can be performed from the Maintenance Panel interactive display screens and menus. System security is assured with multiple levels of password protection for all analyzer-operating functions. A Maintenance Panel emulator (also called a Human Machine Interface, or HMI, emulator) is available from the Maxum System Manager Workstation software. This emulator allows a user to perform Maintenance Panel tasks without being located at the unit.

About The Maxum II, Continued

Work Station

The Maxum II uses a PC based network workstation for programming and data processing. Analyzers can be programmed and monitored from a single location, and, like the Maintenance Panel, the workstation includes graphical displays for operation, maintenance, and diagnostics. It also supports PC printers to print chromatograms and alarm logs in order to meet record keeping requirements.

The Maxum II workstation software is designed for PC's with Microsoft Windows XP (SP1 or SP2) or Windows 2000. PC workstations can be connected through existing LANs for wide access to monitoring or maintenance tasks. The graphical interface recognizes and displays all network hardware. The system monitors the alarm status of all analyzers connected to the network to centralize system maintenance. More information can be found in the Release Notes file supplied with the Maxum System Manager Software (under the Maxum System Manager directory).

System security is assured with multiple levels of password protection for all analyzer-operating functions.

Chromatography Software

EZChrom industry specific software is incorporated in the workstation program. This is a laboratory quality application builder developed by Scientific Software, Inc. and includes custom features for the Maxum II. Using EZChrom, it is possible to set up methods and component peak identification. More information can be found in the Release Notes file supplied with the EZChrom software (under the Maxum EZChrom directory).

EZChrom allows a user to choose the best peak gating and basing methods automatically. It is also possible to:

    Re-process captured chromatograms with different methods
    Measure unknown component peaks automatically
    Record multiple detector measurements simultaneously.

About The Maxum II, Continued

Terms

The following are new terms that are used in this manual.

Application refers to the supporting hardware and software required to perform the analysis. Supporting hardware consists of hardware channels: detector channel (AI), Solenoid Valve Control Module channel (AO), Electronic Pressure Control channel (DI), Temperature Controller (DO). Streams are defined to applications. If there are 3 or 4 simultaneous streams, they are defined as a single group called a Method. Applications can run only one Method at a time. Two applications can run if there are have two cycle clocks in the Maxum II.

Method is the part of the application that contains the parameters for controlling the hardware. Methods control the hardware associated with an Application. The method tells the hardware what to do, and include all cycle clock timed events. Methods are defined to streams. That is, several stream sequences can make up one Method. Methods also control the integration and calculations of the chromatogram. There is one cycle clock per method.

Applet refers to pre-engineered chromatographic segments of common applications, which have been optimized and standardized.

Applet Module refers to a complete assembly including Model 50 valve(s), detector and interconnecting tubing all mounted as a single module. The module includes columns and restrictors

Parallel Chromatography

With the Advance Maxum II hardware and software, it is possible to take a complex single-train chromatograph analysis and break it into multiple simple trains. Each simple train is then run simultaneously – in parallel. Not only does this procedure simplify the overall analysis, but also it is performed faster and more reliably.

Standard Configurations

Since the chromatography is broken into parallel operating modules, it is possible to use standard configurations for common applications. For example, 95% of the vapor thermal conductivity detector applications in a typical olefins plan can be done with various combinations of fewer than 12 standard mini-applications. Many of these measurements can be performed in less than two minutes. Standard applications modules and methods can be taken off-the-shelf and installed in the analyzer. These mini-applications are referred to as "applets". Applets can be configured alone or in any combination of parallel groups, depending on the measurement requirements. By using parallel chromatography and applets, it is possible to significantly reduce application development.

About The Maxum II, Continued

Duplicate Modules

Parallel Chromatography can reduce the cycle time for complex applications and also increase chromatograph analysis frequency by running duplicate modules in parallel at staggered times. Since times are staggered the system will provide more frequent measurement updates. If similar measurements are performed on different streams, parallel modules can be used for each stream instead of switching the stream to a single module. This will reduce overall cycle time on multiple stream applications.

Redundant Measurements

Use of parallel chromatography can reduce calibration requirements by running two identical modules in parallel on the same stream to obtain redundant measurements. As long as the results remain the same within a predefined error limit, the analysis is known to be accurate. Deviations outside the error limit can trigger notification or activate analyzer calibration. Overall, the Advance Maxum II calibration requirements are significantly lower because of the parallel measurement configurations and standard modular applications.
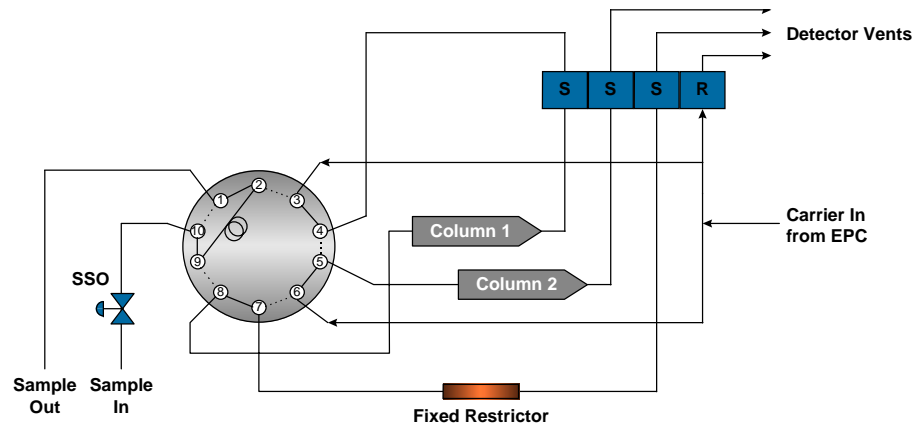
Example

Figure 1-3: Applet Example

About The Maxum II, Continued

Intended Use

The Maxum edition II gas chromatograph is primarily used in all branches of the fine chemicals, refining and hydrocarbon processing industries. It performs chemical composition analysis of gases and liquids that are present in all phases of production. The Maxum II is built for installation in harsh environments either directly or nearby in at-line process measurement laboratories. Its application flexibility allows it to analyze samples of feedstock, partially processed streams, final products and process byproducts including wastes and environmental hazards.

This product is intended to be used only in conjunction with other devices and components which have been recommended and approved by Siemens. Appropriate safety standards were used in the development, manufacture, testing, and documentation of the Maxum II. Under normal operation, this product is safe for use providing that all safety and handling guidelines are observed with respect to configuration, assembly, approved use, and maintenance. This device has been designed such that safe isolation is guaranteed between high and low voltage circuits. Low voltages which are connected must also be generated using safe isolation.

If any part of the Maxum II is opened, certain parts of the device are accessible which may carry dangerous voltages. Therefore, only suitably qualified personnel may work on this device as indicated below in the section titled "Qualified Personnel".

Qualified Personnel

Only suitably qualified personnel may operate or perform maintenance on the Maxum II. For the purposes of safety, qualified personnel are defined as follows:

1. Those who have been appropriately trained for the tasks which they are performing (for example, commissioning, maintenance, or operation).

2. Those who have been appropriately trained in the operation of automation technology equipment and are sufficiently acquainted with Maxum II documentation.

3. Those who are familiar with the safety concepts of automation technology and are sufficiently acquainted with Maxum II documentation.

4. Those who are authorized to energize, ground and tag circuits and devices in accordance with established safety practices may perform the tasks for which they are trained.

WARNING

Operation or Maintenance of the Maxum II by unqualified personnel or failure to observe the warnings in this manual or on the device may lead to severe personal injury and/or extensive property damage.

Advance Maxum II Operation Overview

Description   This section provides an overview of the operation of the Advance
                       Maxum II   Analyzer. Figure 1-4 is an operational block diagram
                       showing how a sample is processed within the analyzer. For simplicity
                       the block diagram only depicts a single stream and one detector. The
                       accompanying narrative traces the sample through the Advance Maxum
                       II and how the various modules interact during the analysis.

                       Figure 1-4: Operational Block Diagram

More Information   See Chapter 2. Advance Maxum II Modules.

Advance Maxum II Operation Overview, Continued

Analyzer Operation

Refer to Figure 1-4 for the following narrative.

Power On

The Power Entry Control Module (PECM), in response to commands on Internal bus, accepts system primary power and provides switching and control of AC power for oven heaters and other AC powered devices.

Sample Conditioning

Before being piped to the analyzer, the sample from the process is sent to a sample conditioner system. The sample conditioner ensures that the process sample is compatible with the requirements of the analyzer. That is, it assures that the phase, pressure, temperature and flow rate to the analyzer are suitable, that the sample is filtered, that condensates are removed and other treatments are carried out. The resultant conditioned sample is piped via 1/8-inch stainless steel tubing to the sample valve(s) located in the oven of the Advance Maxum II.

Sample Valve

The type of sample valve used in an Advance Maxum II is application dependent. Five primary types of sample valves are available. The first is the 10-port Model 50 valve that is designed for vapor sample only. The second is the Model 11 valve for vapor or liquid samples. Third is the Model 20 valve for liquid high-pressure samples. The fourth type the set of Valco valves that are designed for high temperatures and very low sample volumes, and the fifth is the independently heated Siemens Liquid Injection Valve. The sample valve(s) and any column valves are controlled by a Solenoid Valve Control Module located in the Maxum II's electronic enclosure section. There can be up to three SVCMs installed in an electronics enclosure (EC).

Solenoid Valve Control Module

The Solenoid Valve Control Module (SVCM) provides pneumatic on/off control for both sampling and oven systems functions. The SVCM manifolds are connected as a group of four 4-way and four 3-way solenoids. The (SVCM) receives commands from the I^2C bus. Solenoid commands are received from the SNE. Solenoid relay status is read back to the SNE to indicate whether a selected solenoid is to be deactivated or activated. Timing is controlled by SNE timing. There is no time base in SVCM.

Commands from I^2C bus control the deactivation or activation of solenoid valves. If fault or warning conditions have occurred, pressure control and SVCM status information is returned to the SNE and SYSCON database.

Columns

The sample is injected by the sample valve(s) into the chromatograph columns where the sample is separated into individual components. Many different types of columns may be used including 1/16-inch micro-packed, 1/8-inch packed and fused silica or metal capillaries. The columns used are dependent on the requirements of the application.

Advance Maxum II Operation Overview, Continued

Column Valves
In most applications, there are multiple columns in use that are typically switched by column valves located in between them. These column valves are not shown in the illustration, but like the sample valves described above they are also controlled by the Solenoid Valve Control Module and Sensor Near Electronics Module located in the electronics control section.

Electronic Pressure Control
The carrier gas pressure that is used to push the sample through the columns is controlled by an Electronic Pressure Control Module(s) (EPCM) or in some applications by mechanical regulators. The EPCM is mounted on manifolds located on the EC right-side wall. The pneumatics for the EPCM is digitally controlled by the Sensor Near Electronics (SNE) module. Up to four EPCMs can be mounted in an EC. Each EPCM contains two channels, and each channel can use a different gas at a different pressure. EPCMs are also used to control the fuels for some of the detector modules. Each Electronic Pressure Control Module (EPCM) communicates the actual pressure back to the SNE. Information may then be displayed on the Maintenance Panel.

Oven Heaters
For the columns and detectors to work correctly, they must usually be operated at elevated temperatures. The Advance Maxum II uses electrical heater(s) to elevate the temperature. These heaters (not shown in block diagram) are connected to relays in the Electronic Enclosure section and, like the valves and the Electronic Pressure Control Module(s), are controlled by the Sensor Near Electronics.

Detector
The sample eluted from the columns is transported to the associated detector that senses the presence of the sample and converts it to an electrical signal. Depending upon the application, the Advance Maxum II can include up to three detector modules. Each detector module can have multiple detector sensor elements. Several detector module types are available including Thermistor, Filament, Flame Ionization, Flame Photometric, and Pulsed Discharge.

The resulting electrical signal from the detector is then coupled through the feed-through assembly to the Sensor Near Electronics (SNE) module located in the EC. The detector is assembled as part of the Feed-Through-Module. The Feed-Through-Module electrically connects the oven to the EC and provides electrical safety between the oven and the EC.

Advance Maxum II Operation Overview, Continued

Sensor Near Electronics (SNE)

The detector signal(s) is routed to the SNE where the signal is processed by the Detector Personality Module (DPM) located in the SNE. The DPM (unique for each detector type) amplifies the analog signal and converts it to a digital signal. The digital signal output from the DPM is processed by the SNE controller board (SNECON). The SNECON is interfaced to installed peripherals connected to the I^2C bus through a set of digital and analog I/O signal commands. All accessible I/O's are uniquely addressable through the module type, enclosure ID, SNE, location ID and module channel number

The SNECON, which is a 32-bit processor with 16 Mbytes of RAM in the current configuration, manages and controls all chromatography functions to perform the compositional analysis of the input stream. The SNECON communicates to the internal hardware circuits via the internal bus. The analytical result from the SNE is transferred to the System Controller (SYSCON) module.

System Controller (SYSCON)

The System Controller (SYSCON) module is a pullout drop-down assembly located in the EC and controls all external communications and internal communication to the SNE. The SYSCON houses the system controller board, plug-in I/O boards (for external signal control), a network communication card, and an interface to the front panel display. All internal communication between SNE and SYSCON is via the internal signal bus.

The SYSCON controller board, which is a 586 computer with 16 or more Megabytes of RAM, combines all data results from the SNE and performs additional high level data processing and calculations. The SYSCON connects to a Maintenance Panel display, strip chart recorder, other analyzers, printers, the Advance Communication System (ACS), or other connected networks.

The SYSCON is the analyzer control system in addition to containing the application database. It also controls overall analyzer operational mode sequences. The application database also contains analytical hardware database definitions that are used to perform the following functions:

Obtain desired sampling measurements
I/O and SNE's schedule of timing events
Sequence of sampling streams
Calculations of calculated values
Formatting of results and location and outputting results
How to report or correct error conditions

The SYSCON communicates with the SNE via the 10base2 Ethernet. The SNE communicates with the electronics enclosure (EC) installed modules via the I^2C bus.

Functional Tasks

Overview

This section provides an operational overview of the Advance Maxum II's Real-Time functional tasks.

Startup Tasks
  Applying Power
  Valid Database
  Oven Temperature
  Cycle Control Flag
Timed Event Scheduling
  Time-Of-Day Clock
  Schedule of Events

Frequency Events
Analysis Cycle Clock
  Accessing SYSCON
  Analysis Cycle Clock
  SYSCON Cycle Clock
  Valve Events
Manual Operations
  User Interface

Startup Tasks

On start-up, when primary AC power is applied to the analyzer, the analyzer first processes whatever electronic self-tests and diagnostics are required (for example, PROM, RAM, A/D, communication ports, etc.). The processing occurs within 5 seconds.

System related initial messages are generated and output to the network ports. Appropriate initial messages are then displayed on the Maintenance Panel and completed within 20 to 25 seconds. If the analyzer cycle clock is in RUN or CAL mode, an appropriate alarm may be generated during this internal test and the following startup period.

Self Test

After the self-test, the following conditions occur:

Installed hardware is initialized
Interrupts enabled
Oven temperatures and carrier pressure default set points are output
Analog input system(s), associated with detector inputs, are initialized and begin scanning.

The SYSCON checks to be certain a valid database is resident. If it is, the appropriate temperature and carrier set points are output. If not, default set points are left in place.

Oven Temperature

The oven temperature is monitored to check for being at set point and stable before automatically proceeding. Depending on how long primary AC power has been off, this may take from 2 seconds to 45 minutes.

Functional Tasks, Continued

Cycle Control Flag

A check is made to see if the analyzer is to run a diagnostic type cycle. This is for the purpose of validating the analytical hardware, such as solenoid valves, detectors, carrier regulators, etc. This is optional based on a custom application being initiated per the power fail alarm.

Cycle control flags are checked to see if any analyzer cycle clocks are to be in RUN mode. If they are not, the analyzer remains in the HOLD mode until operator intervention. If the cycle clock is in RUN mode, based on having been in that mode prior to powering down, then that mode should be started in progress without waiting for intervention.

Event Scheduling

The TOD (Time of Day) clock schedules events on a second, minute, hourly, daily or weekly basis. The clock is maintained on the SYSCON and schedules events from the residing SYSCON database.

The TOD clock has one-second resolution that is maintained and generated by a hardware device that maintains accurate time independent of analyzer power. This allows a power recovery event to determine duration of power down state.

Certain events are scheduled on a frequency basis, which are independent of the TOD or analysis cycle clocks. The frequency clock has a resolution of 1 second, which is used to schedule repetitive events, such as reading DI and AI signals for alarm purposes. Scheduling of events typically occur at a frequency of every 5 or 10 seconds. They occur regardless of whether the analyzer is in Run or Hold.

Description

A schedule event can be for instrument calibration and special calibrations. Special calibrations include daily or shift averages, report logging to a printer or Host computer. When these tasks are scheduled by TOD clock, they are put on queue. This allows them to be performed at the next appropriate time. Typically, this is after completion of current analysis cycle.

If a calibration is scheduled, it will be put in queue. The calibration is then initiated after completion of current cycle and appropriate time has been allotted for calibration blend to flow through the sampling valve. If shift average reports are to be calculated and printed, the report should include all cycles, which started, or sampled, during the specified shift. To have data available for calculation, a wait period may occur for completion of the current sample analysis.

Functional Tasks, Continued

Analysis Cycle Clock

The Analysis Cycle Clock (ACC) is another clock that provides the time base for all events associated with the actual chromatograph analysis cycle. SYSCON cycle clocks can be configured to provide timed event resolutions of 0.1 second, 0.01 second, 0.01 minute, or 0.001 minute. This is the SNE Event Table Scan Rate, which is independent of detector scan rates.

All SYSCON cycle clocks and associated Sensor Near Electronics (SNE) MUST BE of the same second or minute time units. This clock works in conjunction with the Stream Sequence Table and associated sample stream enable and skip flags. This controls sampling order and analysis of process streams connected to the analyzer.

Accessing SYSCON

The clock cycle RUN mode is controlled by the SYSCON upon command from SNE. When a clock cycle is started, the associated SNE's, for that method, initiate a mirror of the cycle clock.

The SNE clock is the true basis of timed events relating to the Gas Chromatograph oven valve timing, detector digitization and peak integration.

SNE Cycle Clock

The SNE cycle clock is used to schedule the following events.

Analysis valve timing	Pressure set point timing for
Detector balances	pressure programming
Temperature set points start and stop for PTGC	Analysis result calculations and reporting
Cycle Reset	

Important

Scheduled solenoid valve events cause Solenoid Valve Control Module (SVCM) hardware to be activated within 5 milliseconds of stated cycle time. Any scheduled pressure set point adjustments are transferred to the actual Electronic Pressure Control Module (EPCM) hardware within 5 milliseconds.

Manual Operations

Manually controlled functions can be initiated through the Maintenance Panel. A manual controlled event can occur asynchronously with any event and control some of the analyzer operations. Controlled items include:

Activation of solenoid valves
Balancing detectors
Changing a pressure or temperature set point
Initiating a calculation
Report logging event
Change the cycle time of an event
Initiate a calibration

Analyzer Internal Communications

Description

Several internal communication links are used to provide the communication paths from the SYSCON to the SNE's and from the SNE's to the SVCM, EPC, PECM and from SYSCON to the I/O bus.

> 10Base2 Internal Bus
> I^2C Internal Bus
> CAN Internal Bus

Physical Connections

The Advance Communication System (ACS) Ethernet is accessed via the SYSCON Peripheral Control Interface (PCI) board 10base2 port. The SNE's are accessed internally via the SYSCON controller plug-in PCI board, which provides a 10base2 Internal bus.

10 Base2 Internal Bus

The internal data bus is dependent on the analyzer/data base configuration. This is particular to the number of oven installed detectors being serviced and the detector sampling rates. How the internal bus interfaces with the installed SNE's is shown in Figure 1-5. For further information, refer to section Communication Board Operation.
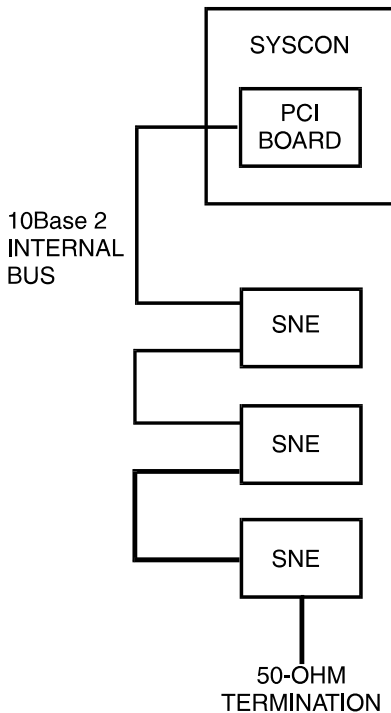

Figure 1-5: 10Base2 Internal Bus

Analyzer Internal Communications, Continued

I²C Internal Bus to SNE Detector Interface

The I²C Internal bus is used to interface the detector signal from the Detector Personality Module to the SNE controller board and then to the SYSCON; see Figure 1-6. The Internal bus also interfaces the SNE's associated modules with the SNE; see Figure 1-7.
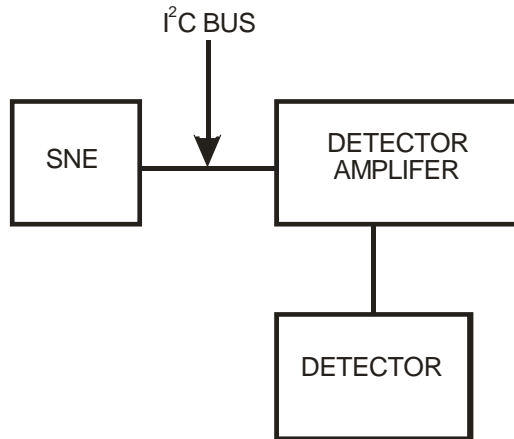
I²C BUS

```
            ┌──────────┐       ┌─────────────┐
            │   SNE    │───────│  DETECTOR   │
            │          │       │  AMPLIFER   │
            └──────────┘       └─────────────┘
                                      │
                               ┌─────────────┐
                               │  DETECTOR   │
                               └─────────────┘
```

Figure 1-6: I²C Internal to SNE Detectors

```
        ┌──────────┐
        │   SNE    │
        └──────────┘
             │
             ◄──────  I²C TO MODULES
             │
             ├──────►  SVCM
             │
             ├──────►  PECM
             │
             ├──────►  EPC
             │
             └──────►  SAMPLE
                       SYSTEM
                       CONTROLLER
```
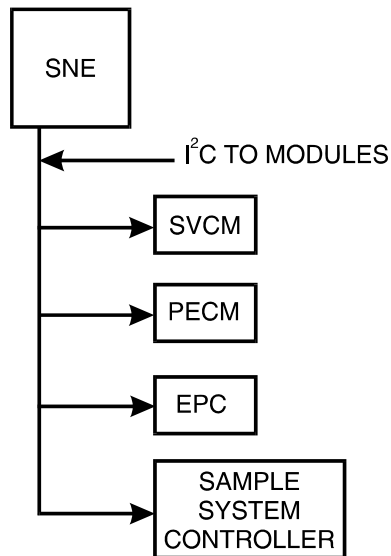
Figure 1-7: I²C Internal Bus to Enclosure Installed Components

Analyzer Internal Communications, Continued

CAN Bus

The CAN Bus interfaces the CAN Extension Unit with the SYSCON; see Figure 1-8.
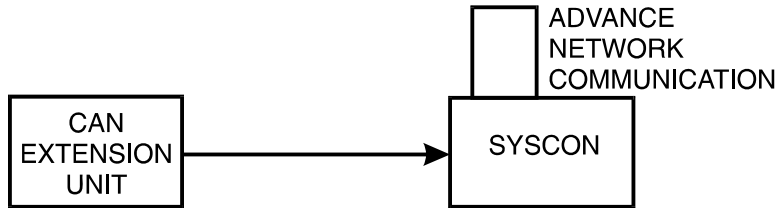

Figure 1-8: CAN Bus

CAN Module Addressing

Installed CAN Modules are identified by physical address which consist of module type, serial number and I/O channel number.

A serial number must be entered when adding or replacing (changing) system modules; see Chapter 3 Maintenance Panel Operation; Setting up CAN I/O modules page 3-142. The serial number is indicated on the module.

The entire 14-digit serial number must be entered (for example):

0 0 2 0 0 0 0 0 1 2 3 0 1

Always **01**
Serial number per tag on module
Always **0 0 0 0**
002   Analog I/O Board
003   Digital I/O Board
004   Analyzer Module

Maxum II Hardware Identification

Overview

The Maxum II modules located in the electronic enclosure section have their own physical address and communicate via the I^2C Internal Bus; see Figure 1-9. Address information is contained in the SYSCON database and identifies modules by their location.
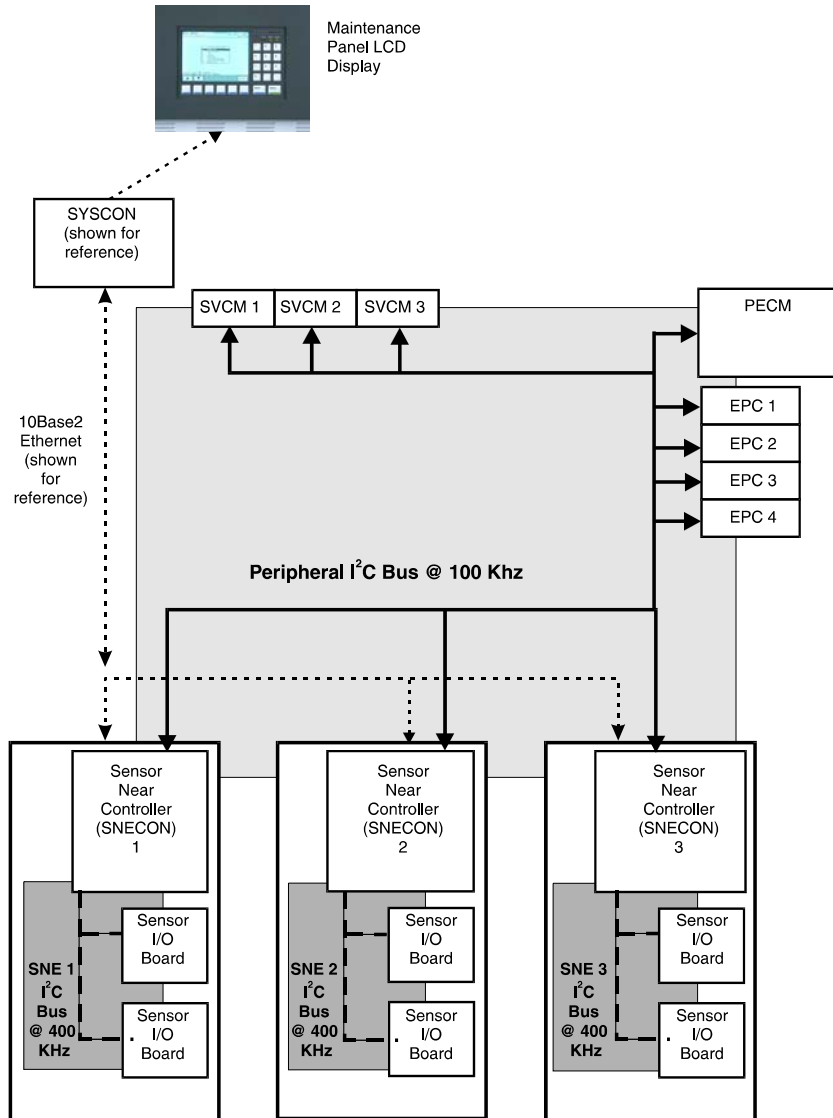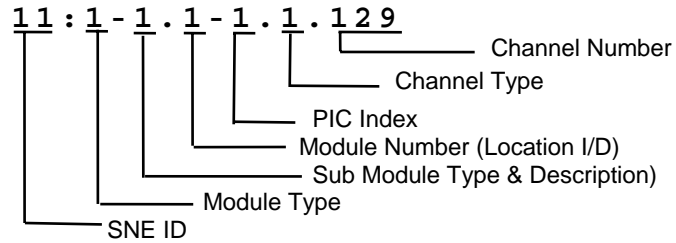

Figure 1-9: I^2C Bus Configuration

Maxum II Hardware Identification, Continued

Identification Number

ALL modules within the Maxum II electronic enclosure have a unique identification number as related to the Sensor Near Electronics module which controls them. The identification relationship between the SNE and the modules it controls is referred to as the SNE ID String.

For a complete description of the Hardware ID address see page 3-127.

```
1 1 : 1 - 1 . 1 - 1 . 1 . 1 2 9
```
Channel Number
Channel Type
PIC Index
Module Number (Location I/D)
Sub Module Type & Description)
Module Type
SNE ID

Address information is located in the analyzer local I/O Table. The I/O points are identified by module type, mounting location within the electronic enclosure and channel number. This allows module addressing from either the SYSCON database, SNE Tables or from Advance Database.

SNE ID String

One SNE in the Enclosure serves as the Bus Manager (identifies all installed modules, assigns each module an address and manages communications with the associated module) for the I^2C bus. Each SNECON has only one Bus Manager for its associated module. The SNECON initializes the address to be certain there is no conflict with other Bus manager capable devices
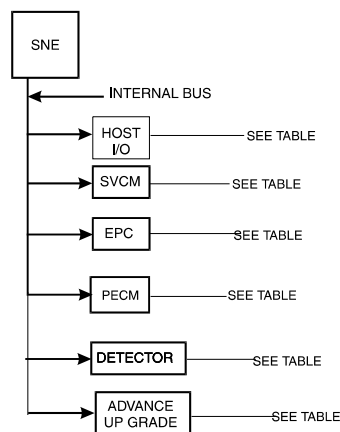

Figure 1-10: SNE ID String

Advance Communication System

Network Connectivity

The Advance Communication System (ACS) uses industry standard protocols and provides high-speed communication among all devices. The ACS can function alone or may be connected to a Distributed Control System (DCS) or plant-wide Local Area Network (LAN). As with other Siemens systems, the network has complete backward compatibility with existing Advance Data Hiway systems.

The network supports the following Advance products:

Maxum II and Optichrom GCs

Flexible high speed peer-to-peer communication

Open TCP/IP connectivity to industry standard networks for large, open systems.

Single Ethernet or redundant DataNET implement in any combination.

Interconnection to Advance Data Hiway and Advance Optichrom Chromatographs for backward compatibility.

Network Access Unit

Maintenance Panel availability

Remote Maintenance Panel access (optional) to any GC attached to the ACS

Slots for optional analog and digital I/O boards which can be used by any GC attached to the ACS

Multiple units can be attached anywhere in one ACS

CAN Extension (CEU)

Additional I/O board slots allows for expansion of I/O capability

Hub

Redundant version of ACS

DataNET

Twisted pair wire or fiber optics

True message confirmation

Hazardous area hardware ratings

Advance Network Gateway (ANG)

Interface high speed Ethernet or DataNET to existing Advance Data Hiway for backwards compatibility

Work Station

User interface for maintenance

Programming interface for engineering changes

Real time network status monitoring

Advance Data Hiway Communications

Description

This section presents information on how the Analyzer communicates with devices on the Advance Data Hiway (ADH) network. Refer to Figure 1-11.
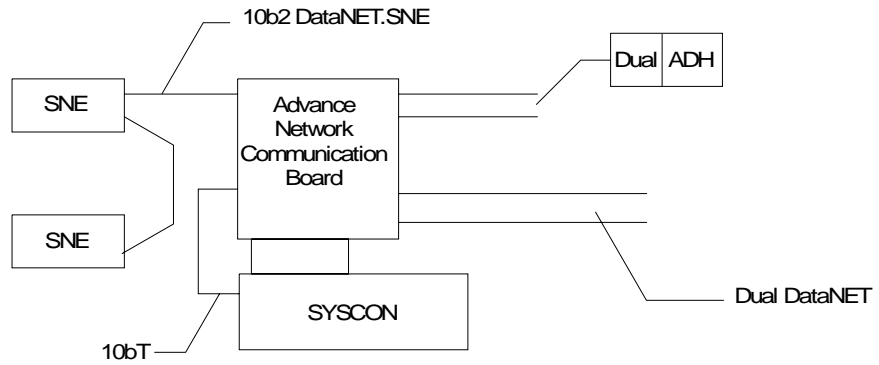
Figure 1-11: ADH Signal Flow Diagram

Powering Up

When analyzer system is powered up, a file is transferred from the SYSCON to the Communication Board Ethernet port and the Loop and Unit address for the ADH ports. This allows the Communication Board to be configured from the SYSCON Application Set information.

Analyzer Message

When the analyzer sends a message to another device connected on the Advance Data Hiway (ADH), the SYSCON formulates the ADH message. It then encapsulates the message as a TCP/IP message on the DataNET with a SYSCON source IP and Communication Board destination IP. The ADH message indicates the preferred ADH channel for transmission. The Communication Board retrieves this message, strips off TCP/IP protocol information, and then transmits the message on the selected ADH channel.

Broadcast Message

For a broadcast message, the SYSCON sends one message to the Communication Board. The channel is set to A and the broadcast bit is set. The Communication Board transmits the broadcast message on both ADH channels.

Advance Data Hiway Communications, Continued

Another ADH Device

For messages directed to the analyzer, from another installed ADH device, the message will have the destination Loop and Unit address as those of the Communication Board ADH ports. The Communication Board retrieves this message, encapsulates the ADH message in TCP/IP protocol, and then transmits it to the SYSCON with the destination IP.

Receiving Broadcast Signal

When the analyzer receives a broadcast signal on the ADH network, the Communication Board treats it as any other message. Typically the SYSCON receives two messages for each ADH broadcast set. One is from channel A and the other from channel B.

Chapter 2

Advance Maxum II Modules

Overview

Description

This chapter provides a functional description for each replaceable module installed within the Advance Maxum II   Gas Chromatograph.

Learning Hint

Please read the System Overview section of this manual for a basic understanding of the overall operation of the Advance Maxum II.

Chapter Highlights

In this Chapter the following information is provided:

System Controller (SYSCON)

Description

The System Controller (SYSCON) has a high-speed 32-bit microprocessor, a PROM chip for long term security, and battery back-up to save data in short term memory. The SYSCON stores the analyzer application database, combines all data results from the SNE and performs additional high-level data processing and calculations. All network communications, maintenance panel and analyzer functions are also coordinated by the SYSCON. The SYSCON provides communications between the Controller Board, I/O Boards and the EC operating modules; see Figure 2-3.

More information and details pertaining to the SYSCON can be found in the System Controller (SYSCON) Assembly Installation Manual (Siemens part number 2000686-001).

Additional Functions

Processing and communicating the measurement values supplied by the SNE
Controlling system functions, e.g. calibration
Display and operator control
Controlling associated systems, e.g. gas supply
Generates reports

Mechanical

The System Controller (SYSCON) assembly is a pullout, drop-down drawer located on a slide rail assembly mounted to the upper wall of the Electronic Enclosure. The SYSCON consists of a card cage that houses the system controller board. The system controller board acts as the motherboard with on board expansion slots to accommodate Analog and Digital I/O boards for external signal control, an Advance network communication board and a 10BASE Ethernet board.

Two versions of the SYSCON assembly have been available. In the original version, the power connectors are on the side and there is a 10BaseT connector on the front of the assembly. In the newer version, the power connectors have been moved to the bottom and the location for the 10BaseT connector, which is now optional, is on the side. Views of the two different assemblies are shown in the figures on the next page.

All PC boards are visible through the front of the drawer for making all I/O connections. Interface connectors to the front panel display, and communication connectors are also located and labeled on the front of the drawer.
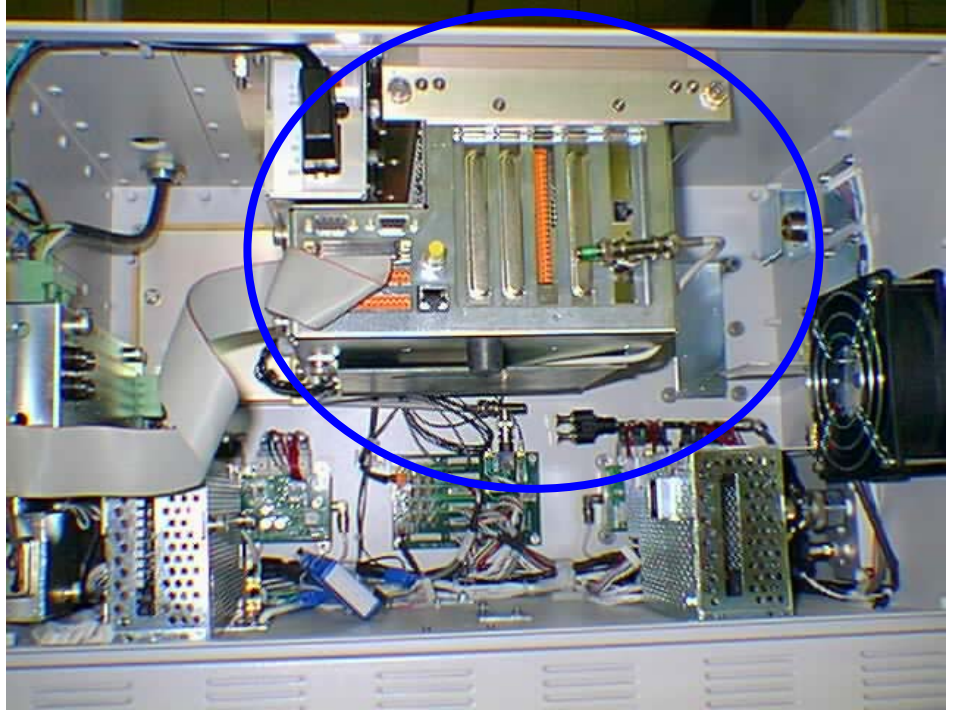
Figure 2-1: SYSCON Assembly – Original Version
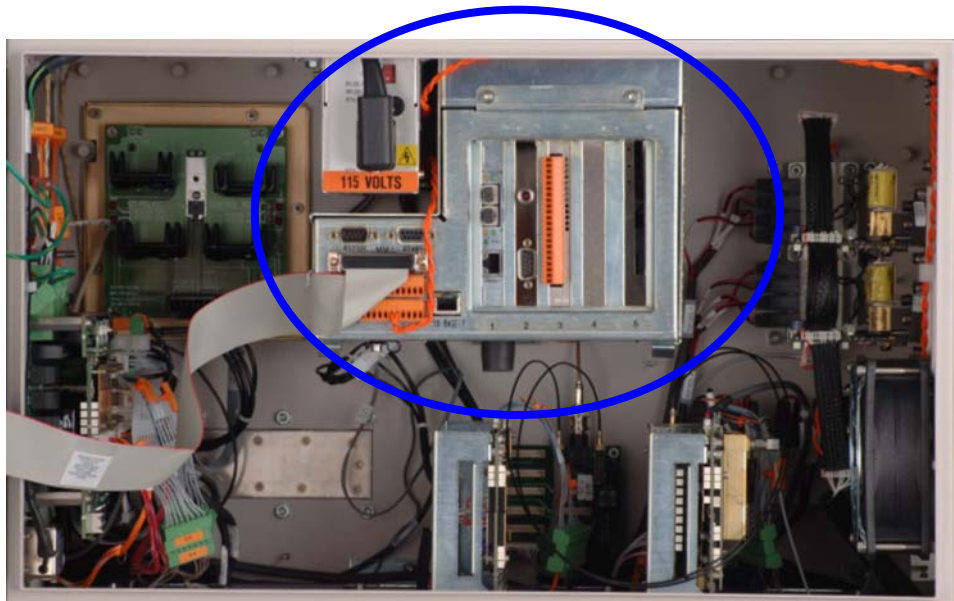
Figure 2-2: SYSCON Assembly – New Version

System Controller (SYSCON), Continued

SYSCON Operation

The SYSCON contains the application programs and data that are accessible directly or via the external network. The SYSCON also contains the Advance Maxum II Basic programs and the software to run the Maintenance Panel, which consists of the real time relational database and display manager.

All network communications, Maintenance Panel and analyzer functions are coordinated by the SYSCON.

> One SYSCON and Maintenance Panel in an analyzer can control other analyzers without a SYSCON and Maintenance Panel.
> The SYSCON does not control sample analysis performed by the Sensor-Near Electronic Module (SNE). The SNE manages and performs all analysis functions independently of the SYSCON.

Block Diagrams

Figure 2-3 is a block diagram of the Maxum II modules.
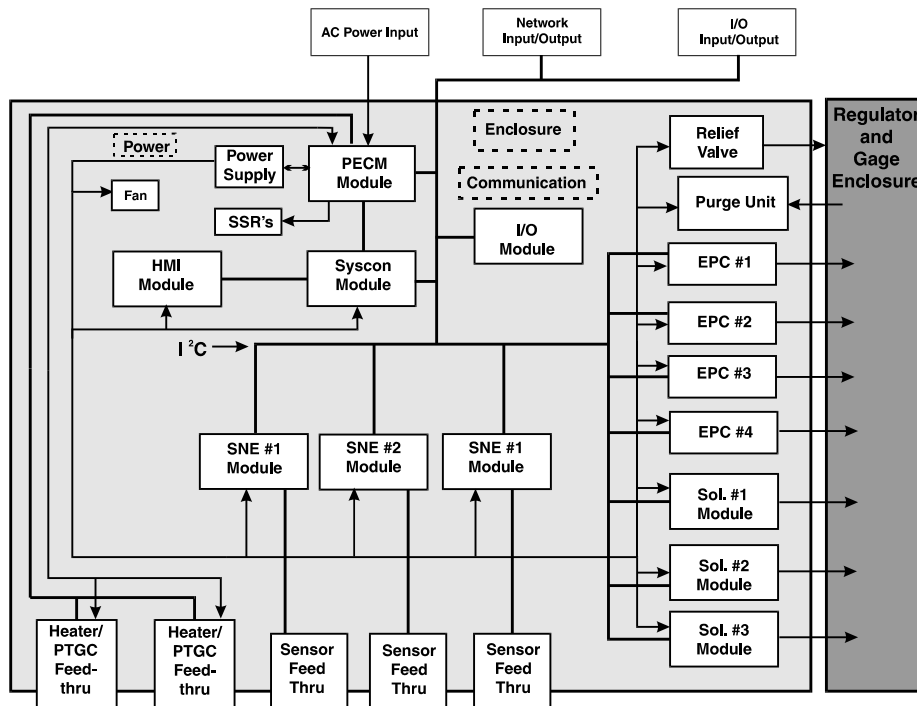
Figure 2-3: EC Installed Modules

System Controller (SYSCON), Continued

Block Diagram, continued

Figure 2-4 shows how analysis sampling information from the SNE is transferred over the 10BASE2 link to the SYSCON to display or archive a chromatogram.

Chromatogram data file from SNE

Detector Personality Module

SNE

Real time Chromatogram bfr

Acquired data file on SNE

Finished file, with integ mkrs, etc.

SYSCON

Strip Chart Recorder

Local display buffer

Maintenance Panel

Remote display buffer

To Network Connected Devices

Remote recorder buffer

Chromatogram archive records
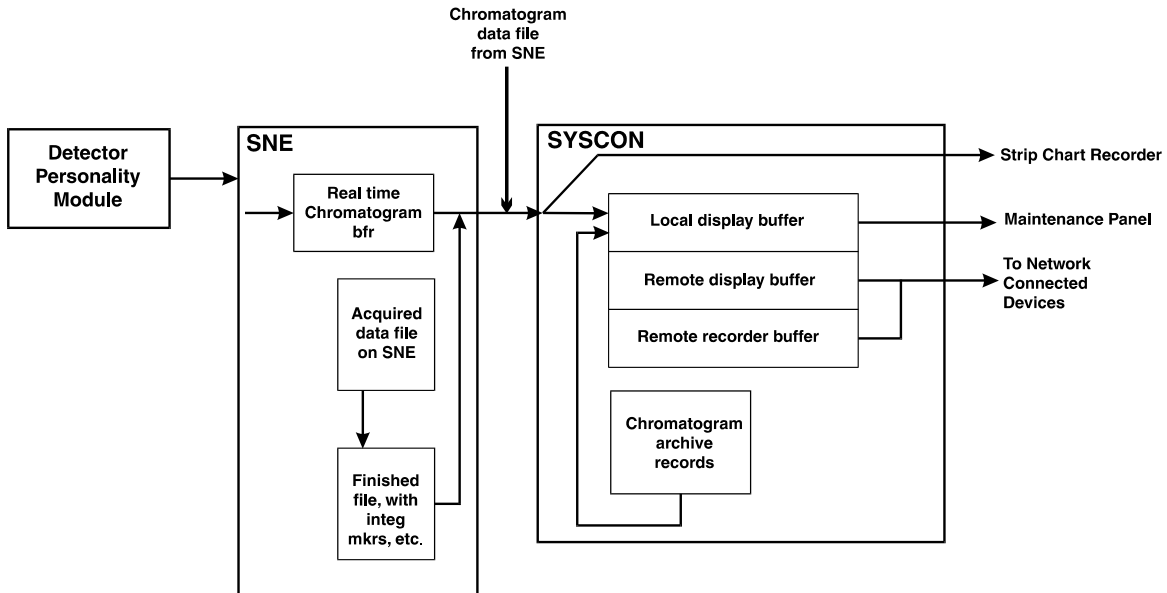
Figure 2-4: Inputs To and From SYSCON

I/O Slot Assignments

If expansion boards are added to the SYSCON Controller Board, they must be installed in the following slots. These slots are numbered from left to right when viewing SYSCON from front, see Figure 2-6: SYSCON Connections.

Advanced Network Communication Board (ANCB) for either DataNet or Advance Data Highway (ADH): Slot #1

10baseT or 100baseT to Fiber Optic Conversion Board: Slot 1

No Board is installed in Slot #2. It is reserved for connecting the external debugging and reset switch assembly.

Analog and Digital I/O Boards: Slots #3 and #4

10baseT ISA Ethernet Board (used on older versions of SYSCON): Slot #5

Compact Flash Card: Slot 5

System Controller (SYSCON), Continued

Analog & Digital I/O Boards

See System Controller Connections, Figure 2-8 through 2-10, for connection diagrams.

> Analog I/O board (AO8): has eight channels of analog fully isolated output channels.
>
> Digital I/O board (DIO-8): has 4-digital inputs and 4-digital outputs
>
> Input/Output board: has 2-digital inputs, 2-digital outputs, 2-analog outputs,.and 4-analog inputs (2 for current and 2 for voltage)
>
> The DOs are rated for 1A resistive load. Inductive loads are different. A DO should not drive an inductive load greater than 0.5A. An example is the typical block and bleed application which uses two parallel solenoids at 0.4A each. Separate DOs should be used to drive each solenoid. Each DO connected to a solenoid should have a diode to suppress the solenoid load.

Additional I/O Boards

If an application needs more than two I/O boards, a CAN Extension Unit can be installed. This allows installation of up to 10 additional I/O boards. The CAN Extension Unit connects to the Advance Maxum II Gas Chromatograph via a Serial Link (CAN Bus).

10BaseT or 100BaseT to Fiber Optic Converter Board

Slot 1 of the SYSCON Assembly can support a Fiber Optic Converter board. Both 100 Mb and 10 Mb versions of this board are available. The type of module used depends on the network configuration. The 100Base module is recommended. However, the 10Base module is also offered since some fiber optic switches may not support the 100Base version.

Note that although installation in slot 1 of the SYSCON Assembly is standard, the Fiber Optic Converter board can install in any unused slot in the SYSCON Assembly (provided the crossover Ethernet Cable is long enough).

Fiber Optic Converter Board Specifications

	10Base FX Board	100Base FX Board
Wavelength	850 nm	1300 nm Nominal (1270-1380 nm Range)
Minimum Output Power	-16.0 dBm	-20.0 dBm
Maximum Output Power	-10.0 dBm	-14.0 dBm
Sensitivity	-32.5 dBm	-33.0 dBm
Maximum Input Power	-8.0 dBm	-8.0 dBm
Link Power Budget	16.5 dB	13.0 dB
FO Connector Type	ST (Stab & Twist)	ST
Fiber Optic cables should be Multimode (MM), with 62.5 micrometer diameter fiber core and 125 micrometer clad.		
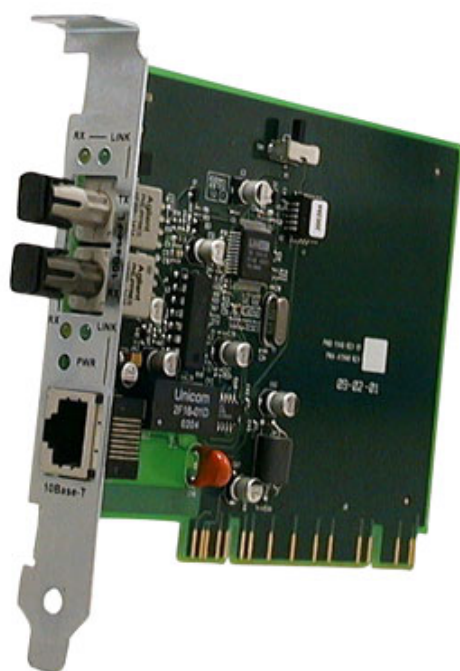
10Base FX Version *   100Base FX Version
                                       (Stab and Twist Connectors Not Shown)

Figure 2-5: Fiber Optic Converter Board

* The 10Base FX Version of this board is obsolete and is in the process of being discontinued by the computer networking companies that manufacture it. To prevent problems obtaining spare parts, it is recommended that the 100Base FX version be used if possible.

Remote Display Buffer

The *remote display buffer* transfers data to remotely connected components installed on a network. *The remote display buffer* transfers data to a peripheral connected display in lieu of the primary Maxum II's LCD display.

Local Display Buffer

The *local display buffer* outputs to the Maintenance Panel LCD can be one of the following:

> A *real-time* chromatogram of a physically installed detector,
> A view of the last Advance EZChrom detector channel or
> An archived chromatograph record as referenced by the Advance EZChrom channel.

System Controller (SYSCON), Continued

SYSCON Connections

Figure 2-6 shows the SYSCON connections. The second Ethernet connector on SYSCON is a 10BaseT connector. This connector will connect this GCEE to the outside world.

The Maintenance Panel connects to the front of SYSCON via a 60-pin connector (X03). Power enters SYSCON on the back left-hand side through a six-pin connector.

A 2-conductor cable from the PECM plugs into the back left hand side of SYSCON. This cable is for Maxum II purge. This plug is located directly behind the power cable plug.

An RS-485 (X01) and RS-232 (X02) port are also available on the front of SYSCON. The RS-485 port will be used for Modbus communication. The RS-232 serial port may be used to interface to a printer. There are 2 additional connectors on the front of SYSCON that are used for on board I/O. These connectors are orange in color. The on board user I/O consists of 4 DI, 4 DO, and 2 AO channels. There is also a Can Bus connector which can be used for a Can Extension Unit. This connector is on the front of the original SYSCON assembly. On the new assembly it is optional and is located on the left side of the assembly (if equipped).

-X01   RS-232C Port
-X02   RS-485
-X03   Maintenance Panel Connector
-X04   Digital Outputs (System Controller)
-X05   Analog & Digital Inputs
-X06   CAN Bus Connector
-X07– Ethernet 10Base T
-X08   Communication Board (NetCom or Ethernet to Fiber Optic Converter) Slot 1
-X09   not used
-X10   Analog and Digital I/O Board
-X11   Analog and Digital I/O Board
-X12   10BaseT Ethernet Board
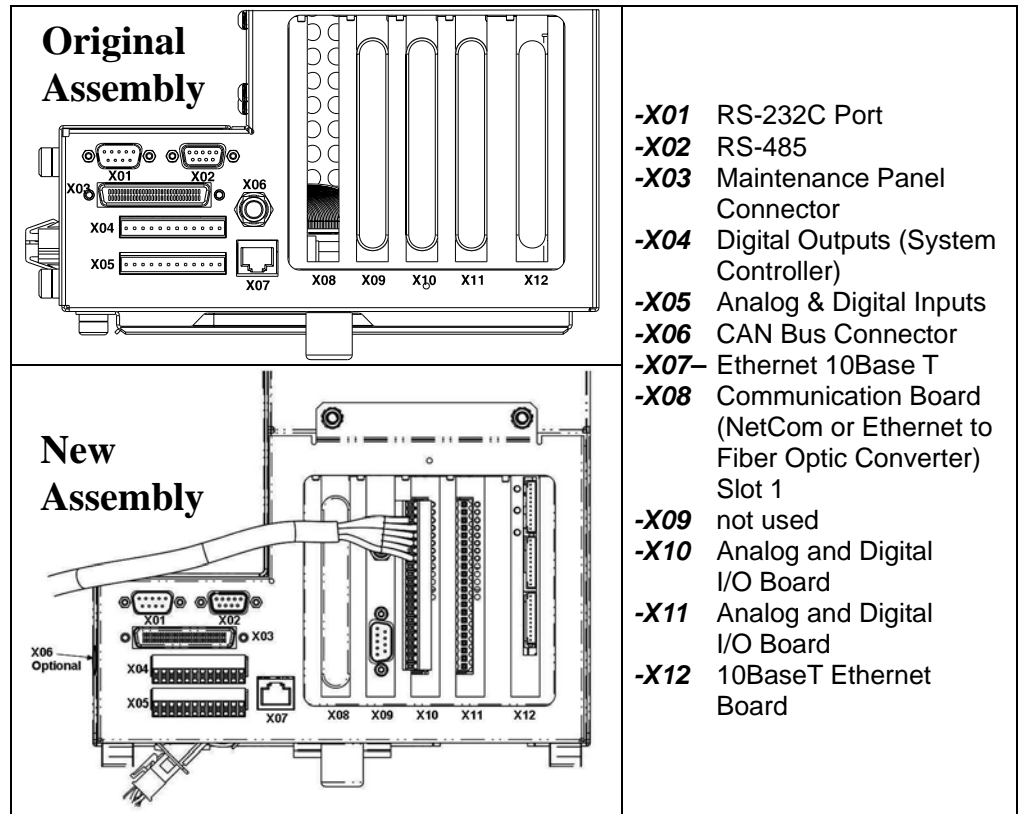
Figure 2-6: SYSCON Connections

System Controller (SYSCON), Continued

Analog & Digital Connections

Figures 2-7 to 2-10 show standard input and output pin layouts for the system controller and analog/digital boards. Relays are shown in a de-energized state, equivalent to their failure mode status.

The actual pin layout with input and output signals in a delivered system will be shown in the System Documentation package.

Digital Outputs (DO)

1	DO1 NC	max. 30 V / 1 A
2	C	
3	NO	
4	DO2 NC	max. 30 V / 1 A
5	C	
6	NO	
7	DO3 NC	max. 30 V / 1 A
8	C	
9	NO	
10	DO4 NC	max. 30 V / 1 A
11	C	
12	NO	

Analog Outputs (AO), Digital Inputs (DI)

13	AO1 +	0 - 20 mA, max. 750 Ω
14	-	
15	AO2 +	0 - 20 mA, max. 750 Ω
16	-	
17	DI1	12 - 24 VDC
18		
19	DI2	12 - 24 VDC
20		
21	DI3	12 - 24 VDC
22		
23	DI4	12 - 24 VDC
24		

DO1–DO4
4 digital outputs: floating double-throw contacts, max. contact load rating 30 V / 1 A
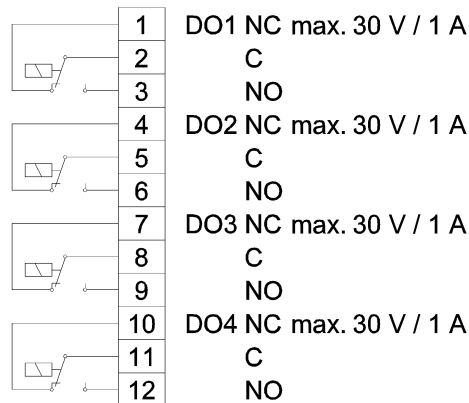
AO1–AO2
2 analog outputs: 0/4–20 mA, common negative pole, galvanically separated from ground, freely connectable to ground, max. gain vs. local protective ground potential 50 V, max. working resistance 750

DI1–DI4
4 digital inputs: Optocoupler with internal 12–24 VDC power supply, switchable with floating contacts; alternative: switchable with external 12–24 VDC supply, common negative pole

Design: Two 12-pin terminal strips for braided or solid cable with max. section of 1.5 mm^2 or 16 AWG.

Figure 2-7: System Controller Connection Diagram -X04, -X05

System Controller (SYSCON), Continued

Pin	Label
1	
2	
3	-
4	AO1 +
5	-
6	AO2 +
7	-
8	AO3 +
9	-
10	AO4 +
11	-
12	Chassis
13	-
14	AO5 +
15	-
16	AO6 +
17	-
18	AO7 +
19	-
20	AO* +
21	-
22	Chassis

Internal
Circuitry
(representation)

Expected
External Load
(representation)
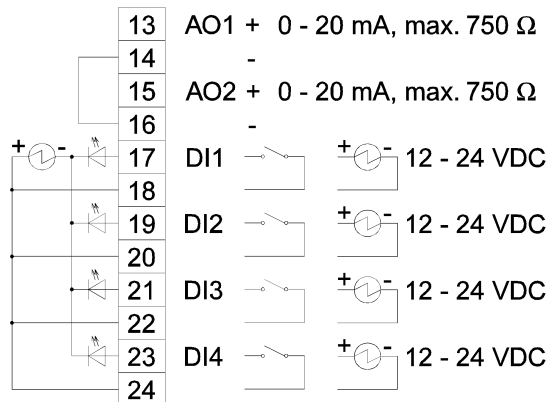
AO1-AO8
Analog Outputs: 0/4-20 mA. Common negative pole, galvanically separated from ground, freely connectable to ground, max. gain vs. local protective ground potential 50B, max. working resistance 750 ohms.

Design
One 22-pin terminal strips for braided or solid conductors with a maximum diameter of 1.5 mm or 16 AWG.

Figure 2-8: Analog Output Board Connection Diagram -X10 - -X11

System Controller (SYSCON), Continued

Internal Circuitry (representation)

Expected External Load (representation
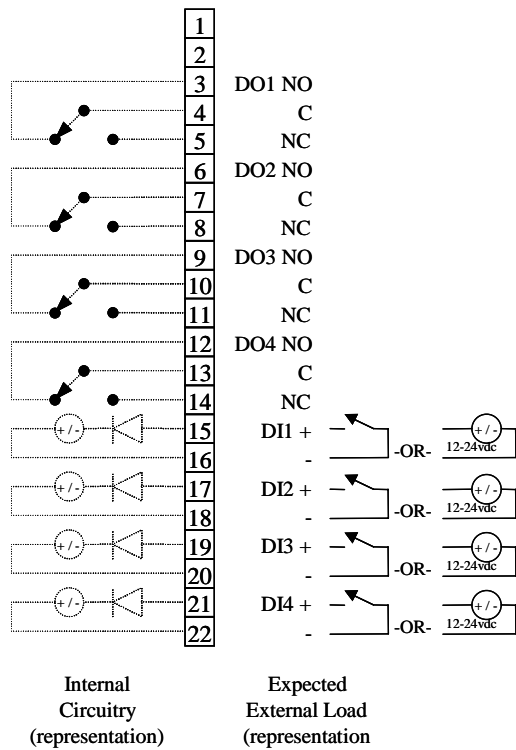
DO1-DO4
Digital Outputs: Floating double-throw contacts, max. contact load rating 30 V/1A.

The DO's are rated for 1A resistive load. Inductive loads are different. A DO should not drive an inductive load greater than 0.5A. The typical block and bleed application, which uses two parallel solenoids at 0.4A each, should use separate DO's to drive each solenoid. Each DO connected to a solenoid should have a diode to suppress the solenoid load.

DI1-DI4
Digital Inputs: Optocoupler with internal 12-24 VDC power supply, switchable with floating contacts; alternative: switchable with external voltage 12-24 VDC, common negative pole.

Design
One 22-pin terminal strips for braided or solid conductors with a maximum diameter of 1.5 mm or 16 AWG.

Figure 2-9: Digital I/O Board Connections Diagram -X10 - -X11

System Controller (SYSCON), Continued

Pin	Label
1	
2	
3	DO1 NC
4	C
5	NO
6	DO2 NC
7	C
8	NO
9	DI1 +
10	-
11	DI2 +
12	-
13	AI1 voltage
14	AI1 current
15	-
16	AI2 voltage
17	AI2 current
18	-
19	AO1 +
20	-
21	AO2 +
22	-

Internal Circuitry (representation)

Expected External Load (representation

DO1-DO2
Digital Outputs: Floating double-throw contacts, max. contact load rating 30 V/1A

DI1-DI2
Digital Inputs: Optocoupler with internal 12-24 VDC power supply, switchable with floating contacts; alternative: switchable with external voltage 12-24 VDC, common negative pole.

AI1-AI2
Analog Inputs: -20 to +20 mA into 50 ohms or -10 to +10V, R_{10}=1 M-ohm, mutually isolated 10 V

AO1-AO2
Analog Outputs: 0/4-20 mA. Common negative pole, galvanically separated from ground, freely connectable to ground, max. gain vs. local protective ground potential 50B, max. working resistance 750 ohms.

Design
One 22-pin terminal strips for braided or solid conductors with a maximum diameter of 1.5 mm or 16 AWG.
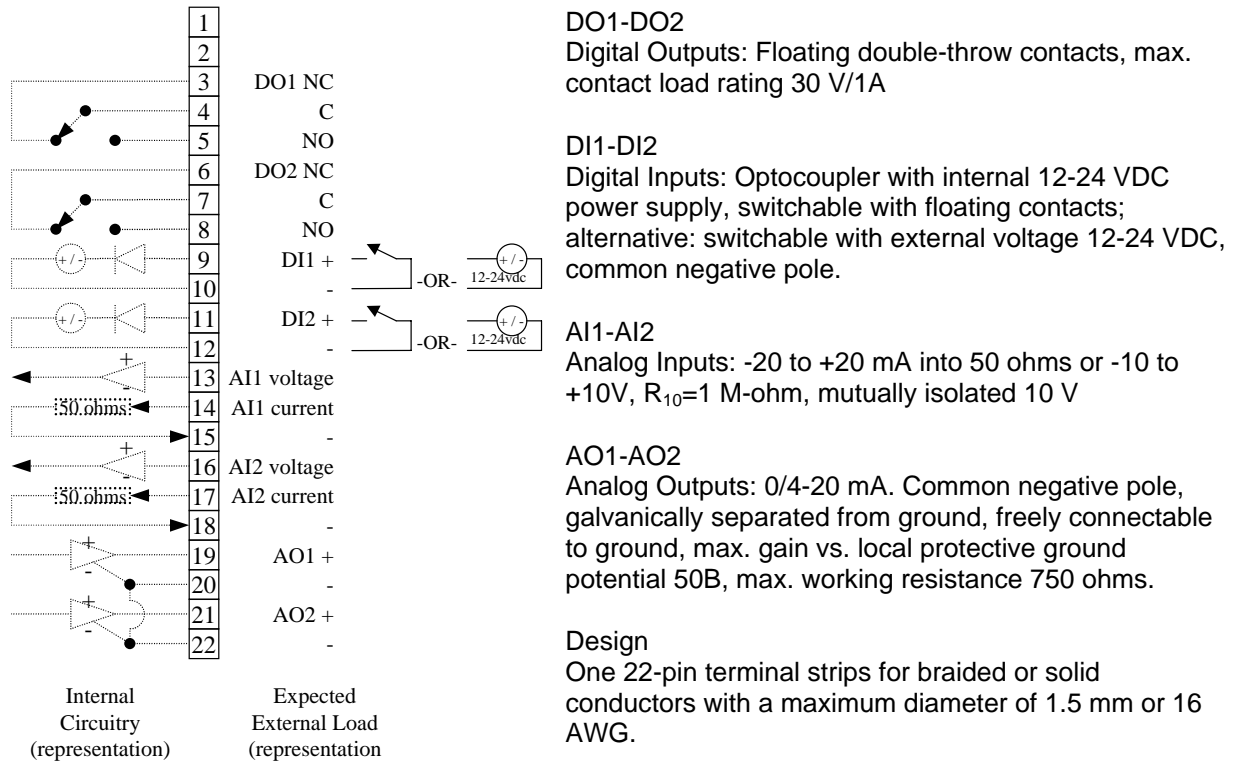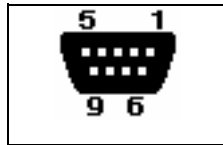
Figure 2-10: Combination Analog/Digital I/O Board Connection Diagram X10-X11

System Controller (SYSCON), Continued

Communication Ports   Figure 2-11 through 2-12 show the wiring requirements for the communication port connectors.

2	RTxD–
3	RTxD+
5	GND

Design: 9-pin Sub D female connector

Figure 2-11: RS-485 Port -X02
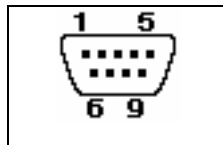
2	RxD
3	TxD
5	GND

Design: 9-pin Sub D male connector

Figure 2-12: RS-232C Port -X01
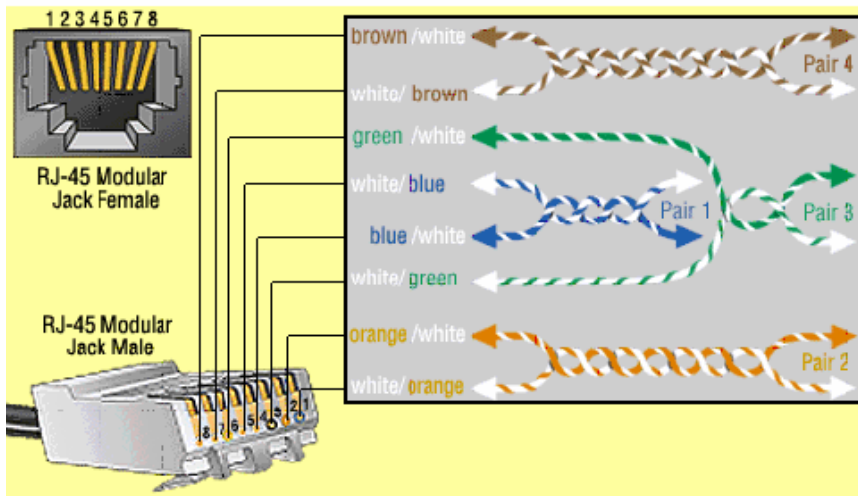
1	10TT+
2	10TT–
3	10TR+
6	10TR–

Design: 8-pin RJ45 Jack Using Pairs 2 & 3

Figure 2-13: Ethernet 10BASET Port -X07

System Controller (SYSCON), Continued

SYSCON Controller Board Layout

Figure 2-14 shows the layout of the System Controller Board.
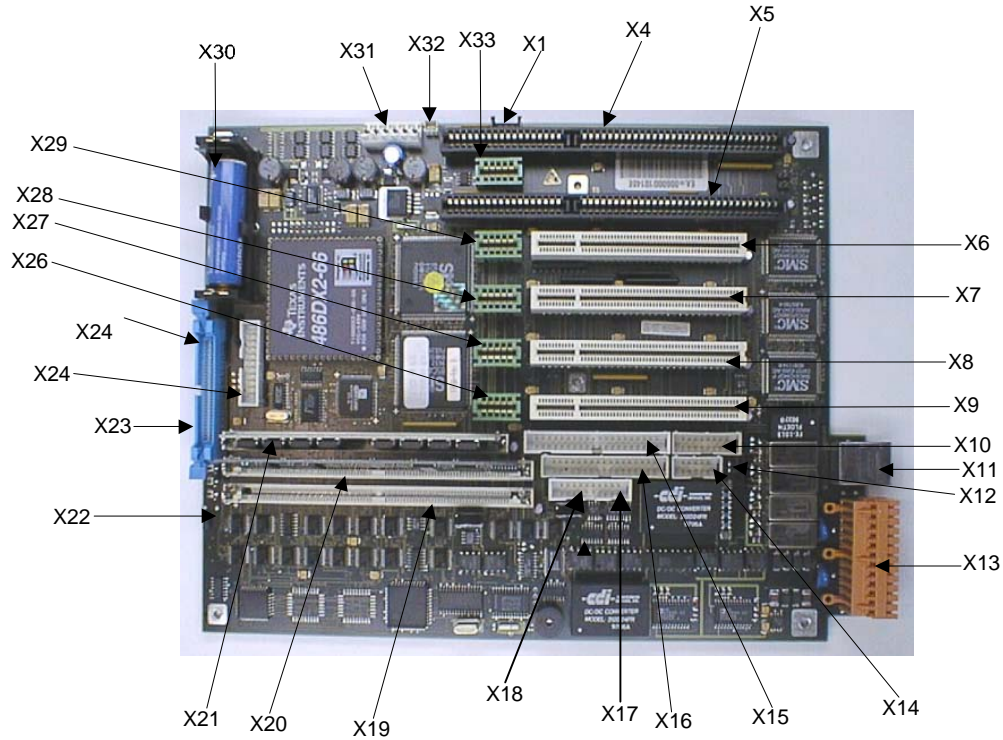
Figure 2-14: System Controller

Inputs/Outputs

X1	Internal bus	X18	RS 485
X2	Reserved	X19	SIMM 80 #2 Flash/SRAM
X3	Reserved	X20	SIMM 80 #1 Flash/DRAM
X4	AT Bus 1	X21	SIMM 72
X5	AT Bus 2	X22	Reset contact
X6	PCI Slot 4	X23	Display
X7	PCI Slot 3	x24	Dongle plug
X8	PCI Slot 2	X25	Keyboard
X9	PCI Slot 1	X26	CAN Direct 5
X10	AUI	X27	CAN Direct 4
X11	10BaseT	X28	CAN Direct 3
X12	Internal bus	X29	CAN Direct 2
X13	I/O	X30	Battery
X14	RS 232 (Debug)	X31	Power
X15	Not used at this time	X32	Purge
X16	Not used at this time	X33	CAN Direct 1
X17	RS 232		

System Controller (SYSCON), Continued

Interface Description   Refer to Figure 2-14 for location of interface connections.

X1   Internal bus

Pin	Signal
1	GND
2	CAN L
3	CAN H
4	GND

X2 / X3   Not used at this time

X4   AT Bus

Pin	Signal	Pin	Signal
A1	IOCHK#	B1	GND
A2	SD7	B2	RSTDRV
A3	SD6	B3	5 Volt
A4	SD5	B4	IRQ 9
A5	SD4	B5	-5 Volt
A6	SD3	B6	DRQ 2
A7	SD2	B7	-12 Volt
A8	SD1	B8	WS 0#
A9	SD0	B9	12 Volt
A10	IOCHRDY	B10	GND
A11	AEN	B11	SMEMW #
A12	SA19	B12	SMEMR #
A13	SA18	B13	IOW #
A14	SA17	B14	IOR #
A15	SA16	B15	DACK 3#
A16	SA15	B16	DRQ 3
A17	SA14	B17	DACK 1#
A18	SA13	B18	DRQ 1
A19	SA12	B19	REFRESH #
A20	SA11	B20	AT Clock
A21	SA10	B21	IRQ 7
A22	SA9	B22	IRQ 6
A23	SA8	B23	IRQ 5
A24	SA7	B24	IRQ 4
A25	SA6	B25	IRQ 3
A26	SA5	B26	DACK 2#
A27	SA4	B27	T/C
A28	SA3	B28	BALE
A29	SA2	B29	5 Volt
A30	SA1	B30	OSC 14
A31	SA0	B31	GND

Pin	Signal	Pin	Signal
C1	SBHE #	D1	MEMCS16 #
C2	LA 23	D2	IOCS16 #
C3	LA 22	D3	IRQ 10
C4	LA 21	D4	IRQ 11
C5	LA 20	D5	IRQ 12
C6	LA 19	D6	IRQ 13
C7	LA 18	D7	IRQ 14
C8	LA 17	D8	DACK 0 #
C9	MEMR #	D9	DRQ 0
C10	MEMW #	D10	DACK 5
C11	SD 8	D11	DRQ 5
C12	SD 9	D12	DACK 6 #
C13	SD 10	D13	DRQ 6
C14	SD 11	D14	DACK 7 #
C15	SD 12	D15	DRQ 7
C16	SD 13	D16	5 Volt
C17	SD 14	D17	Master #
C18	SD 15	D18	GND

X5 AT Bus 2, layout per X5 AT Bus 1

X6 PCI Slot 1

Pin	Signal	Pin	Signal
A1	N.C.	B1	-12 V
A2	12 Volt	B2	N.C.
A3	N.C.	B3	GND
A4	N.C.	B4	N.C.
A5	5 Volt	B5	5 Volt
A6	INT D	B6	5 Volt
A7	INT B	B7	INT A
A8	5 Volt	B8	INT C
A9	N.C.	B9	N.C.
A10	5 Volt	B10	N.C.
A11	N.C.	B11	N.C.
A12	GND	B12	GND
A13	GND	B13	GND
A14	N.C.	B14	N.C.
A15	RESET	B15	GND
A16	5 Volt	B16	CLK
A17	GNT 0	B17	GND
A18	GND	B18	REQ 0 #

Pin	Signal	Pin	Signal
A19	N.C.	B19	5 Volt
A20	AD 30	B20	AD 31
A21	3.3 Volt	B21	AD 29
A22	AD 28	B22	GND
A23	AD 26	B23	AD 27
A24	GND	B24	AD 25
A25	AD 24	B25	#.3 Volt
A26	IDSEL	B26	CBE3 #
A27	3.3 Volt	B27	AD 23
A28	AD 22	B28	GND
A29	AD 20	B29	AD 21
A30	GND	B30	AD 19
A31	AD 18	B31	3.3 Volt
A32	AD 16	B32	AD 17
A33	3.3 Volt	B33	CBE 2 #
A34	FRAME #	B34	GND
A35	GND	B35	IRDY #
A36	TRDY #	B36	3.3 Volt
A37	GND	B37	DEVSEL #
A38	STOP #	B38	GND
A39	3.3 Volt	B39	LOCK #
A40	N.C.	B40	N.C.
A41	N.C.	B41	3.3 Volt
A42	GND	B42	SERROR #
A43	PARITY	B43	3.3 Volt
A44	AD 15	B44	CBE 2 #
A45	3.3 Volt	B45	AD 14
A46	AD 13	B46	GND
A47	AD 11	B47	AD 12
A48	GND	B48	AD 10
A49	AD 9	B49	GND
A50	(keyed)	B50	(keyed)
A51	(keyed)	B51	(keyed)
A52	CBE0 #	B52	AD 8
A 53	3.3 Volt	B53	AD 7
A54	AD 6	B54	3.3 Volt
A55	AD 4	B55	AD 5
A56	GND	B56	AD 3
A57	AD 2	B57	GND
A58	AD 0	B58	AD 1
A59	5 Volt	B59	5 Volt
A60	N.C.	B60	N.C.
A61	5 Volt	B61	5 Volt
A62	5 Volt	B62	5 Volt

System Controller (SYSCON), Continued

X7 / X8 / X9   PCI Slot 2, layout per X6 PCI Slot 1

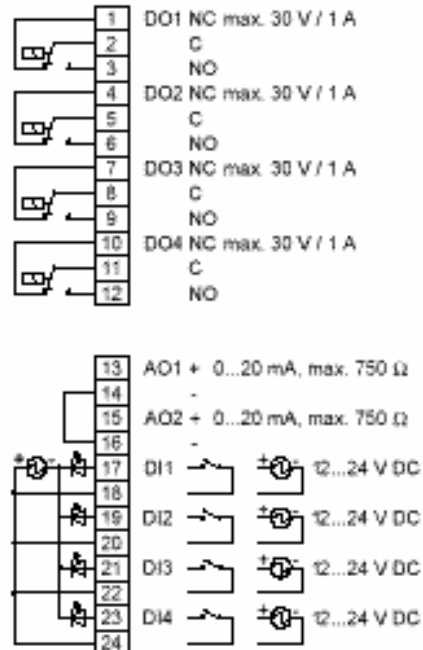**X10**   Not used at this time

X11   Ethernet interface

Pin	Signal	Pin	Signal
1	Transmit +	2	Transmit -
3	Receive +	4	N.C.
5	N.C.	6	Receive -
7	N.C.	8	N.C.

X12   Internal bus, see X1 for layout

X13   I/O contacts

System Controller (SYSCON), Continued

X14   RS 232

Pin	Signal	Pin	Signal
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI		

X15 / X16   Not used at this time

X17   V24 interface

Pin	Signal	Pin	Signal
1	N.C.	2	DATA+
3	DATA-	4	N.C.
5	N.C.	6	N.C.
7	N.C.	8	N.C.
9	N.C.	10	N.C.

X18   RS485

Pin	Signal	Pin	Signal
1	N.C.	2	DATA+
3	DATA-	4	N.C.
5	GND.	6	N.C.
7	N.C.	8	N.C.
9	N.C.	10	N.C.

System Controller (SYSCON), Continued

X19   SIMM 80 #2

Pin	Signal	Pin	Signal
1	GND	41	GND
2	Data 0	42	ByteEnable 0 #
3	Data 1	43	ByteEnable 1 #
4	Data 2	44	ByteEnable 2 #
5	Data 3	45	ByteEnable 3 #
6	5 Volt	46	5 Volt
7	Data 4	47	Adr 2
8	Data 5	48	Adr 3
9	Data 6	49	Adr 4
10	Data 7	50	Adr 5
11	GND	51	Adr 6
12	Data 8	52	Adr 7
13	Data 9	53	Adr 8
14	Data 10	54	Adr 9
15	Data 11	55	Adr 10
16	5 Volt	56	Adr 11
17	Data 12	57	Adr 12
18	Data 13	58	Adr 13
19	Data 14	59	5 Volt
20	Data 15	60	Adr 14
21	GND	61	Adr 15
22	Data 16	62	Adr 16
23	Data 17	63	Adr 17
24	Data 18	64	Adr 18
25	Data 19	65	Adr 19
26	5 Volt	66	Adr 20
27	Data 20	67	Adr 21
28	Data 21	68	Adr 22
29	Data 22	69	Adr 23
30	Data 23	70	Adr 24
31	GND	71	GND
32	Data 24	72	Battery +
33	Data 25	73	NC
34	Data 26	74	SRAM-ChipSelect #
35	Data 27	75	FLASH-ChipSelect #
36	5 Volt	76	SRAM-WriteEnable #
37	Data 28	77	FLASH-WriteEnable #
38	Data 29	78	SRAM/FLASH-ReadEnble #
39	Data 30	79	GND
40	Data 31	80	12Volt

System Controller (SYSCON), Continued

X20   SIMM 80 #1, for layout see X19 SIMM 80 #2

X21   SIMM 72

Pin	Signal	Pin	Signal
1	GND	37	Parity 1
2	Data 0	38	Parity 3
3	Data 16	39	GND
4	Data 1	40	CAS 0 #
5	Data 17	41	CAS 2 #
6	Data 2	42	CAS 3 #
7	Data 18	43	CAS 1 #
8	Data 3	44	RAS 0 #
9	Data 19	45	RAS 1 #
10	Data 4	46	NC
11	NC	47	Write #
12	Adr 0	48	NC
13	Adr 1	49	Data 8
14	Adr 2	50	Data 24
15	Adr 3	51	Data 9
16	Adr 4	52	Data 25
17	Adr 5	53	Data 10
18	Adr 6	54	Data 26
19	Adr 10	55	Data 11
20	Data 4	56	Data 27
21	Data 20	57	Data 12
22	Data 5	58	Data 28
23	Data 21	59	5 Volt
24	Data 6	60	Data 29
25	Data 22	61	Data 13
26	Data 7	62	Data 30
27	Data 23	63	Data 14
28	Adr 7	64	Data 31
29	Adr 11	65	Data 15
30	5 Volt	66	NC
31	Adr 8	67	ID 1 / NC
32	Adr 9	68	ID 2 / NC
33	RAS 3 #	69	ID 3 / NC
34	RAS 2 #	70	ID 4 / NC
35	Parity 2	71	NC
36	Parity 0	72	GND

System Controller (SYSCON), Continued

X23
Control/display unit plug (Maintenance Panel (also called HMI))

Pin	Signal	Pin	Signal
1	GND	2	GND
3	Address 0	4	Address 1
5	Address 2	6	Address 3
7	Address 4	8	Address 5
9	Address 6	10	Address 7
11	Address 8	12	Address 9
13	Address 10	14	Address 1
15	Address 12	16	Address 13
17	Address 14	18	Address 15
19	5 Volt	20	HMI-ChipSelect #
21	5 Volt	22	Data 0
23	Data 1	24	Data 2
25	Data 3	26	Data 4
27	Data 5	28	Data 6
29	Data 7	30	5 Volt
31	GND	32	ISA-System Clock
33	GND	34	5 Volt
35	N.C.	36	Memory Write #
37	MemoryRead #	38	Reset #
39	5 Volt	40	IO-Channel Ready
41	5 Volt	42	RXD
43	TXD	44	RTS
45	CTS	46	DTR
47	DSR	48	DCD
49	RI	50	HMI GPO 0
53	N.C.	54	Interrupt
55	HMI Purge LED	56	HMI_MNT-LED
57	Failure LED	58	GND
59	GND	60	GND

X24
Dongle plug

X25
Keyboard connector

Pin	Signal
1	5 Volt
2	Keyboard Clock
3	Keyboard Data
4	(keyed)
5	GND

System Controller (SYSCON), Continued

X26   CAN Direct 5

Pin	Signal	Pin	Signal
1	CAN H	2	CAN H
3	CAN L	4	CAN L
5	GND	6	GND
7	24 Volt	8	24 Volt
9	N.C.	10	N.C.

X27 / X28 / X29   CAN Direct 4, for layout see X26

X30   Power

Pin	Signal
1	NC
2	PWR PRIM
3	GND
4	GND
5	24 Volt
6	24 Volt

X31   Not used at this time

X32   CAN Direct 1, for layout see X26

Sensor Near Electronics (SNE)

Description

The Sensor Near Electronics (SNE) contains all the application programs required to perform a sample analysis. The SNE controls the sample analysis, acquires and processes data from detectors and controls and monitors the analytical operating environment. A total of up to three SNEs can be installed within the electronic enclosure. Refer to Figure 2-15.

More information and details pertaining to the SNE can be found in the Sensor Near Electronics (SNE) Assembly Installation Manual (Siemens part number 2000685-001).
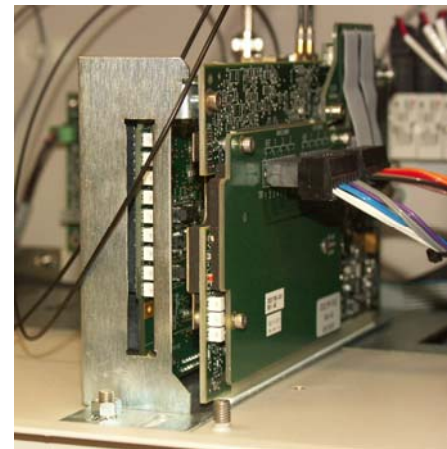
Original Housing   New Housing

Figure 2-15: Sensor Near Electronics (SNE) Assembly

Mechanical

The SNE is located in a protective housing in the Electronic Enclosure (EC). The housing can be the original closed metal cage or the open cage that is the current version of the housing. Refer to Figre 2-15.

Original Housing

The original housing is a perforated cover that allows cooling air to enter and flow around the installed SNE boards. For added ventilation, a cooling fan is mounted between two spring clips on the side of the SNE. Operational LEDs are visible through a cutout in the cover. An easily removed side cover allows access to the expansion slots. A restriction for the original enclosure is that some of the FID detector personality modules will not fit into the cage; in the cases where these are used, the user will need to upgrade to the current version of the housing.

New Housing

The new housing has an open architecture. Because of this there is no cooling fan on the housing. Also, the housing is able to accommodate all detector personality module types. Operational LEDs are visible through a cutout in the cover.

Sensor Near Electronics (SNE), Continued

1 - Status LEDS
2 - Cooling Fan
3 - T0 Oven Heater 2
3A- To Oven Heater 1
4 - DPM Signal todetector
5 - J50 to Wiring Distribution Board
    or for Daisy Chaining SNE
6 -J5 to Wiring Disrtibution Board
    or for Terminating
    Daisy Chaining
7 - not used
8 - J7 I^2C Bus Connection
9 - J14 Module ID Connector
10 -J4 Debug Connector
11- not used
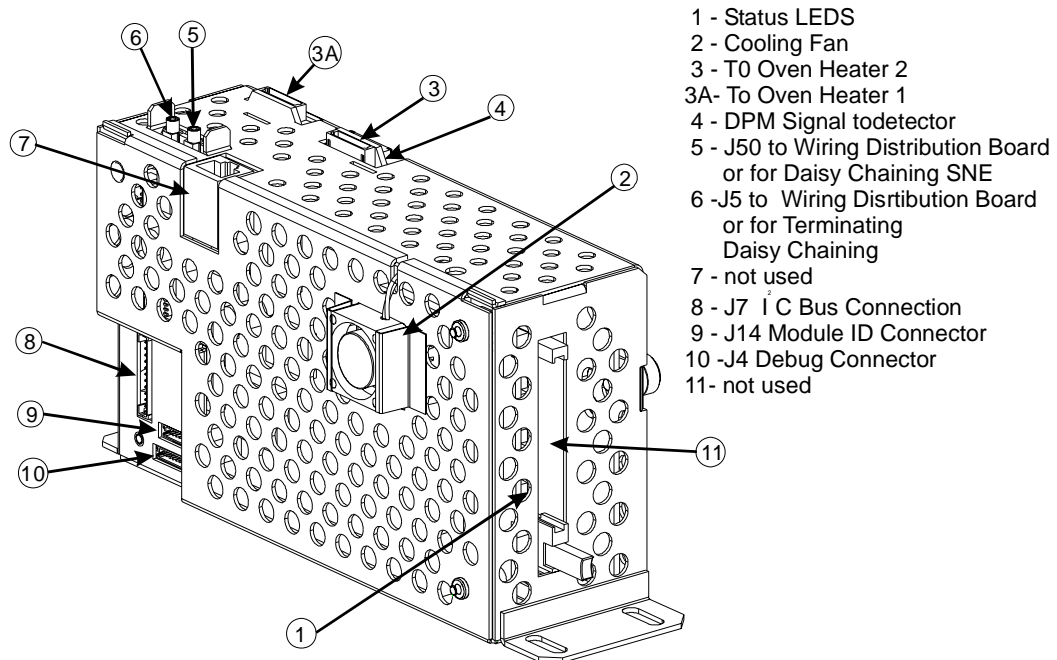
Figure 2-16: SNE Module Connectors (Original Housing)

1. J9 – Not Used
2. J10 – Currently Not Used
3. To Oven Heater 1
4. J50 – To WDB
5. J5 – To WDB
6. To Oven Heater 2
7. J7 – I^2C Bus
8. J4 – SNE Debug
9. J14 – SNE ID
10. Status LEDs
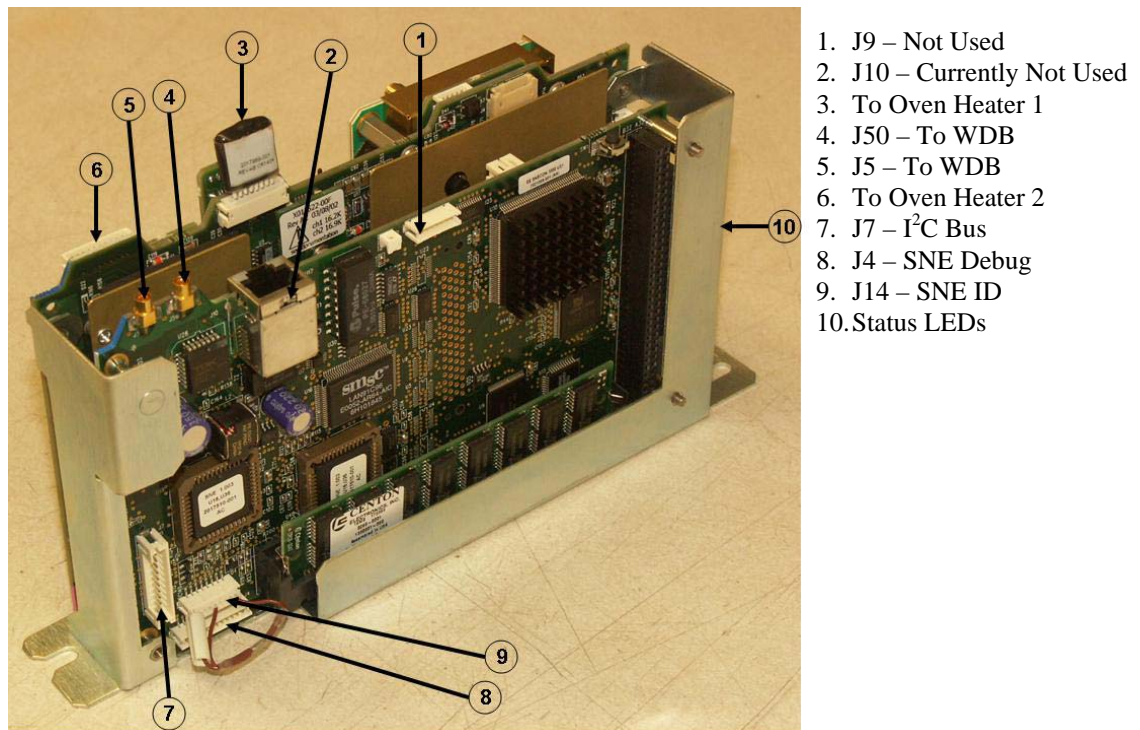
Figure 2-17: SNE Module Connectors (New Housing)

Sensor Near Electronics (SNE), Continued

Electrical

The SNE houses the SNE Controller board and the Detector Personality Module. As an alternative, the SNE can house a Temperature Controller Board that provides two additional temperature controller channels in addition to the two provided for on the SNE Controller board; refer to Figures 2-18 thorugh 2-20.

SNE Controller Board

The SNECON is a 486 Processor CPU running on the pSOS+ operating system with 4 to 16 Mbytes of RAM. The CPU manages and controls all chromatography functions to perform the compositional analysis of the input stream. The SNECON communicates to the internal hardware circuits via I^2C internal bus. The SNECON transmits finished analysis results and alarm information to the SYSCON. The analysis data is then routed either to the maintenance panel for display, to the PC Workstation, to DSS system or to any other output devices. The SNECON also contains circuits to control and monitor the analytical operating environment via the electronic pressure and control sensors, barometric pressure sensors, flow sensors, or temperature control sensors. The SNECON also controls the 24V solenoid valve drivers and high-voltage power switching circuits (heaters, solenoids, etc.) as needed.

Status LEDs visible on the front of the SNE indicate the operational status of Advance Maxum II Gas Chromatograph; see SNE Status LED meanings in Table 2-1 later in this section.

At least one SNECON module is required in the Maxum II. The Maxum GC may have from one to three SNE assemblies – corresponding to the possibility of one to three detector assemblies in the chromatograph oven. It is possible to put a SNECON into each of the three SNEs. This may be required in certain very stringent application situations such as a large number of detectors operating at very fast detector scan rates. However, multiple SNECONs are very rarely used. The SNECON module can handle a combined sampling rate of over 200 points per second. This means that a single SNECON can easily accommodate a Maxum oven loaded with up to eighteen Thermistor Detectors scanning at up to ten points per second (for a combined scan rate of 180 points per second). Or, it can accommodate fewer detectors scanning at much higher scan rates.

Sensor Near Electronics (SNE), Continued

Detector Personality Module

The DPM contains all signal processing circuitry to decode and digitize the analysis signal from the detector. There are a variety of DPM types depending on detector type; refer to Figures 2-18 and 2-20.

Controls oven heating requirements
Regulates analysis cycle timed events
Digitizes detector signal

More Information

For more information refer to Detector Personality Modules, page 2-34.

SNECON Software

The SNECON operates as a set of intercommunicating tasks running on the pSOS+ operating system. The SNECON is configured by the System Controller (SYSCON), connected via one of its communication links. Once the system is configured, the SNE can run independently and periodically report analysis results. The major SNE software components are as follows:

Data Manager
Communications Manager
Hardware Manager
Computational Engine Advance EZChrom
Gates and integrates peak areas
Calculates compositional data
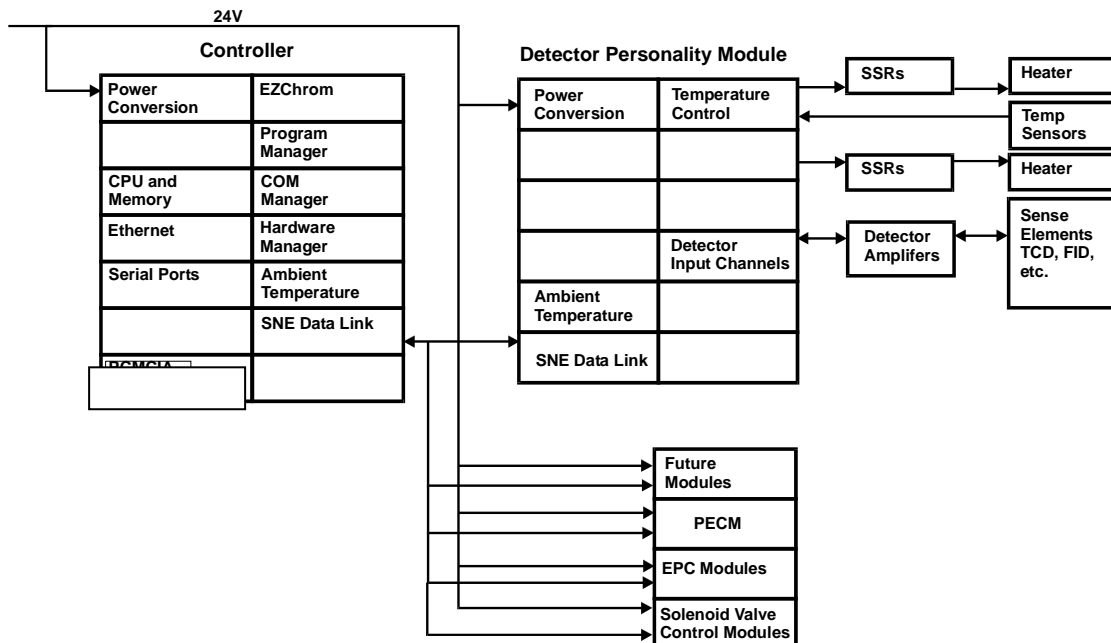
Figure 2-18: SNE Functional Block Diagram

Sensor Near Electronics (SNE), Continued
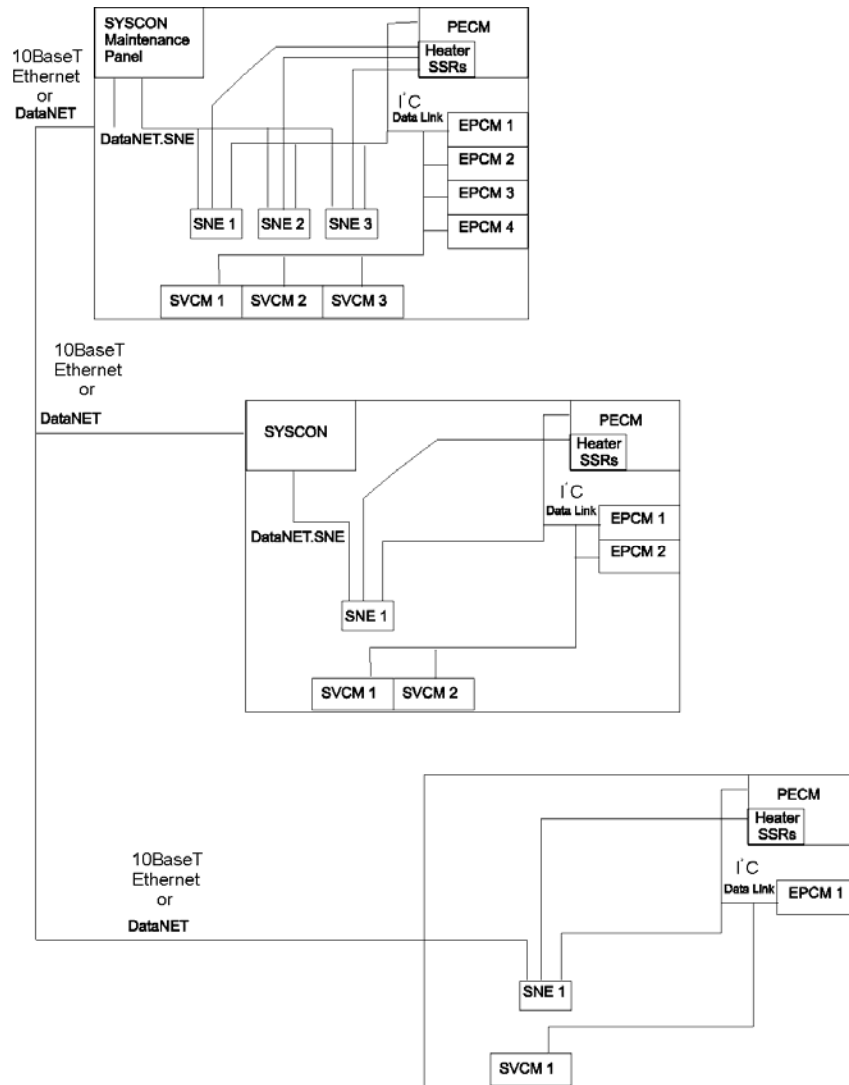
Figure 2-19: SNE Module Connections - Example Configuration

Sensor Near Electronics (SNE), Continued
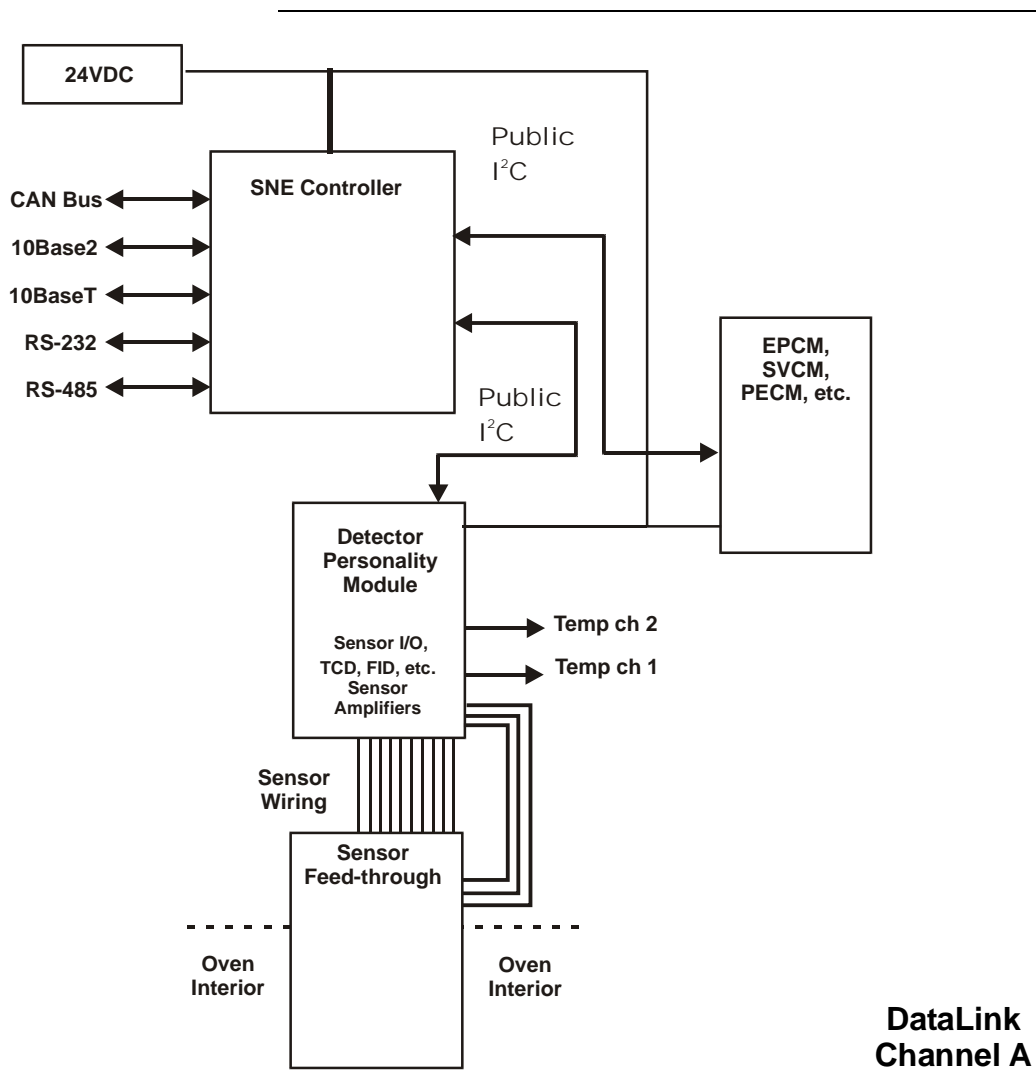
Figure 2-20: SNE Interface Diagram

Sensor Near Electronics (SNE), Continued

Daisy Chaining

All SNECONs equipped in the analyzer must be daisy chained together via the Internal Ethernet bus. Up to 3 SNECONs can be daisy chained together within a single enclosure; refer to How to Daisy Chain in the Wiring Distribution Board (WDB) section of this chapter on page 2-65

Connectors

The SNECON has 2 miniature Coax Connectors on the top of the SNE, see Figures 2-16 and 2-17. These connectors are 10Base2. The connectors (J5 & J50) are interchangeable. One of these connectors will connect to one of the two mini-coax ethernet connectors on the Wiring Distribution Board (WDB). If only one SNE is used, the second connector on the SNE simply returns and plugs into the second connector on the WDB. If more than one SNE is equipped in a GC, these SNEs must be daisy chained together using the second mini-coax connector. The end of the daisy chain will return to the WDB; refer to Figure 2-41 in the WDB section of this chapter.

In a future version of the Wiring Distribution Board (WDB), the miniature Coax connectors will be replaced by RJ45 ethernet connectors. These connections will be 10BaseT. When this version of the WDB is available, connection to the SNECON will utilize the RJ45 connector on the SNECON (J10). The miniature coax connectors will be phased out.

The internal bus connector J7 is located on the lower left of the SNE near the back of the module. The internal bus plugs in here and terminates at the Wiring Distribution Board (WDB).

The ID Key connector J14 is located on the lower left of the SNE near the back of the module. Since multiple SNEs can be located into one Maxum II, it is necessary to identify the individual SNEs. This is done by installing an identification plug on the SNECON at the connector labeled J14. This will be pre-configured at the factory.

The Debug connector J4 is located lower left of the SNE near the back of the module. This connection is only for use by trained Siemens factory technicians.

Sensor Near Electronics (SNE), Continued

Status Lights

These status lights indicate the operational status of Advance Maxum II Gas Chromatograph. Status lights are referenced from LED 1 to LED 9 from top to bottom of board; see Figure 2-21.
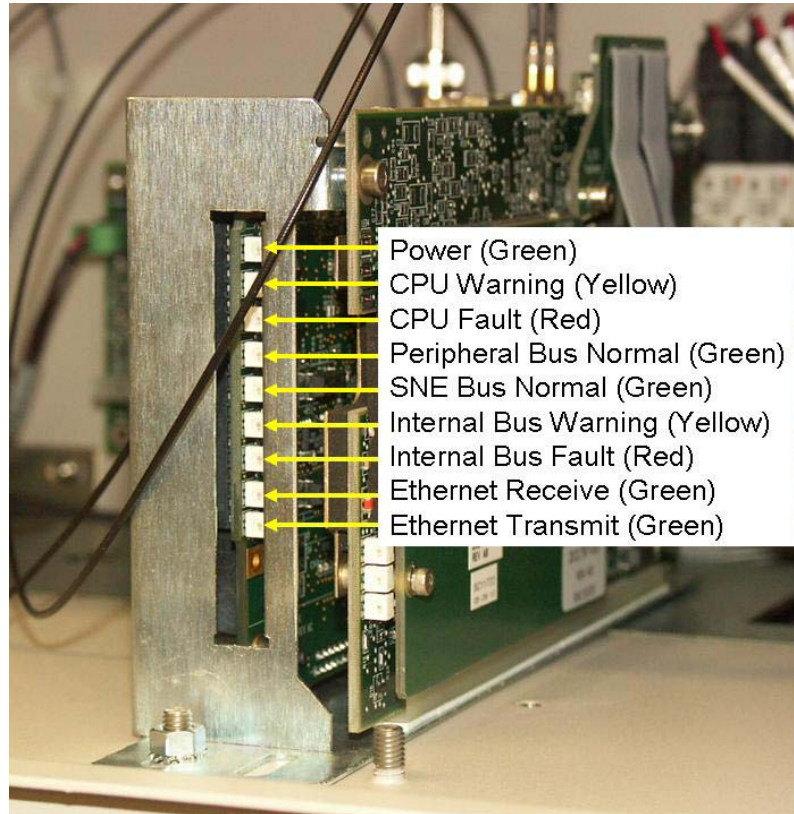

Power (Green)
CPU Warning (Yellow)
CPU Fault (Red)
Peripheral Bus Normal (Green)
SNE Bus Normal (Green)
Internal Bus Warning (Yellow)
Internal Bus Fault (Red)
Ethernet Receive (Green)
Ethernet Transmit (Green)

Figure 2-21: SNE Status Lights

Table 2-1
SNE Functional Status Lights

LED 1	Green	"NORMAL" - Power OK to SNECON
LED 2	Yellow	"WARNING" - SNE CPU Warning
LED 3	Red	"FAULT" - SNE CPU Fault
LED 4	Green	"PERIPHERAL Internal Bus (I^2C) PIC NORMAL"
LED 5	Green	"SNE Internal Bus (I^2C) PIC NORMAL"
LED 6	Yellow	Internal Bus (I^2C) WARNING
LED 7	Red	Internal Bus (I^2C) Fault
LED 8	Green	Ethernet Receive
LED 9	Green	Ethernet Transmit

Sensor Near Electronics (SNE)
(Software)

Overview

Sensor Near Electronics (SNE) provides Advance Maxum II Gas Chromatograph physics control, data analysis and data reduction. The SNE operates as a set of intercommunicating tasks running on the pSOS+ operating system. Refer to software block diagram Figure 2-22.
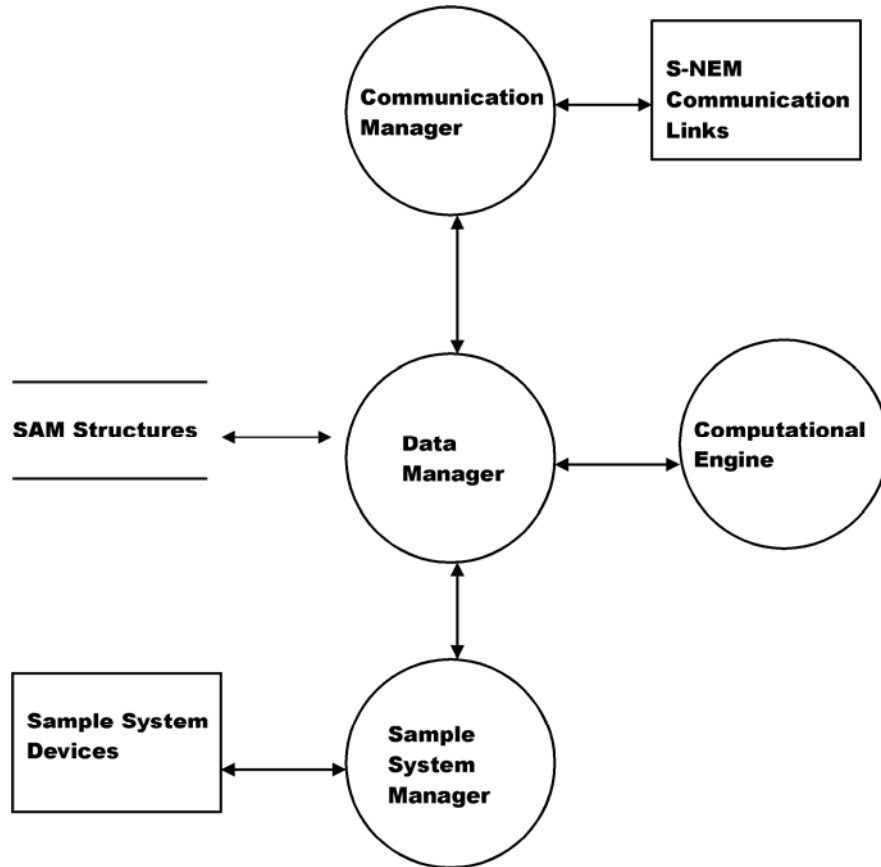
Figure 2-22: SNE Software Top Level Diagram

Configuration

The SNE is configured by the System Controller (SYSCON) connected via one of its communication links. Once the system is configured, the SNE can run independently and periodically report analysis results. It can be interactively controlled for *Real-Time* decisions on operation scenarios. The SNE software controls all sampling relating to its internal physics and sensor setup.

Sensor Near Electronics (SNE) (Software), Continued

Components

The major SNE software components are as follows:

> Data Manager
> Communications Manager
> Hardware Manager
> Computational Engine

A synopsis of each major component is presented in the following sections. Refer to Figure 2-22.

Data Manager

The Data Manager maintains configuration data that controls hardware sequence of events and controls what manipulation is performed on sampled data.

The Data Manager also provides results and status information to externally connected devices via the Communication Manager. This data is organized as a set of Sensor Analyzer Module (SAM) structures. The data represents the unit as a standard sensor to external host.

Communication Manager

The Communication Manager acts as a central point of control for communication links attached to the Sensor Near Electronics (SNE). This allows Internal SNE software to function regardless of which communication link is being used to communicate with the system.

Hardware Manager

The Hardware Manager provides scheduling and communication services for the hardware in the analysis zone. These include devices such as the following:

> Detectors,
> Sample valves,
> Relays,
> Pressure monitors and controllers,
> Temperature monitors and controllers and
> Flow control valves, etc.

Computational Engine

The Computational Engine takes acquired chromatography data and performs system calculations. Most of these calculations are performed by functions contained in the EZChrom method, which provides all peak identifications and integration and response factors.

Detector Personality Module (DPM)

Description

Output signals from any of the detectors are inputted to each associated Detector Personality Module (DPM). This Module is mounted within SNE Assembly. The transfer of detector data is based on the database method transferred to the SNE from the SYSCON. The DPM digitizes the data and then passes it to the SNECON via an I^{2}C port. The resulting data is then processed by the SNE and the results are transferred to the SYSCON database via the Ethernet bus. Resulting data can then be viewed on the Maintenance Panel LCD or the workstation. The DPM controls the oven heating requirements and oven heater temperature. It also regulates and digitizes the detector signal. Refer to Figure 2-23.

More information and details pertaining to the DPM can be found in the Sensor Near Electronics (SNE) Assembly Installation Manual (Siemens part number 2000685-001).

Definition

The method is the part of the application that contains the parameters for controlling the hardware used by one cycle clock on one or more SNEs. It provides peak areas and component concentrations and ncludes all cycle clock timed events. There is one cycle clock per method.
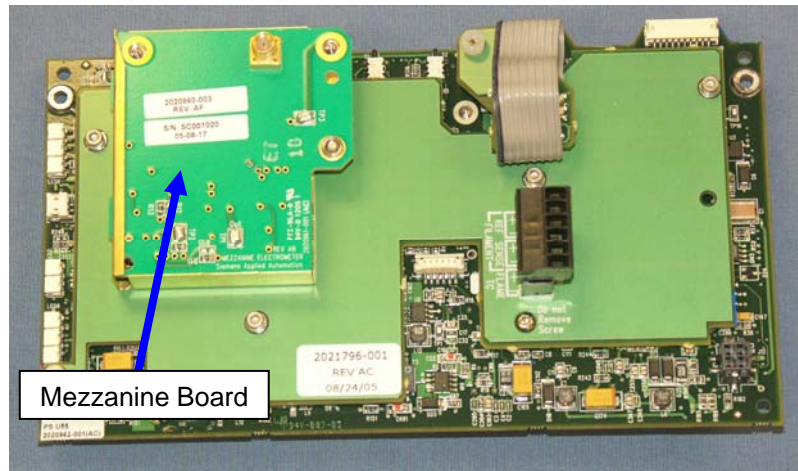
Mezzanine Board

Figure 2-23: DPM with Attached Mezzanine Board

Types of DPMs

There are three primary types of DPM module. The TCD DPM is the personality module for the (TCD). The Filament DPM is available for the Filament Detector version of the TCD. For all other supported detector types, there is a Base DPM that is used in conjuction with an attached mezzanine module, described on the next page.

Detector Personality Module (DPM), Continued

Mezzanine Modules

A mezzanine module is used to further customize a base DPM for non conductivity detectors. The mezzanine plugs into the Base DPM in order to tailor the DPM for a specific measurement.

Three primary types of mezzanine are available, the FID mezzanine, the FPD mezzanine, and an Analog Input (AI) mezzanine. Some of the mezzanines have a dual range function for maximum flexibility. Refer to table 2-2 below for details relating to the various mezzanine options.

The AI mezzanine can be used for reading a detector voltage signal from a specialized or third party detector, such as the Valco PDD, where the device only supplies a scaled voltage output. The AI signal will be treated like a normal detector signal, with a 50% balance range.

Table 2-2
Mezzanine Part Number Descriptions

Mezzanine	Detector Sub Module Type	Usage	Normal Range	Alternate Range
2020960-001	FID	Low level FID	0.2nA	none
2020960-003	FID	Standard FID	1nA	20nA
2021328-002	FID	Large Scale FID	100nA	1000nA
2021328-001	FPD	FPD	100nA	none
2021328-001	FPD	FPD 0.18 Hz Filter	100nA	none
2021326-001	UNIVersal	Voltage AI	+/-1V	+/-10V
1901614-001 Dummy Plug	UNIVersal	When Base DPM is Filament only, and no mezzanine required	none	none

More Information

For more information refer to Sensor Near Electronics (SNE), page 2-24.

Power Entry and Control Module (PECM) – Original Version

Overview

The original Power Entry Control Module (PECM), shown in Figure 2-24 below, is the connection point for the AC mains power. For information regarding the newer version of the PECM, called PECM-2, refer to the next section. The filtered AC output from the PECM is routed to the Power Supply Module and to the high wattage Solid State Relays. The PECM also includes six solid-state relay pairs for controlling the low wattage air bath heaters, or for controlling sample valves or for other devices. PECM other functions are:

> Heater Monitoring
> Purge Detector Switch
> LED circuits for Units without Maintenance Panel

More information pertaining to the PECM or PECM-2, including the procedure to upgrade from PECM to PECM-2, can be found in the Power Entry Control Module (PECM) Installation Manual (Siemens part number 2000687-001).
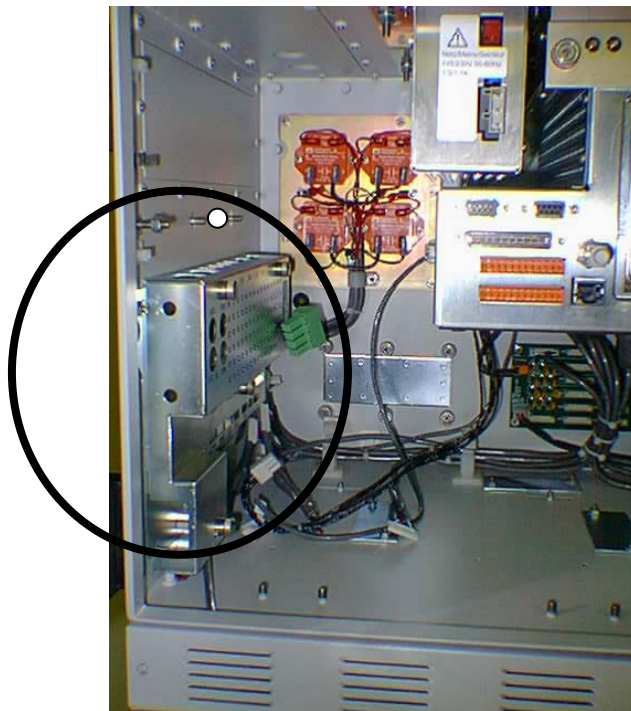
Figure 2-24: Power Entry and Control Module (PECM)

EC Enclosure

The PECM is mounted to the left sidewall of the EC cabinet. All AC supply fuses are clustered on the panel and readily marked and accessible. For troubleshooting, a cover plate can be easily removed from the PECM to access the relays without the need to remove the PECM.

Power Entry and Control Module (PECM) Continued
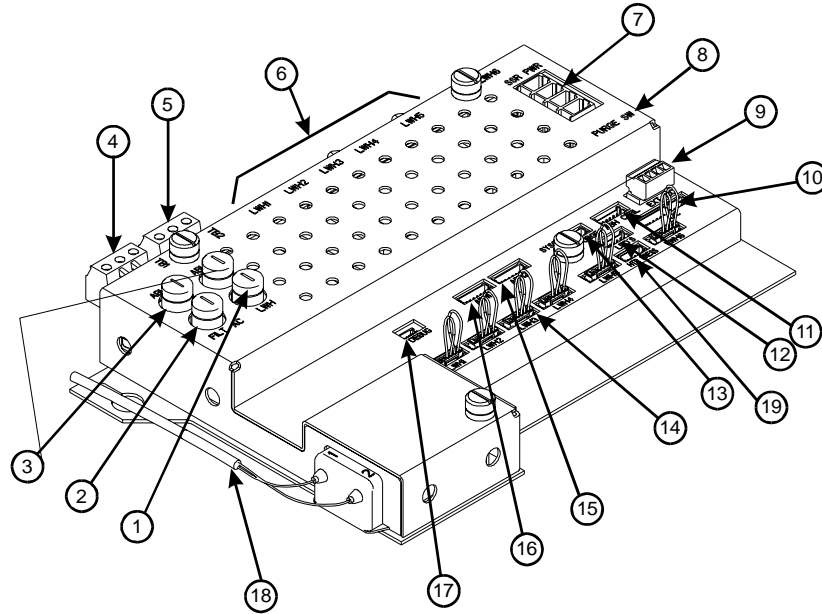
Figure 2-25: PECM I/O Connections

PECM Interface Connections

Refer to Figure 2-25 and Table 2-3 for a description of each interface connection.

Table 2-3: PECM Interface Connectors and Fuses

Item	Description	Function
1.	LWH (fuse)	This inline fuse provides circuit protection for the low wattage heaters.
2.	FILT AC (fuse)	This inline fuse provides circuit protection for the primary AC power line filter.
3.	AB1 & AB2 (Fuses)	These are inline Air Bath (AB) 1 and 2 circuit protection fuses.
4.	TB1	This connector is the interface for connecting primary AC power to the following components: 1400 Watt heater Electronic Enclosure "clean" power

Power Entry and Control Module (PECM) Continued

Table 2-3:
continued

Item	Description	Function
5.	TB2	This connector is the interface for providing AC power to the following: Second installed 1400-Watt heater. Switched sample system AC power and/or one block heater.
6.	LWH1-LWH6 (low wattage switched AC outputs)	These are ***top mounted*** removable power switching AC output connectors. Low wattage heater control or to drive solenoids used via software control. Connectors for LWH5 and LWH6 each require an AC jumper wire that determines the configuration of the two solid-state relays associated with that connector.
7.	SSR PWR	This connection (TB9) allows power to be connected to the solid-state ***heater*** relays (SSR) that are mounted to the E.C. Enclosure back left sidewall.
8.	Purge Switch	Input to purge air pressure switch.
9.	Not Used	
10.	I^2C	This connection (J100) is the interface for connecting the I^2C cable from the Wiring Distribution board to the PECM.
11.	ABH CTRL	This connection (J9) allows the PECM to be connected to the solid-state relays (SSRSs). The connecting cable provides the logic level voltage for SSR switching.
12.	LED	This connection (J101) is the interface to the Maintenance Panel Level 1 that consists only of 3 LEDs on the outside of the analyzer door.

Power Entry and Control Module (PECM) Continued

Table 2-3:
continued

Item	Description	Function
13.	PURGE SYSCON	This connection (J1302) interfaces to the SYSCON.
14.	LWH1-LWH6 (switched inputs)	These are **bottom mounted** connectors used for controlling the associated **top mounted** low wattage device outputs. Input power at these connectors is 5 VDC. Installed jumper wire connectors for internal control must be installed or replaced with external control wiring connectors. Examples of a low wattage device are methanator, vaporizing regulator, FID heater or sample system stream switching solenoid.
15.	ABH2	This connection (J92) allows interfacing of the Detector Personality Module (DPM) heater control wiring to the PECM. This cable allows switching of solid-state relays used for temperature control of the first air bath heater.
16.	ABH1	If **two** air bath heaters are required, the additional air bath cable is interfaced to the PECM via this connection.
17.	DEBUG (not used)	This connection (J102) allows a diagnostic device to be interfaced to the PECM.
18.	Power Cord	Filtered AC output to Power Supply.
19.	HTR PRESS	This connection (J7) is the interface for the heater air pressure switch cable to the PECM.

Replacement

The original version of the PECM is no longer available for order. It it must be replaced then upgrade to PECM-2 is necessary. Refer to the Power Entry Control Module (PECM) Installation Manual (Siemens part number 2000687-001) for the procedure to replace the original PECM with PECM-2.

Power Entry and Control Module (PECM) Continued

AC Circuits

The AC power input (Mains) can be either 115 VAC or 230 VAC. The primary AC (Mains) power is routed through the side or top access plate on the electronic enclosure chassis to TB1 on the PECM. The AC is filtered and routed from the filter to the Power Supply. An unfiltered AC leg from the mains is routed via F1 to the High Wattage (1400 watt) Heater located on the right rear wall. AC input 2 on TB2 is used by the Solid State Relays located in the PECM.

Fuses

F1-ABH2: 16 Amperes, 115 VAC or 10 Amperes, 230 VAC
F2-ABH1: 16 Amperes, 115 VAC or 10 Amperes, 230 VAC
F3-FLT AC: 3 Amperes 115 VAC or 230 VAC
F4-LWH: 10 Amperes 115 VAC or 230 VAC.
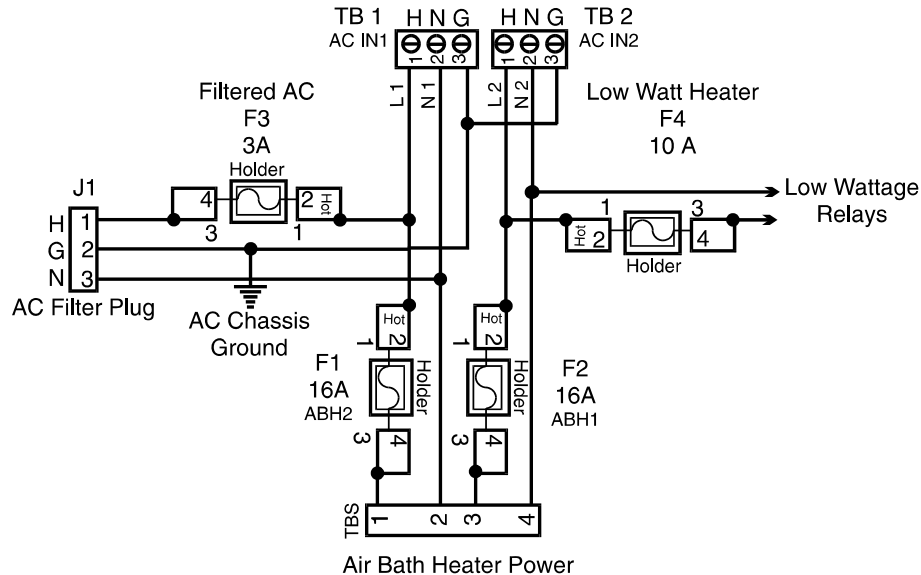
Figure 2-26: AC and Air Bath Heater Power Circuit Schematic

WARNING

⚠️

The power switching circuit is designed for either 115 VAC or 230 VAC. For safety reasons, the PECM is not designed to rectify DC to AC. To generate and control 115 VAC from a DC voltage system, the customer must use components external to the PECM.

Power Entry and Control Module (PECM) Continued

High Wattage Air Bath Heater Control

The PECM provides the voltage to the two pairs of 1400-Watt AC Air Bath heater power switching circuits located on the rear wall of the EC. Connection to the heaters is made through a special cable. Each circuit consists of two series connected solid-state relays.

One series connected relay controls the 1400-Watt AC heater to maintain the set point temperature. Monitoring the air bath RTD and heater pressure switch accomplish this. The second series connected relay is used for safety purposes. It performs an emergency analyzer heater shutdown if an over-temperature condition is detected. Both relay circuits are completely independent of each other. However; in order for the power switching to occur both relays must be enabled. Temperature controls are monitored by the Detector Personality Module located in the SNE and routed to the PECM via a dedicated cable and connector. No other functions are connected to the temperature control circuit. The connections are EMC filtered. When over temperature is detected the PECM over temperature circuit inhibits the SSR from firing.

Power Entry and Control Module (PECM) Continued

Low Wattage Power Switching Relays

The PECM has six solid-state relay circuits. These circuits are designed specifically for controlling any optional low wattage (10 to 250 Watts) air bath heaters, but can also be adapted for on or off control of a sample valve or other devices. The output voltage from each relay can either be 115 VAC or 230 VAC depending upon the mains supply voltage. Available outputs from the relays are on TB3 through TB8. Corresponding inputs are labeled LWH1 through LWH6. When a relay's output is used for sample valve control the supplied jumpers connector must be inserted in the corresponding input LWH1 through LWH6. Since the power switching circuits are primarily designed for low wattage air bath heater control, for safety, each circuit consists of two series connected SSRs each being separately controlled. The jumper effectively ties the two relays together to function as one output when they are not used for low wattage heater control. The circuitry is similar to the 1400-Watt High Wattage Heater Power Switching and it is controlled by signals from the Detector Personality Module (DPM) heater circuit. Figure 2-27 shows a simplified schematic of the Low Wattage Heater Relay Circuit LWH4.
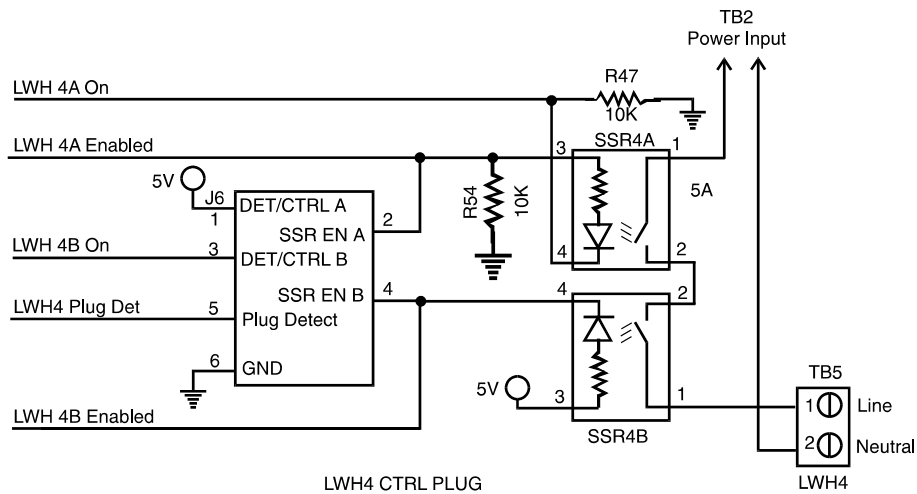
Figure 2-27: LWH4 Heater Circuits

Power Entry and Control Module (PECM) Continued

Additional Relay Outputs

Relay circuits LWH5 and LWH6 when used for purposes other than on/off control of low wattage heaters can supply four separate outputs. A simple jumper on pins 1 to 2 on output connector TB7 or TB8 makes this possible. With the jumper in place, each connector will provide two independent outputs; see Figure 2-28.
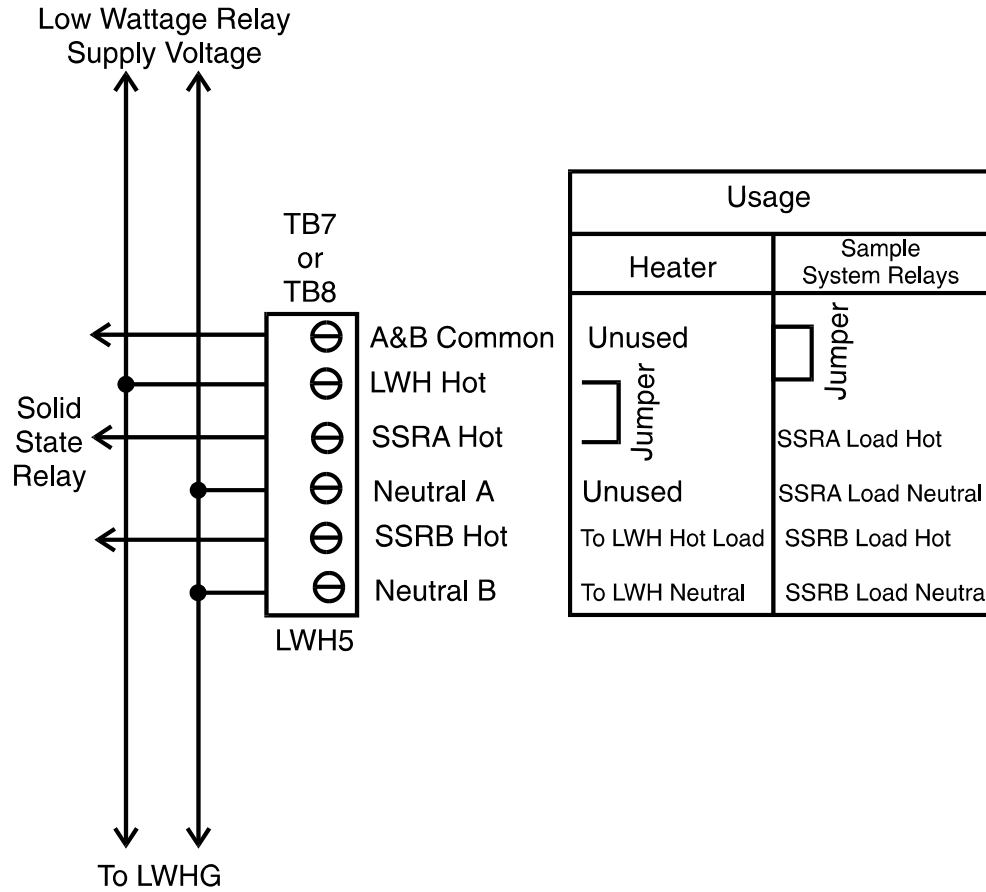

Figure 2-28: LW5 & LW6 Relay Circuit Jumper Connections

Power Entry and Control Module (PECM) Continued

Purge Circuit

The monitoring of the purge condition is a safety related function of the PECM. A loss of purge sets the PURGE_LOSS flag and turns on the purge LED on the front panel display.

Air Bath Heater Air Monitoring

Air bath heater control switches, located externally to the PECM, monitor the air bath heater air supply for air bath heater 1 and air bath heater 2. If a loss of air is detected in either oven, the air bath heater disables the heater SSR; thereby, preventing destruction of the heating element.

Maintenance LEDs

For units that are not equipped with a Maintenance Panel, the PECM provides LED control signals to the three status and 1 purge LEDs on the door. The LED status are set to all "ON" during the power-up sequence and remain that way until a DO command has been received to set the LED to a defined state. From then on, the "Normal", "Warning" and "Fault" LED output are set according to the status of the corresponding DO (even if the LED connector is not connected). The Purge LED is hardware controlled.

Power Entry and Control Module (PECM) Diagnostics

Overview

The Operating diagnostic functions, provided by the PECM are:

Power
Read-back of SSR Controls
Purge

Power

This PECM diagnostic is a customer specified option. Primary AC power is fed to the SSRs and the diagnostic checks the resulting 5 VDC SSR energizing voltage is within 5 V 5 .

Purge

If a loss of purge is detected the purge switch is enabled. This results in the Purge LED to light. The purge LED light is located on the door mounted Maintenance Display panel, or as a separate LED on the door for those units not equipped with the panel. The purge control alarm signal is controlled by the SYSCON.

SNE Internal Bus

The operating SNE Internal Bus diagnostics are as follows:

Data Transmission

This diagnostic monitors data transmission errors. The error data rate should be less than one bit error per 100,000 packets. This is less than one error per day. If error limit is exceeded a yellow diagnostic LED light on the SNE illuminates for approximately 0.5 seconds.

When transmission errors occur and a retry fails, the red diagnostic LED light illuminates for approximately 0.5 seconds. If retry fails, wait 0.5 seconds and then reset the communication interface.

Temperature Sense

The temperature of I^2C modules in the EC can be monitored and compared to low and high limits set by the user from the Maintenance Panel. If a limit is exceeded, an alarm message can be issued and an appropriate error code stored in non-volatile flash memory. This function is not commonly used in normal operation, but it is occasionally used for troubleshooting.

Power Entry and Control Module – Version 2 (PECM-2)

Overview

The Power Entry and Control Module (PECM) assembly contains the electronics that conditions electrical power entering the Maxum GC and distributes the power to various other components. The PECM provides electronic interface to the power relays for oven heating systems. Additionally, the PECM may provide controls for temperature control circuits and for the Solenoid Valve Control Module.

More information pertaining to the PECM and PECM-2, including the procedure to upgrade from PECM to PECM-2, can be found in the Power Entry Control Module (PECM) Installation Manual (Siemens part number 2000687-001).

Figure 2-29: Power Entry and Control Module – Version 2 (PECM-2)

Physical Location

The PECM is mounted to the left inside wall of the EC cabinet. All fuses and electrical connections are readily accessible. Also included on the PECM-2 is a solenoid valve controller board that eliminates the need for individual SVCM controller boards. Refer to figure 4-30 for the physical layout of the PECM-2.

Power Entry and Control Module (PECM-2) Continued

Changes from PECM to PECM-2

The PECM has been changed in its design since its original release. The newest version of this part is also used as the spare part replacement for the previous version. The original PECM was a single electronic circuit board with a metal protective shield. It provided connection points for the electrical power coming into the Maxum GC and mounted low power electrical relays which could switch power to any electrical heater smaller than 200 watts.

The newest version of the module, PECM-2, is a two part circuit board. One part connects the electrical power. The other part includes certain electronic circuits. Key features of the newer design are:

Easy access (no cover)

Two on-board temperature control circuits that can allow use of a lower cost Thermistor Detector Personality Module (TCD DPM): in some cases the less costly 2021797-002 can be used instead of full-featured 2021797-001.

Additional medium-wattage heater circuit.

May allow elimination of additional DPM when it is used for temperature control only, such as for heated valves and the methanator.

Includes solenoid valve control which eliminates the need for individual SVCM controller boards. When converting older design and eliminating original SVCM controller boards, additional long cables are required.

Improved low-profile fuse holders

LED indicators for air pressure switch on air-bath heater circuits

Built-in provision for connection of Uninterruptible Power Supply (UPS) for 24vdc circuits. The heaters are powered through different connectors to minimize the loading of the AC power needed for running the 24vdc circuits.

Maintenance LEDs

Maintenance Panel Level 1 consists of LEDs on the outside of the analyzer door. It is intended for use in GCs that are not equipped with the full feature Maintenance Panel. The PECM supplies the control signals for Maintenance Panel Level 1, if equipped. For PECM-1, the Maintenance Panel Level 1 connects to position J17. See Figure 2-30 for the location of connector J17.
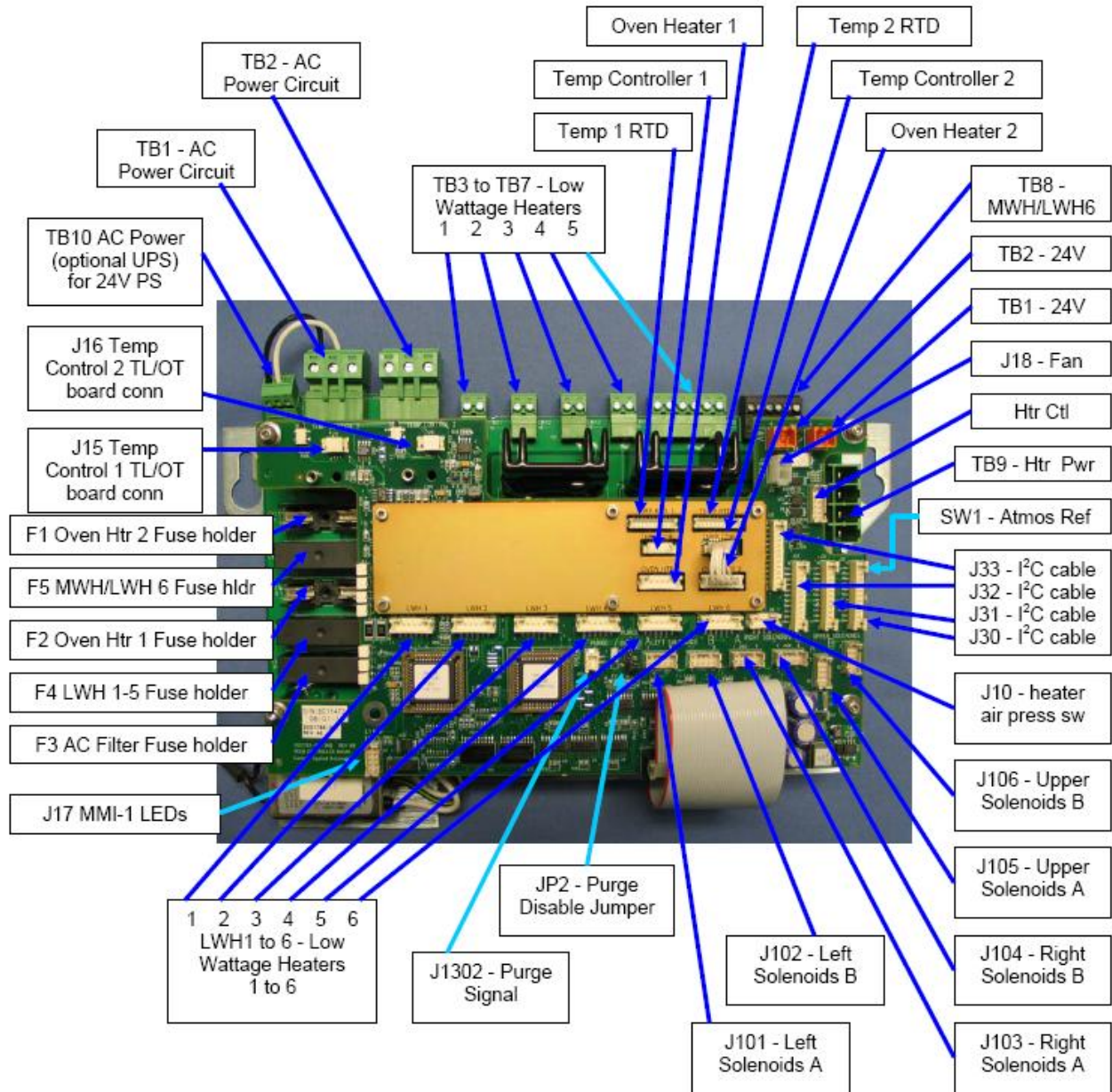
Power Entry and Control Module (PECM-2) Continued

Figure 2-30: PECM-2 Assembly Layout

Power Entry and Control Module (PECM-2) Continued

Fuses

Table 2-4 below gives the designations for each PECM-2 fuse. Note that the fuse numbers are out of order in the table. This matches the way the fuses are positioned on the PECM-2 (looking from top to bottom). Refer back to Figure 2-30 for fuse locations.

Fuse	Function	Fuses for 115VAC	Fuses for 230VAC
F1	AC Power Circuit 1	16A (1901693-001)	10A (1901694-001)
F5	Heater Channel 6	6.3A (1901695-001)	6.3A (1901695-001)
F2	AC Power Circuit 2	16A (1901693-001)	10A (1901694-001)
F4	LWH 1-5 (low wattage heaters)	10A (1901694-001)	10A (1901694-001)
F3	Power Supply (24V out)	3.15A (1302004-033)	3.15A (1302004-033)

Table 2-4: PECM-2 Fuse Assignments

Purge

One function of the PECM is to monitor the state of the purge condition for the analyzer. If a loss of purge is detected the purge switch is enabled. The purge control alarm signal is controlled by the SYSCON. The purge signal cable from SYSCON to PECM plugs into connector J1302 on the PECM-2. Connection SW1 on the PECM-2 is used to connect atmospheric reference for the purge switch.

When a purged enclosure is not required per the safety codes, connector J2 on the PECM-2 can be used to disable the purge alarm. Refer to Figure 4-30 for connector locations.

Power Entry and Control Module (PECM-2) Continued

Heater Control for Air Bath Ovens

The original PECM design provided for only one type of heater assembly for its air bath configurations (single isothermal; dual isothermal; or Programmed Temperature Control). This was a 1400 watt heater assembly. A single heater was used for the single isothermal configuration and two heaters were used in the other configurations. Now, a second air bath heater assembly has been introduced. It is a 500 watt heater and can be used in single isothermal configurations where the controlled oven temperature is 70°C or less. In all other air bath configurations, the original heater is required.

Additionally, with the introduction of the PECM-2, a new "medium power" Solid State Relay Module (temperature control relay module) is available. The original assembly included four large relays suitable for switching two of the 1400 watt air bath oven heater elements. However, many Maxum GCs do not require that much power. Therefore, a new SSR Module has been added to the Maxum spare part offering which can lower spare parts costs. The newer board provides smaller relays which are capable of controlling the new 500 watt air bath heater assembly (described above). In addition, the "medium power" SSR Module can be used to control the two 250 watt heaters used in the Maxum airless oven configurations. The newer board can also be used to control the low wattage heaters in the heated Flame Ionization and Flame Photometric detector housings or in heated sample injection valves.

Low Wattage Heater Circuits

The PECM has six solid-state relay circuits which can be used to contol heated valves, detector heaters, etc.. Each circuit has a 2 Amp/250 Watt maximum. Available outputs from the relays are on TB3 through TB8. Corresponding inputs are labeled LWH1 through LWH6.
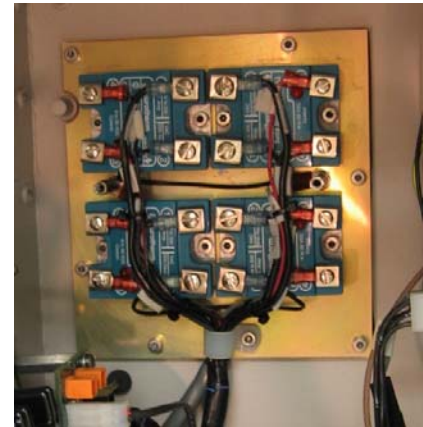
Solid State Relay Module

Description
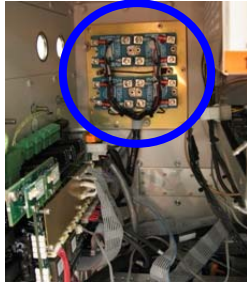
The Solid State Relay Module is made up of two pairs of high wattage heater relays that are used for controlling the oven air bath heaters. One pair controls ABH1 and the other ABH2. Each pair of relays controls Temperature Limit and Oven Temperature shut down. If the over temperature limit is exceeded, the power to the air bath heater is shutdown. Two different configurations of Solid State Relay Module are available, the SSR and the Medium Wattage SSR. There are also two slightly different versions of the standard SSR. Refer to Figure 2-31.
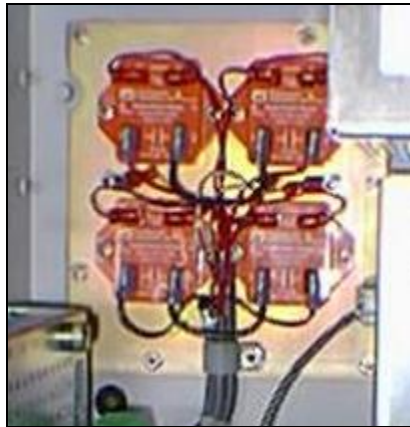
Old SSR   New SSR

Figure 2-31: Solid State Relay Modules (High Wattage)

Mechanical Information (High Wattage SSR)

The Solid State Relay Module assembly is mounted to the left side of Enclosure back wall. A metal cover not shown in Figure 2-31 protects the relays. The Module is equipped with heat dissipating fins that extend through the back of the enclosure wall to dissipate generated heat to the outside atmosphere.

The relays on the newer SSR provide an indicator LED which shows the operational status of the control signals. In addition the newer SSR is equipped with a plastic shield which covers the connection screw terminals and helps prevent inadvertent contact. Note, however, that the older SSR is entirely enclosed in a sheet metal housing so human contact is not possible without disassembly of the module.

Both the original and newer relays can be replaced and both are available as spare parts.

Solid State Relay Module, Continued

Electrical Information (High Wattage SSR)

The PECM provides the voltage to the two pairs of 1400-Watt AC Air Bath heater power switching circuits located on the rear wall of the electronic enclosure. A dedicated cable is used to connect the PECM to the relay assembly. Each circuit consists of two solid-state relays connected in series.

One series-connected relay controls the 1400-Watt AC heater functions to maintain controller initiated set point temperature. In conjunction with the control signal, the air bath heater pressure switch enables the relay. The second series-connected relay is used for safety purposes. It performs an emergency analyzer system shutdown if an over-temperature condition is detected. Both relay circuits are completely independent of each other. However, in order for the power switching to occur both relays must be enabled. Temperature controls are monitored on the Detector Personality Module located in the SNE and routed to the PECM via a dedicated cable. No other functions are connected to the temperature control circuit.

Power Source

The heater element can operate from either 115 VAC or 230 VAC power sources with a total power output capacity of 1400 to 1500 watts. Figure 2-32 is a schematic of the air bath heater relay.

115VAC or 230VAC

If the primary AC voltage is changed from 115 VAC to 230 VAC, the Power Entry Control Module (PECM) AB1 and AB2 fuses must be changed. For 115 VAC power the fuses are rated at 16 amps. For 230 VAC, the in-line fuses must be changed to 10-amp rating. Also the 115/230 VAC switch must be set to 230 VAC. The switch is located on the Power Supply Module, mounted to the left side of SYSCON. In addition the correct power adapter must be plugged into the Heater 115V/230V connector; 115 VAC Power Adapter P/N 2017595-001 and 230 VAC Power Adapter P/N 2017595-002.

CAUTION

⚠️

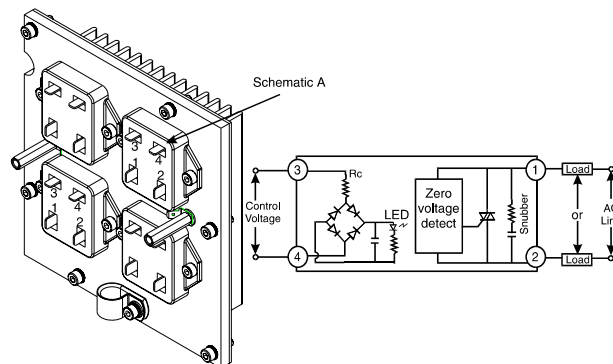**DO NOT** use a 16-amp rated fuse for 230 VAC primary AC power.

Figure 2-32: Air Bath Heater Relay Schematic

Solid State Relay Module, Continued

Medium Wattage SSR Module

A new medium wattage version of the Solid State Relay (SSR) module is available. The original assembly included four large relays suitable for switching two of the 1400 watt air bath oven heater elements. However, many Maxum GCs do not require that much power. Therefore, a new SSR Module has been added to the Maxum spare part offering which can lower spare parts costs. The newer board provides smaller relays which are capable of controlling the new 500 watt air bath heater assembly (described above). In addition, the "medium power" SSRB can be used to control the two 250 watt heaters used in the Maxum airless oven configurations. The newer board can also be used to control the low wattage heaters in the heated Flame Ionization and Flame Photometric detector housings or in heated sample injection valves.

The relays on the medium wattage SSR cannot be replaced individually. However, the module is easily replaced. Another difference between the high wattage SSR and medium wattage SSR is that the medium wattage version does not required heat dissipating fins on the back of the enclosure. The relays are equipped with heatsinks on the front of the module (which can be seen in the picture below).
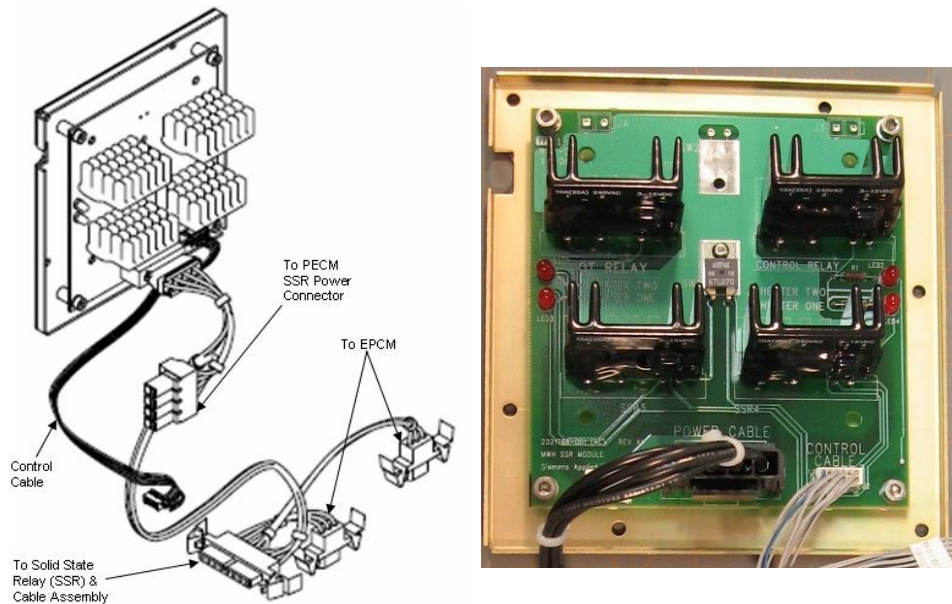

Figure 2-33: Medium Wattage Solid State Relay Module

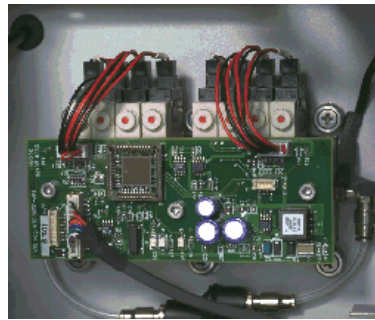# Solenoid Valve Control Module (SVCM)

Description

The Solenoid Valve Control Module (SVCM) provides pneumatic interface to control flow to the oven sampling and column valves.Solenoid valves are suitable for air, nitrogen and helium on the pressure side and vacuum on the vent side. The electronic enclosure has space for up to three modules.

Two Versions

There are two configurations of SVCM. The old version, which is still supported as a spare part, is equipped with a valve driver circuit board. For the newer version of the SVCM, this valve drive circuitry has been moved to the PECM-2 module. The newer version has a lower cost and is more reliable.

The SVCM electronics, whether onboard for the old version or on the PECM-2 for the new version, receives commands from the Sensor-Near Electronics module (via the internal bus). Pulse timing is controlled from the SVCM electronics.

Original SVCM   New SVCM

Figure 2-34: Solenoid Valve Control Module (SVCM)

Mechanical

Each SVCM incorporates 8 solenoid valve circuits for driving 3-way and 4-way solenoid valves. The SVCM is mounted in the Controller Enclosure on the manifold block. It can also be mounted in a Division 2 purge enclosure. Up to 3 SVCM assemblies can be mounted in the Maxum II. This allows for up to twelve 3-way solenoids and twelve 4-way solenoids. SVCM-1 is mounted in the lower right portion of the back wall. SVCM-2 is mounted in the lower left portion of the back wall. SVCM-3 is mounted (vertically) in the upper right portion of the back wall. The original SVCM is equipped with Parker solenoids. The newer SVCM is equipped with SMC solenoids. Manifold in/out SST tubing connections incorporate one touch push type tubing connectors.
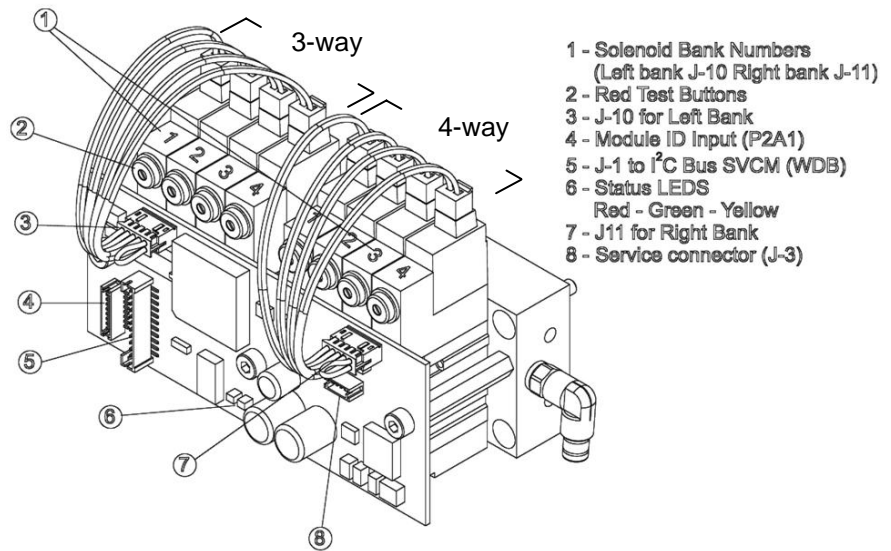
Solenoid Valve Control Module (SVCM), Continued

1 - Solenoid Bank Numbers
    (Left bank J-10 Right bank J-11)
2 - Red Test Buttons
3 - J-10 for Left Bank
4 - Module ID Input (P2A1)
5 - J-1 to I^2C Bus SVCM (WDB)
6 - Status LEDS
    Red - Green - Yellow
7 - J11 for Right Bank
8 - Service connector (J-3)

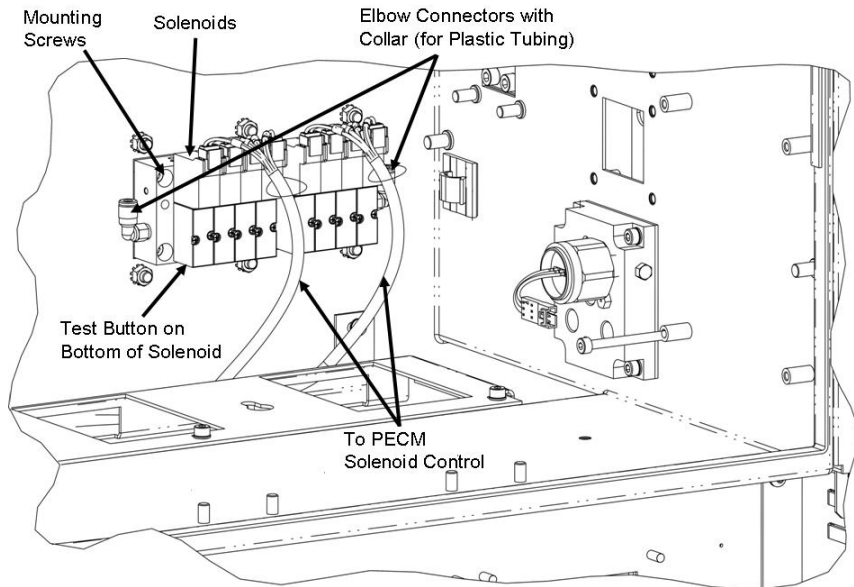**Figure 2-35: Original Solenoid Control Module**

Figure 2-36: New Solenoid Control Module

Solenoid Valve Control Module (SVCM), Continued

Digital Outputs

Digital outputs assigned to each solenoid valve are shown in Table 2-6. If a digital output is 0 the valve is OFF and if output is a 1 the valve is ON. Each group of four valves is identified as being left or right. There are no digital inputs. Refer to Table 2-5 for the numbering pattern of solenoid valves (same for original and newer versions). Each solenoid valve can be manually set to the ON or OFF conditions by manually depressing the red button on each solenoid. This button is on the top front of each Parker (original) solenoid and on the bottom of each SMC (new) solenoid. Refer to Figures 2-35 and 2-36 for the button location.

Table 2-5: DO Solenoid Valve Groups

Group	Solenoid Valve
Left	Valve 1
Left	Valve 2
Left	Valve 3
Left	Valve 4
Right	Valve 1
Right	Valve 2
Right	Valve 3
Right	Valve 4

SVCM I/O Assignments

Table 2-6 shows the specific digital output I/O assignment summary. For location of solenoid valves, refer to Figure 2-35. There are no analog inputs or outputs.

Table 2-6: SVCM I/O Assignments

Signal Type	SYSCON Channel #	I/O Name	Group #	Channel #
DO	1	LEFT_GROUP_VALVE_1	1	80h
DO	2	LEFT_GROUP_VALVE_2	1	40h
DO	3	LEFT_GROUP_VALVE_3	1	20h
DO	4	LEFT_GROUP_VALVE_4	1	10h
DO	5	RIGHT_GROUP_VALVE_1	1	08h
DO	6	RIGHT_GROUP_VALVE_2	1	04h
DO	7	RIGHT_GROUP_VALVE_3	1	02h
DO	8	RIGHT_GROUP_VALVE_4	1	01h

Solenoid Valve Control Module (SVCM), Continued

SVCM Fault Indicators

Table 2-7 shows the specific SVCM fault indicators and condition causing the error. For J10 and J11 connector locations in the original SVCM, refer to Figure 2-35. Refer to Figure 2-30 in the PECM-2 section of this chapter for the locations of connectors for the new SVCM.

Table 2-7: Fault Indicators

Fault Indicator	Fault Condition
VALVE_SWITCH_ERROR	Valve status read back is incorrect
J10_DISCONNECTED (left bank connector)	J10 connector not connected
J11_DISCONNECTED (right bank connector)	J11 connector not connected

Status Lights

Table 2-8 shows the SVCM board mounted status lights (for the original SVCM) and their assignments. For location of LED status lights, refer to Figure 2-35.

Table 2-8: Status Lights for Original SVCM

LED Status Light	Color	Assignment
LED1	Green	When illuminated, it indicates valve communication and power is ON.
LED2	Red	When illuminated, it indicates there is a condition causing a fault.
LED3	Yellow	When illuminated, it indicates a warning status.

Solenoid Valve Control Module (SVCM), Continued

Operation Test

Step	Procedure
1.	Using a fine pointed object, depress Solenoid Valve red button.
2.	When depressed, pressure is applied to the piston that moves to either the open or closed position. Resulting pressure is then applied to the column or sample valve.
3.	If piston does not operate when the button is depressed, check for correct gas pressure.
4.	If piston does not operate and pressure is 75 psig, Solenoid Valve is defective and must be replaced.
5.	Repeat for each valve operating on and off. Allow at least 1 second between depressions.

Solenoid Valve Control Module (SVCM), Continued

Specifications

The following specifications are applicable to the SVCM.

Function	Specification
Switching Speed (Maximum response time on/off ms)	
4-way	15 ms
3-way non-latching	15 ms
Operating Voltage	24 VDC
Pressure Range, 3-way	25 to 100 psi
Pressure Range, 4-way	25 to 100 psi
Maximum PSI	100 psi
Vacuum Range	0 to 27" of Hg
Ambient Temperature Range	-18 C to 65 C -0.4 F to 149 F (dry air)
Leakage	Not greater than 50 micro Liter/min, air @ 69.8 F (21 C) with 50 psig on the common port.

Electronic Pressure Control Module (EPCM)

Description

The Electronic Pressure Control Module (EPCM) reduces oven set-up time by using precise pressure control without restrictors or needle valves. This module also allows programmed pressure control for faster chromatography and modern applications. It allows for precise resetting of pressures. The EPCM can be used for both carrier and fuel gas supply, which eliminates the less reliable mechanical regulation. Four independent EPCMs can be installed in one Maxum II.

Each EPCM provides two independently regulated pressures for use on carrier and flame fuel sources in the oven. Gas connection is located in the regulator section. Regulated pressure range is 5-100 psig.
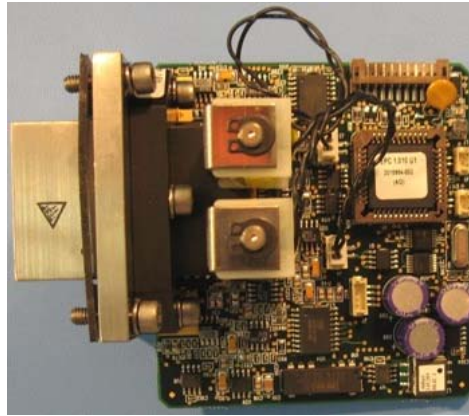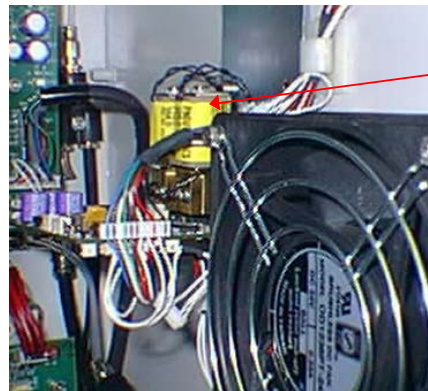

Figure 2-37: Pressure Control Module (with Attached Manifold)

Mechanical

The EPCM is mounted to right side wall of the Electronic Enclosure. For mounting location, refer to Figure 2-38. Up to four (a total of 8 EPC channels) can be installed in a single Electronic Enclosure. The EPCM is easily field replaceable using common tools.

EPCM Right Side Wall

Figure 2-38: EPCM Component Location

Electronic Pressure Control Module (EPCM), Continued

Electrical

The EPCM is made up of a printed circuit board with two pressure transducers, two proportional valves with associated electronic circuitry, manifold for pneumatic connections, PC connector for communication signals and a DC power connector. Refer to Figure 2-38.

The EPCM provides electrically controlled pressure for helium, hydrogen and nitrogen carriers etc., as well as low flow and low pressure (<100 psi) applications such as flame detector fuel. The EPCM operates from +24 VDC at 4 watts. Electrical connections are made using plug type connectors.

The EPCM receives commands from the Sensor Near Electronics Controller (SNECON) via I^2C bus regarding timing and pressure setpoint. The timing of messages from the SNECON controls timing within the EPCM. There is no time base in the EPCM. Module control is established by sending parameters, such as setpoint pressures and ramp rates to the EPCM. The EPCM is used in the Maxum II to control the carriers and/or fuels for the detector modules. The EPCM can also be used in field-mounted installations.

The EPCM communicates with other components via the I^2C bus and communicates actual pressure back to the SNECON. Regulated pressure range is 5-100 psig.

Channels

Each EPCM channel consists of a pressure sensor amplifier and analog filter followed by an A/D Converter. The converter is read by the local controller that calculates a new control value used to control the proportional solenoid valve.

Control parameters, such as set-point pressures are sent, via the Sensor Near Electronics Controller (SNECON) I^2C, to the EPCM. Status and diagnostic data is available via the SNECON I^2C.

Non-Volatile Memory

The initial control parameters and calibration parameters are stored in SYSCON On-Board non-volatile memory. With this type of memory, data is not lost in the event of a power failure or turning system power off.

Diagnostics

EPCM diagnostics are read-back of setpoint pressure via the software, DC power within operating limits, monitoring of line and short-term pressure variations with respect to the setpoint regulation, out of range pressure alarm and a diagnostic failure.

Electronic Pressure Control Module (EPCM), Continued

Specifications

The following specifications are applicable to the Electronic Pressure Control Module (EPCM):

Topic	Specification
Maximum inlet pressure	120 psig
Pressure output range	5-100 psig
Minimum differential between EPC inlet and outlet	5 psi
Flow range from EPC	5-500 sccm (see note below)
Controlled pressure stability over temperature range	0.5% of setpoint
Short-term pressure stability	0.0005 psi over 30 seconds
Typical response time for step change in setpoint.	Stable to within 0.1% of final value within 0.5 seconds* * (For hydrogen the response time is ~ 1 second).

Note: When running applications with column flow rates of less than 5 sccm, a separate bleed flow path is recommended in order to reduce the time required to achieve pressure stability when variable setpoints are used. Depending on the volume involved, a bleed flow rate of 5-10 sccm is recommended.

Wiring Distribution Board (WDB)

Description

The Wiring Distribution Board (WDB) is the central connecting point for the internal bus wiring to the Modules as well as to the power supply and circulating fan wiring harnesses.

Figure 2-39: Wiring Distribution Board

Mechanical

The WDB is mounted on the lower back wall of the electronic enclosure. The board has connectors for interfacing PECM, SVCM, EPC and SNEs over the internal bus. The WDB has a eight-position selector switch that is no longer used. This switch was originally intended for identifying an analyzer in configurations involving more than one analyzer being controlled by a single System Controller (SYSCON). In new analyzers this switch is not functional.

Electrical

There are no fuses or active electronics on the WDB. The board provides +24 VDC to operate the air-circulating fan.

Wiring Distribution Board (WDB), Continued

Ethernet Connection

The WDB has a standard 10Base2 Ethernet connection that allows the Maxum II to communicate via a network. Communication requires that an Ethernet Board be installed in a SYSCON expansion slot. The Ethernet connection, from the WDB to the SYSCON, uses 10Base2 50-ohm BNC coaxial cable.

The WDB has 2 miniature Coax connectors located on the top of the board. These connectors are 10Base2. The connector left of the Ethernet connection will connect to connector J5 on the SNE. If only one SNE is used, the other connector on the SNE (J50) plugs into the right side connector on the WDB.
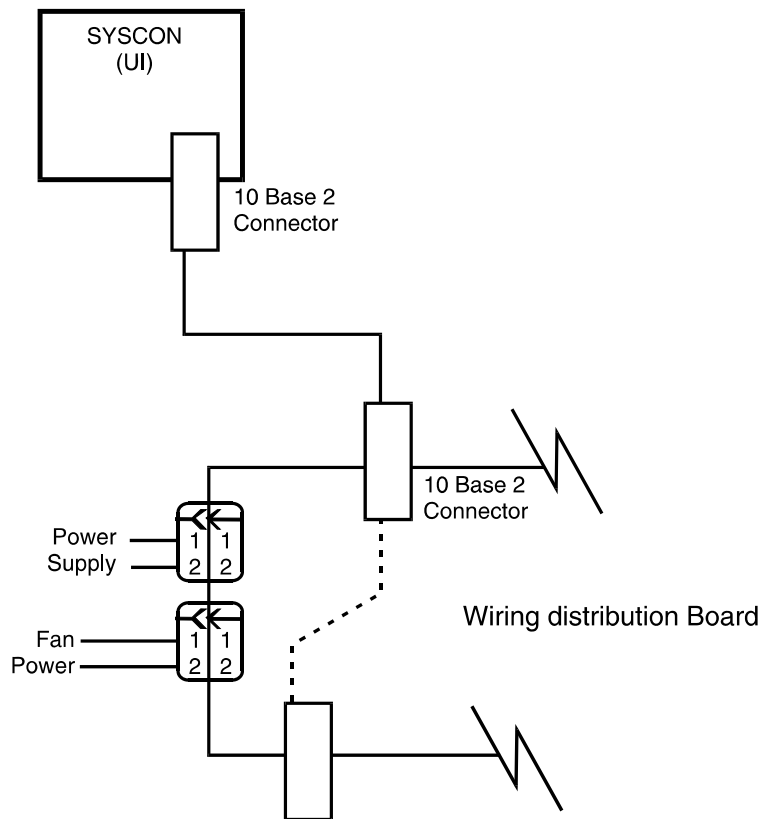
Figure 2-40: SYSCON to WDB Ethernet Connection

Wiring Distribution Board (WDB), Continued

Daisy Chaining SNEs

When more than one Sensor Near Elecronics Controller (SNECON) is equipped, it is necessary to daisy chain their mini Coax connectors together for connection to the WDB. The SNE jumper and termination cables must not be less than 1.64 feet (0.5 meters) between WDB and first and last installed SNE and each installed SNE. Refer to Figure 2-41 Daisy Chaining SNEs.

Figure 2-41: Daisy Chaining SNEs

Wiring Distribution Board (WDB), Continued

New WDB Design

A new Wiring Distribution Board (WDB) is being designed. Expected to be available in 2008, this new board will be capable of communicating with the Sensor Near Electronics Controller (SNECON) via 10BaseT connection. This module will be equipped with RJ-45 connectors which will interface directly with the currently unused RJ-45 connector (J10) on the SNECON. With three RJ-45 connectors equipped on the new WDB and one RJ-45 on each SNECON, there will be no need to daisy chain as described earlier in this section.

The new WDB will still be equipped with 10Base2 miniature Coax connectors to allow it to be used as a replacement for the original WDB.

Power System Module (PSM)

Overview

The Power System Module (PSM) is comprised of a 110/230 VAC switching power supply that provides 24 VDC operating system voltages. It also provides 110/220 VAC conditioning. The 24 VDC power supply provides high speed switching with power factor correction and universal input. The PSM is a stand-alone system consisting of a power supply, filtering, circuit fuse protection and a power monitor board.
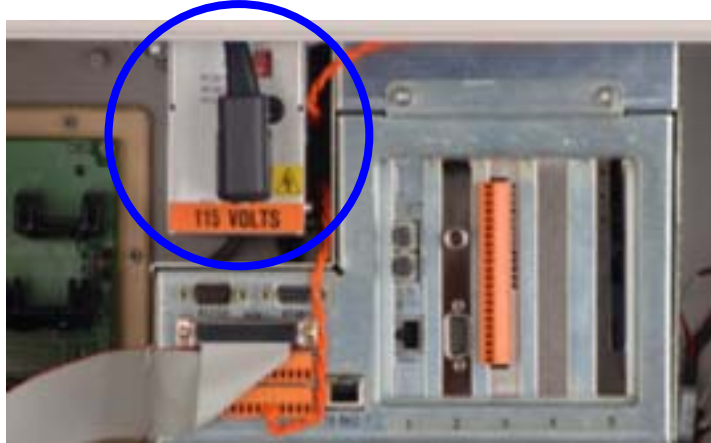

Figure 2-42: Power System Module (PSM)

Input AC Power

AC power input to the power supply is from the Power Entry Control Module. A line cord from the PECM plugs into the front AC receptacle of the power supply. A primary input power selector switch (located above the AC receptacle) must be set to match the primary AC voltage input from the Power Entry Control Module.

Output Connections

Output 24 VDC is supplied to components within the Maxum II via a cable harness that exits the backside of the PSM. The cable terminates in quick disconnect connectors.

Circuit Analysis

Primary AC power is conditioned and converted to 24 VDC. After conditioning; only one 24 VDC source is supplied to system components. DC to DC converters generate other operating voltages.

24 VDC

The PSM provides only one 24 VDC source to operate system components. A blocking oscillator generates the 24 VDC output voltages at 6 amps. Operating voltages for other components within the analyzer are generated by the 24 VDC using DC to DC conversion.

Power System Module (PSM), Continued

Specifications	The Power Supply Module specifications are presented below.

Voltage Range	115 VAC (85 to 140 VAC) 230 VAC (185 to 264 VAC)
Frequency Range	47 to 63 Hz
Nominal Input Current	2 amp @ 115 VAC 1 amp @ 230 VAC
Output Rating	24 VDC @ 6 amp
Nominal Output Voltage	24 VDC 3%, 1% ripple plus noise at a bandwidth of 30 MHz
Nominal Output Current	6 amps @ <104 F (40 C) 4 amps @ 104 to 158 F (40 to 70 C)
Basic Load	0.2 amps/0.0 amps open circuit permitted
Dynamic Load	Between 0.2 amps to 3 amps in the load range. A maximum load of 2 amps at 1.8 kHz is switched. Switching is controlled by pulse width. Precision range is not exceeded in this operational mode.
Current Limitation	Start at 6.4 to 7.5 amps. When current drops, device is switched on.
Overvoltage Cutoff	Starts 27 to 31 VDC. When voltage drops, device is switched on.
Over-temperature Cutoff	After temperature decreases to specified tolerance, device is switched on.
Power Fail Transitions	Occurs 20 ms after a primary power failure. Should a power failure occur, a low 20 msec signal is generated.
Electric Isolation	Input/Output: 3.7 kV
Size	Length: 10.24 inches (260 mm) Width: 2.36 inches (60 mm) Depth: 3.54 inches (90 mm)
Cooling	Convection and conduction through aluminum mounting plate.
Output Wiring	Cable harness

**PSM Fuse
Replacement**

The Power System Module is equipped with a fuse (Siemens Part Number A6X19905350). This fuse is located on the front of the PSM just above the power cord plug. The fuse is a 250V, 4.0 Amp, "slow-acting" type. Although this fuse rarely fails, replacement is simple (disconnect power to the analyzer first). To remove the fuse, unplug the power cable that comes from the PECM. Access the fuse by removing the fuse cap with a large blunt screwdriver.

Siemens Liquid Injection Valve

Description

The Siemens Liquid Injection Valve (SLIV) is used to automatically inject a fixed quantity of liquid sample followed by fast, complete vaporization. Small gas quantities can also be injected using the valve. Refer to Figure 2-43 below.

Components

The Siemens Liquid Injection Valve (SLIV) consists of three components:

Temperature-controlled vaporization system
Sample flow unit with seals
Pneumatic drive (actuator)

Figure 2-43: Siemens Liquid Injection Valve

Functional Description

The SLIV uses a moving injection tappet attached to a piston actuator. Sample is injected via a groove or cross hole in the tappet. In the filling position, the sample flows continuously through the cross hole or the ring groove of the injection tappet. When injecting, the tappet is pushed pneumatically into the heated vaporization area. The liquid in the cross hole or ring groove is vaporized and flushed by the carrier gas into the column. The tappet is then shifted pneumatically, via the piston actuator, back into its original position. Sample then passes through the injection hole again. Refer to figure 2-44 on the next page.
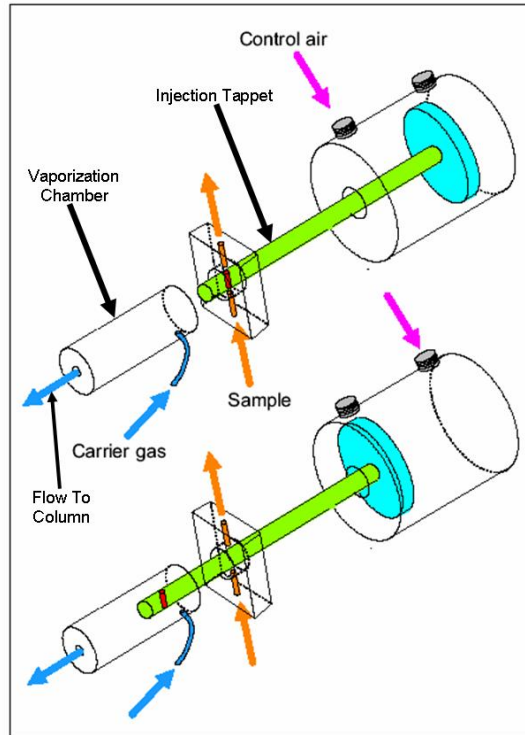
Siemens Liquid Injection Valve, Continued

Figure 2-44: LIV Sample Injection

Specifications

Max. Vaporization temperature	60 - 300 C (140 - 572 F) with explosion-proof analyzers according to the temperature class
Injection volume	0.4 to 2.5 l
Ambient temperature	-20 to150 C (-4 to 302 F)
Material of parts in contact with the sample	V4A, mat. No. 1.4571 Hastelloy, Monel or special
Control pressure	4 to 6 bars (48 to 87 lb/sq inch)
Sample pressure	Max. 50 bars (725 lb/sq in), recommended 5 … 10 bars (72.5.145 lb/sq in)
Connections	For tube with 3 mm (1/8 in.)outer diameter

Siemens Liquid Injection Valve, Continued

.

Vaporization system

The vaporization tube is inserted with an aluminum sleeve into the heating mushroom plate whose temperature is regulated by a heating cartridge. In addition to the standard vaporization tube, a version of the SLIV is offered with a glass lined vaporization tube.

The carrier gas is routed via tube into the vaporizer and heated up to the vaporization temperature in the process.

Sample flow unit

The sample flow unit (Figure 2-45 below) is located in the middle section (body) of the valve between the vaporizer and the actuator piston. It is isolated from the vaporizer and actuator by lens shaped Teflon gaskets. An adjustable adapter and Belleville washers position the Teflon gaskets with a constant pressure and compensate for temperature expansion effects and gasket wear.
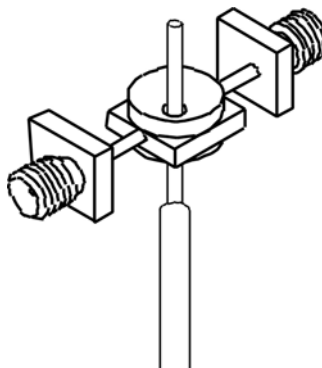

Figure 2-45: Sample Flow Unit

Vaporization Temperature

The vaporization temperature can be set independent of the oven temperature. It is selected according to the sample and the sample's boiling point. The optimum vaporization temperature must be determined experimentally. The amount by which the vaporization temperature should be above the sample's boiling point depends on the heat of vaporization of the sample. Samples with a high heat of vaporization, such as aqueous samples, only vaporize sufficiently fast for chromatographic purposes at high temperatures (above 200 C), as shown in Figure 2-46.
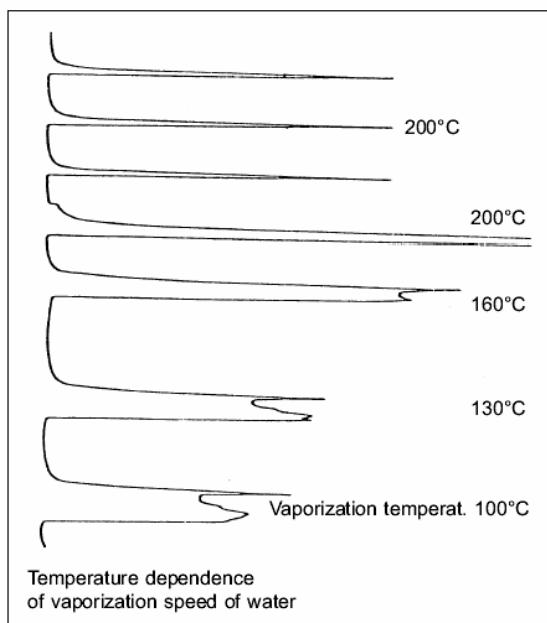
Siemens Liquid Injection Valve, Continued

Figure 2-46: Vaporization Temperature

⚠️ **Warning**

EX units: To comply with electrical hazardous area requirements ensure that:

The sensor of the temperature sensor is fully inserted into the heating plate.

The purge tube vent is not being obstructed.

Filter Requirements

The tappet and gaskets will wear faster if the sample contains solid particles. In these cases, a filter is required upstream of the injection. Siemens recommends a filter with the following characteristics:

98% for 0.3- m particles with liquid samples
99.99% for 0.1- m particles with gaseous samples

Flame Photometric Detector

Description

The FPD is a selective detector that can detect sulfur based on the emission of light during combustion.   It is intended for use only in the Maxum II. Two versions have the FPD have been available for the Maxum II. In 2007, enhancements were made to the original FPD. The enhanced FPD is called FPD II. The original FPD and FPD II are very similar. All information in this section refers to both versions unless otherwise specified.

The components leaving the column are combusted in a hydrogen rich flame. They then generate light with wavelengths specific to the material. An interference filter permits only those wavelengths which are characteristic for sulphur to pass on to the photomultiplier. The photomultiplier generates an electric signal proportional to the amount of material passing through the flame. It is also possible to detect phosphorus in this manner; however, detection of phosphorus would require a different filter and is not supported in the Maxum II at this time.

Specifications

Detection limit for sulfur (Original FPD) Detection limit for sulfur (FPD II)	2×10^{-11} g/sec 7×10^{-13} g/sec
Characteristic for sulfur	Quadratic: $[S]^2$
Operating temperature range	80 C to 150 C
Ignition type	Glow Plug
Electrical Data	2 Volts / 3 Amps (Maximum, only for flame ignition)

Flame Photometric Detector, Continued

Labels

Below are sample views of the certification labels affixed to the FPD.
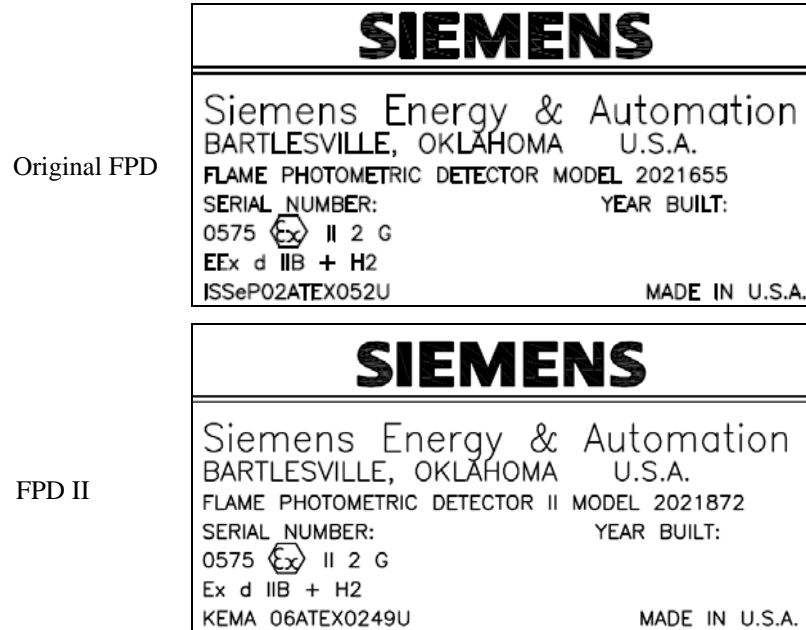
Original FPD

FPD II

Figure 2-47: Certification Labels

Conditions for Safe Use Per ATEX Certificate

The FPD shall be protected against mechanical damage by mounting inside another enclosure.

The relative maximal pressure existing inside the flameproof enclosure shall not exceed 0.065 bar.

The grounding of the FPD shall be ensured by mounting to a metallic frame.

The external part of the bushing shall be protected by pressurized enclosure "p"; not included in the ATEX certificate.

Flame Photometric Detector, Continued

Design

The FPD comprises:

Bottom part contains connections for combustion gas, combustion air, column and exhaust, and a burner nozzle.

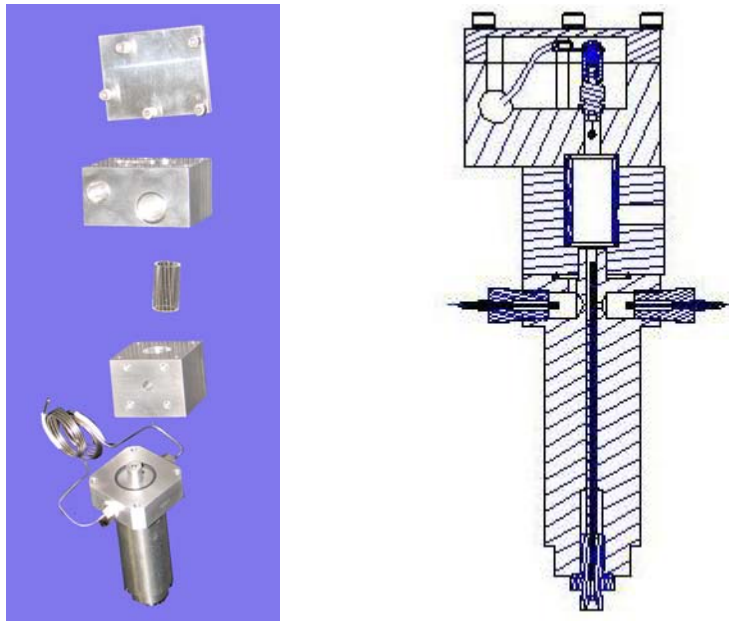Top part contains combustion chamber, glow plug and fiber optic interface

Figure 2-48: Flame Photometric Detector

Combustion Chamber

The burner nozzle consists of two annular gaps. The combustion gas H_2 flows out of the outer annular gap and mixes with the combustion air from the inner gap. The carrier gas flows from the nozzle into the dome-shaped flame.

The exhaust is taken from the combustion chamber output via a flameproof joint.

The glow plug is located above and to the side of the burner.

Optics

The flame burns in a recessed area shielded from the fiber optic interface.

The fiber optic cable connects to the photo multiplier tube (PMT) module in the EC.

The optical interference filter is built into the PMT module

All connections between the combustion chamber and the photomultiplier are absolutely lightproof.

The ignition cable of the FPD is routed through an EEx-e feed through to the EC.

Flame Photometric Detector, Continued

Heater

The FPD is supplied with an external heater. Condensation would be formed in the FPD at temperatures below 80 C and have a negative influence on the measuring properties. The detector is insulated to prevent moisture from entering it.

The detector temperature is factory set depending upon the application. The temperature is normally set equal to or higher than the oven temperature and at minimum 80 C.

Detector Gas Supply

The FPD requires the following gases:

Type of Gas	Gas Quantity
Combustion Gas Hydrogen (Original FPD) Combustion Gas Hydrogen (FPD II)	75-85 ml/min. 60- 130 ml/min.
Combustion Air (Original FPD) Combustion Air (FPD II)	110-130 ml/min. 50-135 ml/min.

IMPORTANT

The FPD is a very sensitive detector. The gases and their supply lines must be extremely clean and sulfur free to achieve a high signal/noise ratio.

Selection of Carrier Gas

Nitrogen, helium, argon or hydrogen can be used as the carrier gas. If hydrogen carrier is used, the required flow of hydrogen flame fuel will be reduced. For the FPD II, the total hydrogen flow (combined flame fuel and carrier) will be ~100-130 mL/min.

Increasing the Sensitivity

The sensitivity of the FPD can be increased by reducing the flow of combustion air. Most of the time, the FPD cannot be ignited with a normal air/hydrogen ratio. If an electronic pressure controller (EPC) is used for the combustion gasses an event will be written at the factory, which will automatically adjust the flows during the ignition sequence. To obtain the recommended flow settings for an analyzer, refer to the custom documentation supplied with that analyzer.

Flame Ionization Detector

Description

The flame ionization detector (FID) is used for measuring hydrocarbons. It responds to most carbon containing compounds.
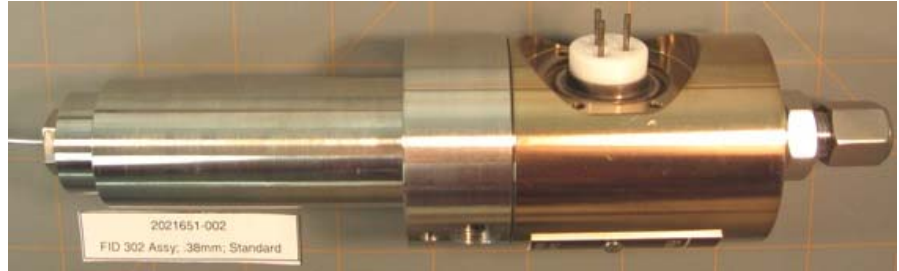

Figure 2-49: Flame Ionization Detector

Measurement Principle

See Figure 2-50. The output from the separation column is burned in a hydrogen flame. The ions produced are captured by the collector electrode and generate ionization current. This measurement current I_D is converted to a measurement signal U_A in the amplifier.

Within the linearity range, the measurement signal is proportional to the number of hydrocarbon atoms that are burned per time unit. The measurement signal also depends on the bonding types and possible presence of heteroatoms in addition to the carbon. Detector geometry and gas supply are calibrated so that the sensitivity and structural linearity are optimal.

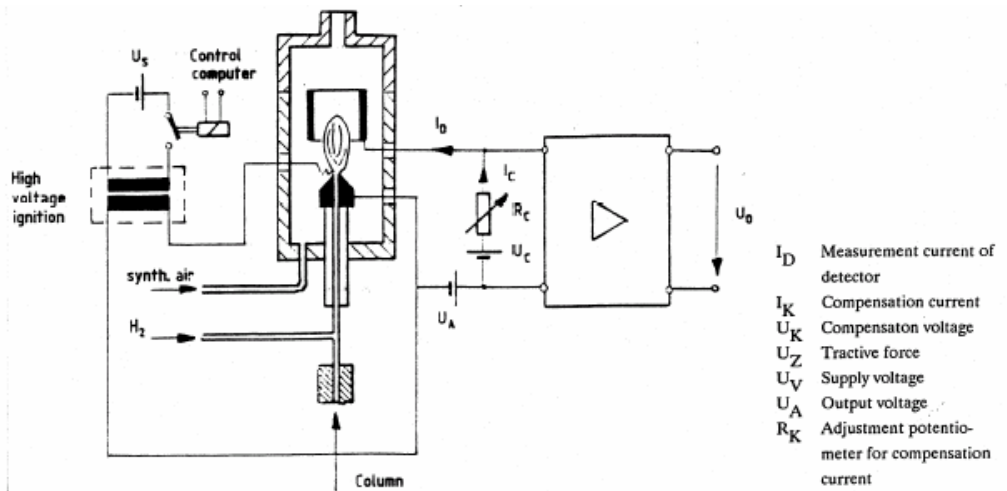|	
I_D	Measurement current of detector
I_K	Compensation current
U_K	Compensaton voltage
U_Z	Tractive force
U_V	Supply voltage
U_A	Output voltage
R_K	Adjustment potentiometer for compensation current

Figure 2-50: FID Block Diagram

Flame Ionization Detector, Continued

Ignition Spark

The high voltage igniter module is comprised of a switching stage and a high voltage transformer that is used to generate the voltage for the ignition spark.The ignition module is in a separate unit from the detector.

A new ignitier module has been developed for the FID. This module is expected to be available in Fall of 2007. Refer to the Maintenance Chapter of this Manual (Chapter 4) for more information regarding the new igniter module.

Configurations

Non Ex Module

Explosion Proof (Ex Certified Module

Specifications

Detection limit	Approx. 1×10^{-12} g C/s
Absolute sensitivity	Approx. 2×10^{-3} As/g C
Concentration range	Approx. 10 ppb ... 10^4 ppm
Linearity range	10^{-12} ... 10^{-5} g C/s
Basic current at 250	$3 ... 7 \times 10^{-12}$ A
Noise at impedance 0	Approx. 10^{-13} A
Noise at impedance 2	Approx. 4×10^{-14} A
Max. operating temperature	180 °C (T3), 280 °C (T2)
Ignition type	High voltage spark
Classification	EEx dp IIB+H_2 T3 or T2

Flame Ionization Detector, Continued

Detector Gas Supply

Reaction Gas
The FID requires both hydrogen and combustion air (synthetic air or purified air).

Carrier Gas
Hydrogen, nitrogen, argon or helium are suitable carrier gases.

Additive/Make-up-Gas
To increase the sensitivity of the FID and to improve the structural linearity, air is added to the combustion gas via R02. When operating with Nitrogen as carrier gas this additive is not required.

If the Hydrogen carrier gas stream is below 20 ml/min Siemens recommends the addition of Hydrogen combustion gas to achieve a stable flame and, if necessary, air to increase the sensitivity.
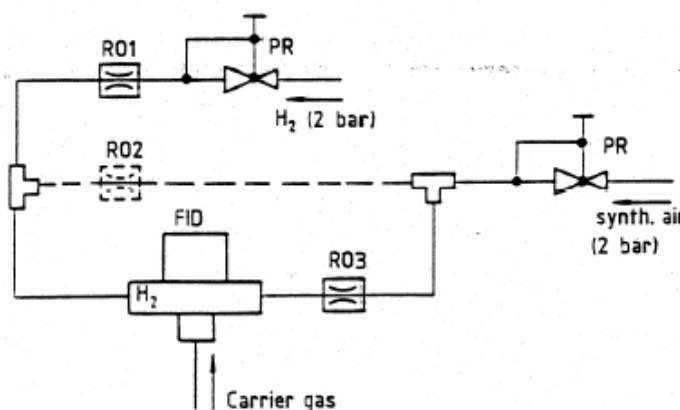
Pressure reducers R01 to R03 are installed in the combustion gas inputs on the side of the detector.

Figure 2-51: FID Gas Supply

Maintain a Clean Supply Gas

The FID is very sensitive to all types of hydrocarbons and to any contaminates in gases or supply lines. For a high signal/noise ratio ensure that the gases have a purity of 99.995 % and a hydrocarbon content below 2 vpm. For special detection sensitivity filter all supply gases using a molecular sieve filter. If plant air is used a catalytic air treater is strongly recommended to reduce the possible hydrocarbon content of the air.

Flame Ionization Detector, Continued

Sensitivity

The temperature of the detector flame and the size of the combustion zone determine the sensitivity of an FID as do the composition and the flow speed of the gas mixture. For an optimum signal/noise ratio use following gas flow rates:

Combustion gas	20	to	45	ml/min
Combustion air	300	to	500	ml/min
Additive air	20	to	40	ml/min

Pressure Regulators

The electronic pressure control modules control the gas flow rate to the detectors. The flow rates can be adjusted. The carrier gas flow rate can be ~20 to 40 ml/min, but it should never exceed 60 ml/min including the additive.
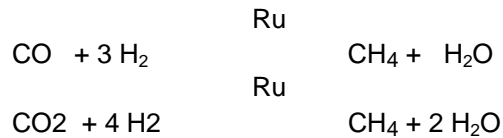
Methanator

Description

The methanator (figure 2-52) is used with a Flame Ionization Detector (FID) when it is necessary to detect carbon monoxide (CO) or carbon dioxide (CO_2). In the methanator CO and CO_2 are chemically changed to methane using excess hydrogen and a catalytic reaction. The concentration of methane, which can be detected using an FID, is proportional to the concentration of CO and $CO_2.$. In this manner, it is possible to detect CO and CO_2 using an FID.

Methanator Operation

In the methanator, CO and CO_2 are catalytically reduced to methane under excess hydrogen, which can be detected in the FID. The catalytic reaction can be described as follows.

$$CO + 3 H_2 \xrightarrow{\text{Ru}} CH_4 + H_2O$$

$$CO2 + 4 H2 \xrightarrow{\text{Ru}} CH_4 + 2 H_2O$$

⚠ **WARNING**

When a methanator is installed, if the purge air supply of the Maxum II is interrupted during operation, it is imperative that the analyzer be powered down. Once powered down, the electronics enclosure door must be kept closed for at least 8 minutes. An 8-minute delay is necessary to give the methanator time to cool down sufficiently. If the door to the electronics enclosure is opened prematurely, explosive gas can ignite by entering the electronics enclosure and then entering the methanator through the conduit tube.

⚠ **WARNING**

In addition, any time the analyzer is powered down when explosive gases are present, it is necessary to wait at least 8 minutes in order to allow the methanator to cool before opening the analyzer door.
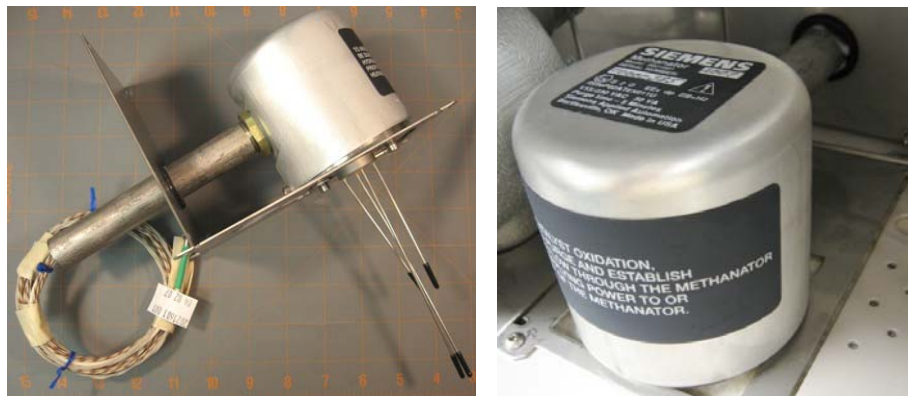

Figure 2-52: Methanator

Methanator Parts

The methanator design consists of a "U" shaped stainless steel pipe that is filled with a catalyst. A heater block is attached around the pipe. Two heating cartridges and an RTD temperature sensor insert into the heater block and regulate heating. The pipe is heated to approximately 400°C and the sample with hydrogen carrier is passed through the pipe. The CO and/or CO_2 (depending on the exact temperature) is converted into methane for detection by the FID.

Because of the very high temperature of the heater plate, various safety protections are built into the design of the methanator. First, although the methanator assembly is installed in the detector compartment, it is installed inside a protective cover that limits air passage. The interior of the assembly is connected to the electronics enclosure using a conduit pipe which contains the electrical wiring for the methanator. This pipe and the protective cover over the assembly effectively make the interior assembly part of the purged electronics enclosure.

Further explosion protection features of the methanator include the gas inlets and outlets that enter and leave the methanator. These are configured as flame arrestors. In addition the protective cover that is installed over the methanator assembly is insulated to prevent the surface temperature from exceeding 180°C.
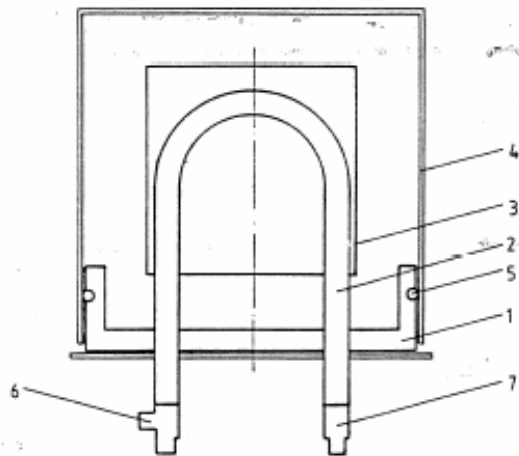
1	Base plate
2	U pipe (reactor)
3	Heater plate with heating cartridges and Pt 100 temperature sensor
4	Protective cover
5	O-Ring
6	Gas connector nozzle for H_2 carrier gas
7	Carrier gas outlet

Figure 2-53: Methanator Parts (Current Design)

Methanator, Continued

Specifications

max. Operation Temperature	400 °C
Heater	2 cartridges 115 V each
Classification	EEx dp IIB+H2 T3

Gas Supply

Use H2 (35 to 45 ml/min) as carrier gas. It is used as reaction gas in the methanator and as combustion gas in the FID. Combustion air and additive are adjusted the same as with the FID without methanator.

Thermal Conductivity Detector

Description

The Thermal Conductivity Detector (TCD) is a concentration responsive detector of moderate sensitivity. The detector cell, containing the sensing element, is an explosion-proof unit located in the chromatograph oven. The electronic circuits are located on a Detector Personality Module (DPM) that is located in the SNE.

The detector works on the principle that the thermal conductivity of the carrier gas is different (conducts more heat or less from the heated element) than the thermal conductivity of the sample components. The electronic circuits sense the change in heat flow and produce a proportional analog voltage signal.

Sensing Elements

For varied applications the TCD can use either filaments or thermistors for its sensing element

Thermistor Model

8-cell Thermistor TCD: The detector includes six independent measurement cells and two reference cells

Filament Model

For higher temperature requirements a 2-cell Filament TCD is available. The 2-Cell Filament TCD can be used as an Inter-column Detector (ITC) in conjunction with a FPD or FID application.

Measurement Principle

The TCD is operated in a constant temperature mode. The TCD compares the power required to maintain the measurement element (either thermistor or filament) at a specific temperature versus the power required to maintain the reference element at that same temperature. Thermistor detector beads are run at approximately 135 °C and filaments are run at approximstely 325 °C.

Thermal Conductivity Detector, Continued

Detector Gas Supply

Carrier Gas
Hydrogen, helium, nitrogen or argon are suitable carrier gases. In this sequence the thermal conductivity of the gases decreases. The TCD is most sensitive when the gas with the highest thermal conductivity difference is used. Table 2-9 below shows the thermal conductivity (at 300 ^{0}C) of various gases with reference to nitrogen.

Table 2-9: Relative Thermal Conductivity

Gas Type	Relative Thermal Conductivity at 300 C
H_2	675
He	560
CH_4	170
O_2	105
N_2	100
CO_2	90
Ar	70

Flow Rates
The flow rates through the reference branch and the measurement branch should be 1 to 40 mL/min each. For trace analyses the carrier gas should be selected such that the thermal conductivity difference is highest between the gas and the component of lowest concentration.

.

Pulsed Discharge Detector (PDD) by Valco

Description

The Valco Model D-2 Pulsed Discharge Detector (PDD) is manufactured by Valco Instrument Co. Inc. Three variations of the PDD are available for use in the Maxum II Process Chromatograph. These are Helium Ionization (PDHID), Photoionization (PDPID), and Electron Capture (PDECD). The PDD uses a stable, low powered, pulsed DC discharge in helium as an ionization source such that the need for a radioactive source is eliminated. Performance of the PDD is comparable to detectors with conventional radioactive sources.

In the helium ionization mode (PDHID), the PDD is a universal, non-destructive, high sensitivity detector. The response to both inorganic and organic compounds is linear over a wide range. Response to fixed gases is positive (increase in standing current), with a minimum detectable quantity (MDQ) in the low ppb range.

The PDD in helium photoionization (PDPID) mode is a selective detector. When the helium discharge gas is doped with a suitable noble gas, such as argon, krypton, or xenon (depending on the desired cutoff point), the PDD can function as a specific photoionization detector for selective determination of aliphatics, aromatics, amines, as well as other species such as ammonia.

In the electron capture mode (PDECD), the PDD is a selective detector for monitoring high electron affinity compounds such as refrigerants, chlorinated pesticides, and other halogen compounds. For this type of compound, the MDQ is at the femtogram (10^{-15}) or picogram (10^{-12}) level. The PDD is similar in sensitivity and response characteristics to a conventional radioactive ECD, and can be operated at temperatures up to 400°C.
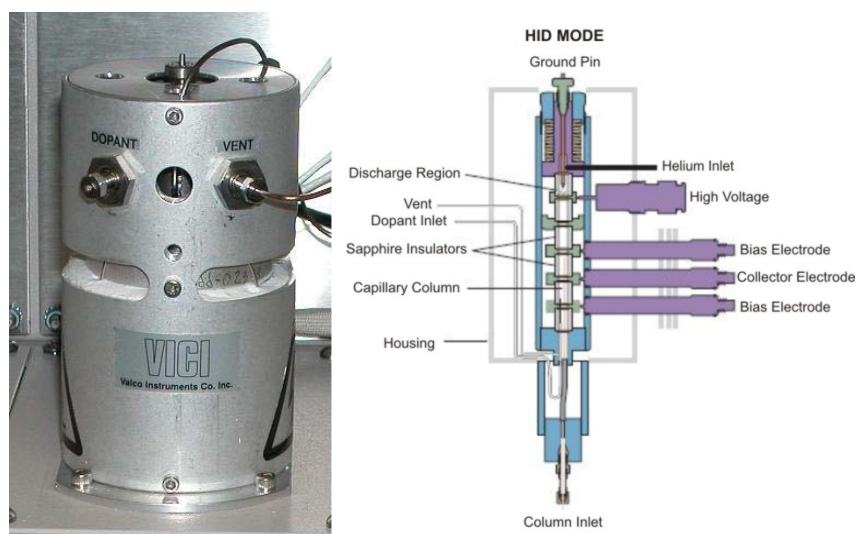

Figure 2-54: Valco Pulsed Discharge Detector (PDD)

Pulsed Discharge Detector, Continued

Measurement Principles

Refer to the Pulsed Discharge Detector (Models D-2 and D-2-I) Instruction Manual available from Valco Instruments Co. Inc. for information regarding the measurement principles of the Valco PDD in its different operating modes.

Specifications

Refer to the Pulsed Discharge Detector Instruction Manual for complete specification information associated with the Valco PDD.

Operation and Installation

The electronics (Pulsed Discharge Controller) of the Valco detector are used to control the pulsed discharge and the detector temperature. The Valco electronics is also used to amplify the detector signal. The output of the Valco detector electronics is connected to the Maxum via a Base Detector Personality Module equipped with an Analog Input Mezzanine board. The processing of the Valco detector signal is then handled by the Maxum II electronics.

The Valco PDD should be operated in on the 1X range with the Maxum detector board set on "low sensitivity". The PDD 0-10V (un-attenuated) output from the Valco electronics is used.

The connection to the detector is critical. The column or a capillary tube must be inserted in the detector as noted in the Column Connection section of the Valco manual.

High purity gases together with a high quality gas purification device are required for proper use of the PDD. The quality of the gases is dependent upon the specific application. Refer to the Valco manual for general gas requirements and your custom documentation for specific requirements for your application. Normally an SAES Getters gas purifier is supplied with the system.

Refer to the Pulsed Discharge Detector Instruction Manual for additional information regarding installation and operation of the Valco PDD.

Service

Service of the detector is limited to replacement of the electronics module or the replacement of the detector itself. Repair of these parts requires return to Siemens or Valco.

Live Tee Switch

Description

The live tee is a valveless switch that can be used in place of a valve for switching columns. The live tee is virtually maintenance free since it has no moving parts, no temperature limitations and the sample only comes into contact with metal parts in the Live Tee.
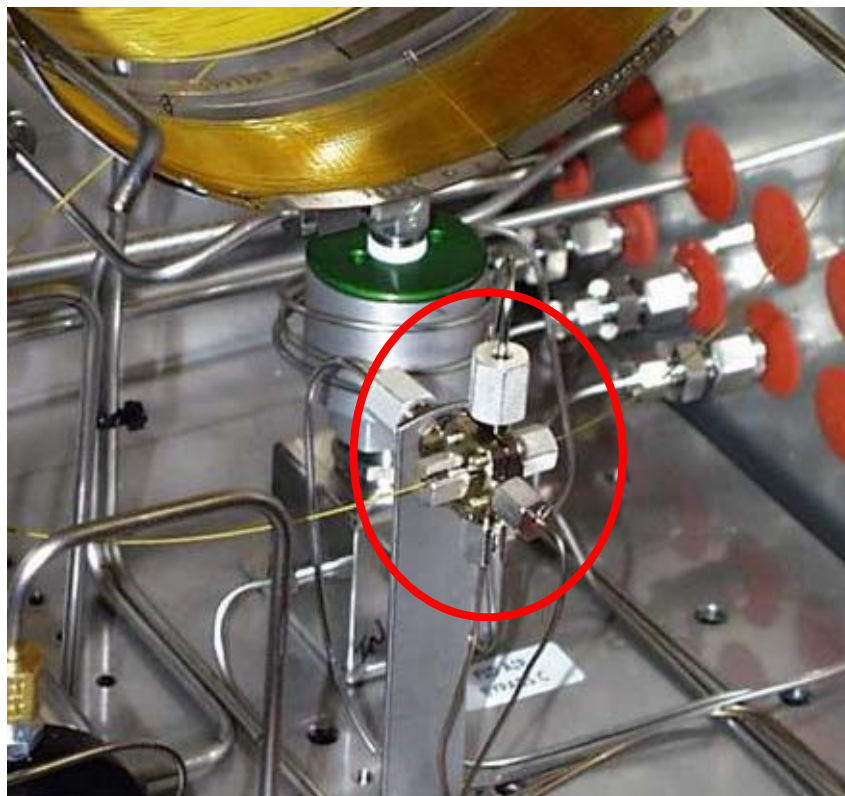
Figure 2-55: Live Tee Switch

Mechanical Description

There are two separate inner chambers separated by a polyamide barrier between the upstream column side (pre-column) and the down stream column side (main column). A platinum/iridium capillary tube (tee piece capillary) passes across the barrier. Columns are attached to the live tee by slipping the column end over the tee piece capillary all the way to the barrier, then backing out about 1 mm, and tightening a fitting using a metal sleeved graphite ferrule.

Exercise care to avoid puncturing the polyamide barrier or bending the capillary while installing columns. Follow the column manufacturer's instructions for cutting and handling fused silica columns.

Live Tee Switch, Continued

Figure 2-56: Live Tee Switch for Capillary Columns
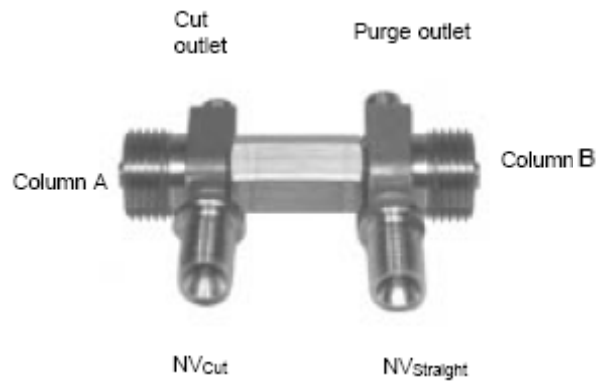
Figure 2-57: Live Tee Switch for Packed Columns

Live Tee Switch, Continued

Inlets & Vents

The live tee has carrier gas inlets and vents on each of the upstream (Pm(-)) and downstream (Pm(+)) sides. The upstream side vent of the live tee is the heartcut vent (cut vent), and is normally run directly to atmospheric vent or through a monitor detector or ITC. The downstream side vent is called the "purge" vent and is normally connected to the outlet of the downstream column as a make-up or fuel gas just upstream of the main detector. During the flow set up procedure the purge vent can also function as an ITC when connected to the main detector. This is the typical arrangement of these vents. However, in some circumstances it is advantageous to plumb the cut vent to the main detector, and the purge vent to the ITC or directly to atmosphere. Figure 2-58 schematically shows the tee piece with columns and carrier gas connections.
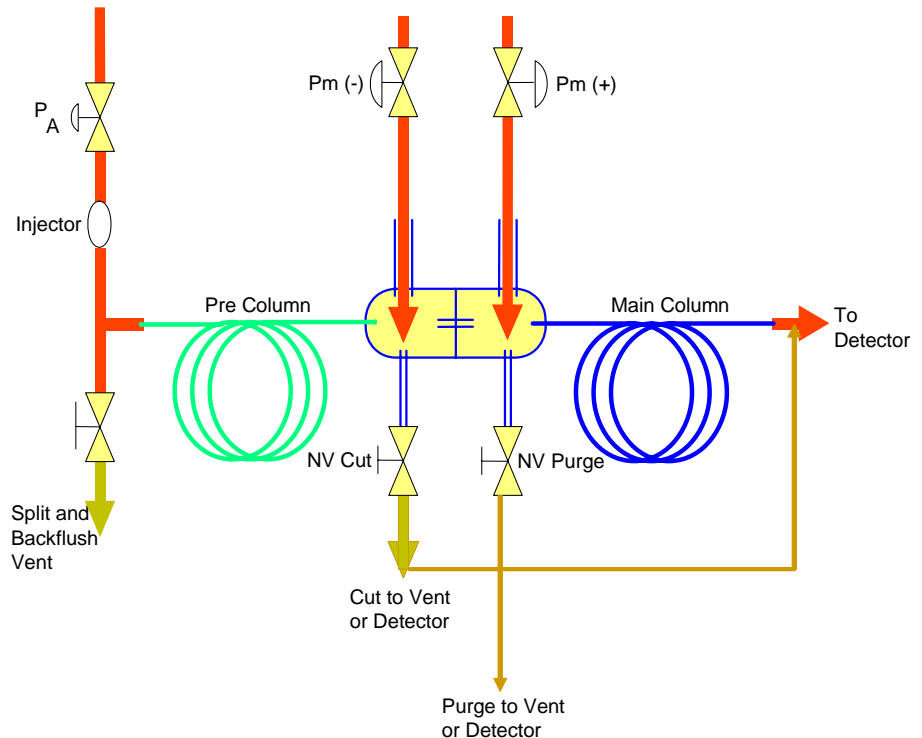
Backflush OFF: Flow from Pre-Column to Main Column ($P_a > P_m$)

Backflush ON: Pre-Column Flow Reversed; Flow to Vent or Detector ($P_a < P_m$)

Figure 2-58: Back Flush & Heart Cut Configuration

Live Tee Switch, Continued

Operation

The following is a list of common terminology and abbreviations used in the following narrative.

Pa	Column Inlet Pressure
Pm (-)	Midpoint pressure (at the end of the first column, inlet of the tee piece)
Pm (+)	Midpoint pressure (at the inlet of the main column, outlet of the tee piece)
Cut Vent	Vent on the column inlet side of the tee piece, controlled by needle valve 1 (NV1)
Purge Vent	Vent on the column outlet side of the tee piece, controlled by NV2
Cut On	Straight run flow pre column to main column (heartcut on)
Cut Off	Pre column to cut vent (heartcut off)
Back Flush Off	Injector to pre column (opposite of the terminology used with valves)
Back Flush On	Pre column to backflush vent

How It Works

The operation of the Live tee takes advantage of the pressure drop across the tee piece capillary and the annular spaces between the outside diameter of the capillary and the inside diameter of the column ends.

Varying Pressure

The heartcut and backflush functions of the tee piece are achieved by varying the pressures Pa, Pm(-) and Pm(+).To function in the cut on or straight through column mode, pressure on the upstream carrier gas inlet (Pm(-)) of the live tee is adjusted slightly higher than the outlet pressure of the upstream column.

Live Tee Switch, Continued

As shown below, this causes carrier gas entering the Pm(-) inlet of the tee piece to flow through the annular space between the column and the capillary, adding a small component to the column flow, then through the capillary to the main column. Pressure on the Pm(+) inlet of the tee piece is adjusted slightly higher than the outlet of the capillary causing carrier gas to flow through the annular space between the column and capillary adding another small element of flow to the main column. The small flows introduced to the column at both sides of the live tee effectively serve as make up flows, preventing any peak broadening through the tee piece by eliminating unswept dead volumes.

Figure 2-59: Cut On
Pa > Pm(-) > Pm(+)
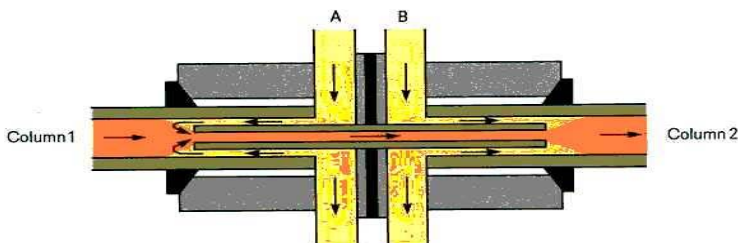
Cut Off Mode

To function in the cut off mode, as shown below, the pressure at Pm(-) is reduced to slightly below that of Pm(+), causing carrier gas to flow from the Pm(+) side back through the capillary and out to the cut vent, taking with it all flow from the pre-column. It is possible to have this pressure adjusted marginally so peaks are split and flow to both the main detector and out to the cut vent. It is also possible to have the Pm(+) pressure adjusted so peaks partially flow through both the purge vent and the main column. When either of the two vents is connected to the main detector at the outlet of the main column, the earlier eluting peaks from the vents signal the peak retention time of the pre-column and are useful in determining cut timing.

Figure 2-60: Cut On
Pa > Pm(+) > Pm(-)
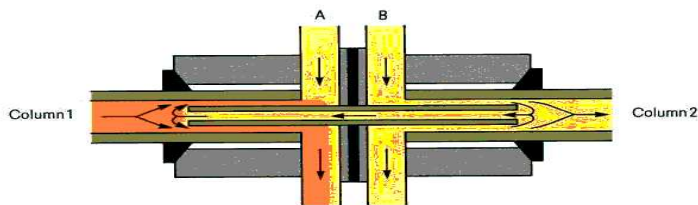
Backflush Mode

To function in the backflush mode, shown below, pressure at the column inlet Pa is reduced to allow flow of carrier gas from the Pm(-) side of the live tee back through the pre-column and out the backflush vent. The splitter vent will usually double as a backflush vent, but in the case of direct injection, a pneumatic valve can be opened when inlet pressure is reduced.

Figure 2-61: Cut On Pm(+) > Pm(-) > Pa
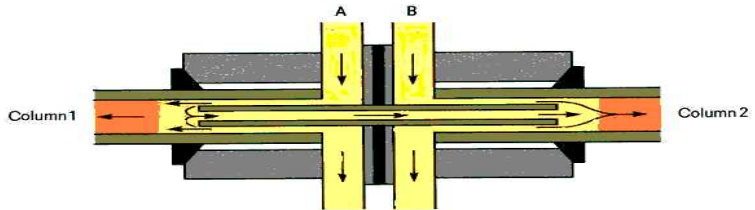
Chapter 3

Maintenance Panel (HMI) Operation

Overview

Introduction

This chapter is intended for operating and maintenance personnel.

All of the Maxum II's operational and daily routine maintenance tasks can be performed from the Maintenance Panel, which is also known as the Human Machine Interface (HMI). The Maintenance Panel was previously known as the MMI. The Maintenance Panel is the physical hardware that is installed in the door of the Maxum II. HMI refers to the software function associated with that hardware. Because this chapter deals primarily with the operation of the software, HMI will be the primary term that is used throughout this chapter. The HMI utilizes interactive display screens and menus. It is intuitive and simple to use once you are familiar with the screens and their functions.

The menu tree of the HMI is organized into 3 functional levels. These allow different levels of access to analyzer control and configuration.

Before you Begin

The information in this chapter is written for HMIs with firmware version 4.2 installed. If your HMI has a different software version some screens and menus may appear different. The firmware version number for the software is displayed during power-up on the HMI introductory screen.

For additional information concerning the HMI interface refer to the online help files provided with the Maxum II System Manager Software. The help files are included with the Software and are also included in the Maxum II Documentation Library CD (Siemens PN 2000597-001).

Emulator

A PC-based graphical simulation of the physical HMI, known as the HMI emulator, is available using the System Manager software. This emulator is capable of performing most of the functions that are available with the physical unit.

The emulator is a graphical representation of the HMI. Because of this, some aspects of the emulator appear slightly different than they appear on the physical unit. Most of the screen displays in this chapter are captured screens from the emulator. Because of this they may appear slightly different than on the physical unit. Any significant differences between the two are noted in the description.

Overview, Continued

Chapter Highlights

Overview, Continued

Display & Control Unit

Overview

The HMI display and control unit contains a back-lit graphic display screen, softkeys, status LEDs and a numeric keypad.
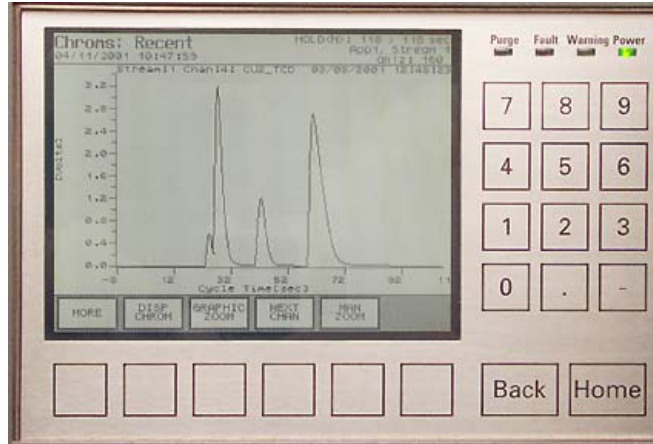
Figure 3-1: Display and Control Unit

More Information

Topic	Page
Screen Characteristics	3-5
Status LEDs	3-6
Numeric Keypad	3-7
Softkeys	3-8
Password Restrictions	3-10
Menu Tree	3-13

Screen Characteristics

Description

The back-lit graphics screen has a 320x240-pixel resolution.

The screen is divided into three areas:

      Status Bar
      Content Area
      Softkey Bar
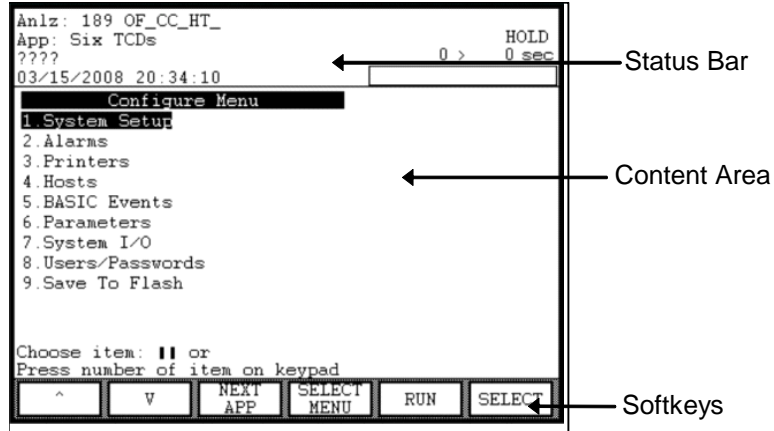
Status Bar

The status bar shows the analyzer name, application, stream, and date and time on the left. On the right of the status bar is shown the alarm status, application state, and cycle clock. The cycle clock is shown in seconds with a cycle progress bar below the timer.

Content Area

The middle part of the screen is the general content area. It contains menu lists or parameters with the applicable values, as well as alarm messages and operator hints. Usually, the content area will include some lines of help at the bottom. The top of the content area is usually a general description of the screen.

The Softkey Bar

The softkey bar appears at the lower edge of the screen. Its gray background distinguishes it from the content area. The softkey bar associates different actions with the softkeys located below the screen. The actions vary depending on the screen shown.

Status LEDs & Alarms

Status LEDs
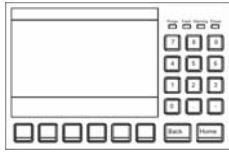
The four LEDs next to the screen indicate the analyzer systems status.

Green "Power" LED

Yellow "Warning" LED

Red "Fault" LED

Red "Purge" LED

Power

The green "Power" LED lights when the power supply is on.

Warning

The yellow "Warning" LED lights when the "Maintenance request" status signal is active.

Fault

The red "Fault" LED lights when the "Failure" status signal is active.

Purge

The red "Purge" LED lights when purge pressure is lost as detected by the PECM.

Alarm Messages

For a list and description of HMI displayed alarm codes and messages see Page 3-154, HMI Displayed Alarms.

Numeric Keypad

Numeric Keypad
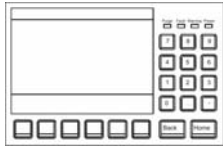
The numeric keypad is located to the right of the screen, below the status LEDs.

1 ... 9 , . , -
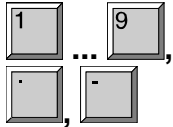
The operator can enter values directly with the:

> numeric keys "0" through "9"
> Decimal point "."
> minus sign "-"

Operating Hint

The numeric keys can be used to select any menu field by simply pushing the numeric key associated with that field.

Softkeys

Definitions
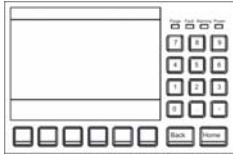
The keys below the display screen are known as softkeys.

The function of each softkey changes and is dependent on the given menu displayed on the screen. The function of each softkey is identified in the softkey bar at the bottom of the display screen.

The Softkey Bar

When a menu is displayed, a series of softkeys appears on the softkey bar. As the user navigates through the different screens, the softkeys that appear will depend on the particular screen being displayed.

Softkey Labels
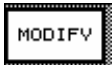
A softkey's label can be set by the user to show words or a symbol that is representative of the word. This feature can be activated using the "System Setup" menu and selecting the "Display Info" softkey. The "Button Icon" setting is used. Refer to discription of System Setup menu and the Display Info softkey later in this chapter for more information.

The "SELECT MENU" softkey is used to change between the three different functional levels of menus that are available. It is also possible to log out of the HMI using this menu. The functional level menus allow different levels of access to analyzer control and configuration.

> Monitor Menu – This level allows minimal control of the analyzer and viewing of analyzer status and is intended for operations personnel.

> Maintenance Menu – This level allows detailed application and stream control and is intended for engineering personnel.

> Configure Menu – This level allows system configuration control and is intended for use of system administrators and engineers.

> Logout – This button is used to cancel the current password session and return to the default login. The screen is returned to the Monitor Menu.

Softkeys, Continued

Arrow Softkeys

| ▼ | | ▲ |

The two arrow softkeys are used to move the selection cursor up or down in a menu or list to select menu items. The arrows keys are available for most screens and are always located on the left side of the softkey bar. The two symbols shown to the left are the arrow keys as they appear on the physical HMI. These softkeys appear slightly different on the HMI emulator (although they are in the same locations). On the HMI emulator the (^) and the
(V) characters are used to represent the up and down arrows.

When a menu or list item is selected the text is reversed, i.e. appearing as bright characters on a dark background.

Note:

In this manual, entries to be made on the HMI by the operator will not be identified by key symbols but by showing the entry information (softkey, number entries, etc.) enclosed in quotes:

Press softkeys: "SELECT MENU", "SELECT", "BACKSPACE"

Select menu items: "Select Analyzer", "Setup"

Enter numbers: "1" … "9"

Back Softkey

Back

The "Back" key is located below the numeric keypad. It allows the user to cancel a function or menu item and return to the previous menu level.

The "Back" key also allows the operator to clear analyzer system help text and messages.

Home Softkey

Home

The "Home" softkey returns the user back to the Starting Menu of the functional level menu tree that is currently in use (Monitor Menu, Maintenance Menu, or Configure Menu).

Password Restrictions

Description

It is possible to configure the HMI for different levels of password access. By default, six different levels of password access are available. Also by default, the HMI is set for a "configure" level of access. This level allows the user to perform almost all analyzer functions except password administration. If the access level of the current active password is not sufficient for a requested operation, a pop-up screen will appear stating that the proper level of password must be entered. By default, when a password is entered, the session remains active for 60 minutes unless a different time period has been set; see description of "SET TIME" softkey below.

Checking Your Access

To see if you are authorized to perform a specific function, use the appropriate menu path to navigate to that function.

If the following screen appears, then password entry is necessary to perform that function (i.e. The current level of access is not sufficient to perform the function). From the password entry screen press the "NEXT USER" softkey to scroll through the list of predefined users. If your level of access is on the list, then enter your password and press the "ENTER" softkey. If your password is correct and has sufficient access, the main menu will reappear. You are now logged on and can follow the appropriate menu path to execute the required function. If the password is incorrect, the screen will display "ACCESS DENIED". If the access level is not sufficient, then the password entry screen will remain.

Password Format

A password consists of one to six numerical digits and is entered via the numeric keypad.

Password Restrictions, Continued

Obtaining/Changing a Password

Passwords can be modified from the User's Passwords screen. Refer to the section "Users/Passwords (on Configure Menu)" later in this chapter.

Privilege

If your password is accepted you can modify any menu items or parameters assigned to your user level (or lower user levels). There are six predefined user levels (levels 0-4 and 99). The items that can be modified at these user levels are predefined and cannot be changed by the user.

By default six users are defined. These are "public", "operate", "calibrate", "maintain", "configure", and "super". The default access level for each of these users matches their names. In addition, multiple individual users may be defined. These users must have unique names and they can be created with either "operate", "calibrate", "maintain", or "configure" access levels. Creation and deletion of users must be performed in System Manager. (Refer to the System Manager chapter of this manual for instructions on creating and deleting users).

Duration of the Privilege

The change privilege remains in effect if the user presses any key before the timeout limit (default 60 minutes). In this manner the user does not have to re-enter a password repeatedly while browsing through menu screens.

However, the analyzer automatically logs out (back to the default user), if the user has not pressed a key within the timeout limit.

Reminder

For security purposes it is important to log off when work on the analyzer is finished. You can log out by pressing the "Home" softkey to return to the main menu. Then press the "SELECT MENU" softkey and select item 4 to log off. Typically analyzers are not in a fully restricted area, and unauthorized people may pose a security risk if a password is left active.

SET TIME Softkey

The "SET TIME" softkey is used to change the expiration time for a session. The default for this parameter is 60 minutes and applies to all passwords. A different timeout period may be set using the "SET TIME" softkey. Note that a "configure" or "super" level password is necessary to modify the timeout period.

Password Restrictions, Continued

Softkeys Descriptions for Password Entry Screen

The softkeys that are defined on the password entry screen are defined as follows.

CLEAR FIELD	
SET TIME	As stated previously in this section, this softkey allows the user to modify the login expiration time.
NEXT USER	This softkey toggles between user login profiles so that the person logging in can select their desired profile.
LOG OUT	This softkey cancels the login process and the access level reverts back to the default login. The "Back" softkey has the same function when it is pressed while in the password entry screen.
ENTER	This softkey is used to confirm entry of the password while in the password entry screen.
SET PSWD	On the password entry screen, this softkey appears only when the "SET TIME" softkey is pressed. It is used to confirm entry of the new login expiration time.

Menu Tree

Description

As mentioned previously, the menu tree of the HMI is organized into three functional levels. This structure is used to allow different levels of access to analyzer control and configuration operations. The three functional menu levels are as follows.

> Monitor Menu – This menu level allows minimal control of the analyzer and viewing of analyzer status and is intended for operations personnel. All password levels have access to the Monitor Menu; however, higher access is necessary for some functions.

> Maintenance Menu – This menu level allows detailed application and stream control and is intended for engineering personnel. A password with "Maintain" level access is needed to access the Maintenance Menu and all of its functions.

> Configure Menu – This menu level allows system configuration control and is intended for use of system administrators and engineers. A password with "Configure" level access is needed to access the Maintenance Menu. Higher ("Super") access is needed to access user and password functions.

The appropriate menu may be selected using the "SELECT MENU" softkey that appears on the main root menu of each of the three menu trees. The main root menu for any menu level can be accessed at any time by pressing the "Home" softkey.

Main Menu Screen

```
Anlz: 189 OF_CC_HT_
App: Six TCDs                                          HOLD
????                                          0 >     0 sec
03/15/2008 23:18:18
                    Configure Menu
1.System Setup
2.Alarms
3.Printers
4.Hosts
5.BASIC Events
6.Parameters
7.System I/O
8.Users/Passwords
9.Save To Flash




Choose item: ▐▐ or
Press number of item on keypad
┌────────┬────────┬────────┬────────┬────────┬────────┐
│   ^    │   V    │  NEXT  │ SELECT │  RUN   │ SELECT │
│        │        │  APP   │  MENU  │        │        │
└────────┴────────┴────────┴────────┴────────┴────────┘
```
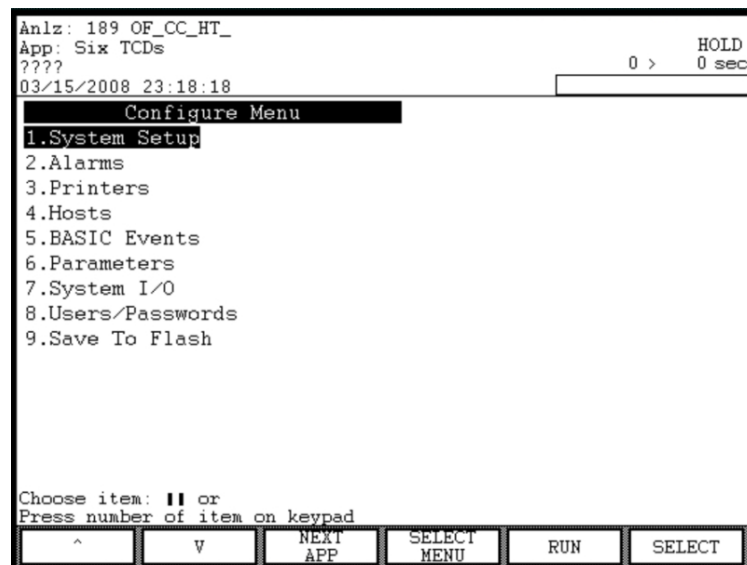
Menu Tree, Continued

Navigating the Menu

To select any item from a menu you can use the arrow softkeys on the left of the menu bar highlight the item and then press the "Select" softkey. Alternatively, you may select a numbered item by simply pressing the corresponding number on the numeric keypad.

Top Level Menu Items

The following chart lists selections from the each of the three main menu levels. Only the top-level menu items are shown; the menu branches more extensively at most menu items. Refer to the referenced page for more detail on each item.

Monitor Menu	Page
Select Analyzer	3-15
View and Clear Alarms	3-17
View Streams	3-21
View Detectors & Realtime Chroms	3-26
View Results & Chromatograms	3-31
Validation	3-46
Calibration	3-48
Maintenance Menu	Page
Select Analyzer	3-15
Alarms	3-19
Applications	3-50
Stream Sequences	3-23
Detectors & Realtime Chroms	3-28
Results & Chromatograms	3-39
Method, Calibration & Validation	3-54
App I/O, Temperature & Pressure	3-83
Save To Flash	3-105
Configure Menu	Page
System Setup	3-106
Alarms	3-19
Printers	3-118
Hosts	3-121
BASIC Events	3-123
Parameters	3-129
System I/O	3-131
Users/Passwords	3-151
Save To Flash	3-105

Select Analyzer (Selection 1 on Monitor and Maintenance Menus)

When to Use

This function is intended for maintenance personnel who need to connect the HMI of one analyzer to any other analyzer on the network.

Hints

It may take several seconds for the "Select Analyzer" screen to display once the softkey has been pressed.

The status bar information at the top of the screen will be displayed in reverse video when connected to a remote analyzer. This is true for all menus on the remote analyzer..

To return to the local analyzer, choose the "Select Analyzer" menu item and then, from the resulting screen, press the "RETURN LOCAL" softkey. Note that it may take several seconds for the main menu from the local analyzer to re-display.

Menu Path

The "Select Analyzer" screen can be accessed from either the Monitor Menu or the Maintenance Menu If not already displayed, the appropriate menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Select Analyzer" Screen

```
Anlz: 189 OF_CC_HT_
App:  Six TCDs                                    RUN
Strm: Stream 5                          95 >  120 sec
03/19/2008 11:57:29
Select Analyzer
        !  175     AL-BB-HT-Therm     Maxum
                   Test
        !  176     AL-BB-HT-Total     Maxum
                   Sulfur
        !  185     SL-FG-LT-Statmon   Maxum
        >  189     OF_CC_HT_          Maxum
        !  194     SAM6F78A7          SAM
        !  195     LT_Long_Cycle      Maxum
           199     OF-DB-ST-limits    Maxum
           211     QL-KB-LT-HR-VOC_NA Maxum
                   U_4.2
        !  213     VL-DB-ST-Valve_Swi Maxum
                   tching
        !  215     VL-KB-NA-CoopMerc_ Maxum
                   ALH_FID
        !  216     VL-KB-NA-COOP ADV+ Maxum
> indicates the attached analyzer
!=fault ?=warning
Choose item: ‖ and select action:
  ┌─────┐ ┌─────┐ ┌─────┐ ┌─────┐ ▓▓▓▓ ┌───────┐
  │  ^  │ │  V  │ │VIEW │ │VIEW │ ▓▓▓▓ │REMOTE │
  │     │ │     │ │MODBUS│ │ OPC │ ▓▓▓▓ │CONNECT│
  └─────┘ └─────┘ └─────┘ └─────┘ ▓▓▓▓ └───────┘
```

Select Analyzer, Continued

Instructions

Step	Procedure
1.	From either the Monitor Menu or the Maintenance menu, select the first menu item, "Select Analyzer". On the resulting screen, the local analyzer should be highlighted.
2.	Use the ▲ ▼ softkeys to scroll up or down through the list of analyzers and select the desired analyzer.
3.	Press the "REMOTE CONNECT" softkey to connect to the desired analyzer. Within a few seconds the Monitor Menu of the remote analyzer should be displayed. The status bar at the top of the screen should appear black with white lettering.
4.	To return to the local analyzer choose the "Select Analyzer" menu item from either the Monitor Menu or the Maintenance menu. Then, select the "Return Local" softkey.

Hints

It is important to remember that all the screens viewed while connected to a remote analyzer will be associated with that analyzer.

Some additional information, such as IP address and Loop/Unit, is shown in the analyzer table when displayed using the Maintenance Menu. This information is not available on the Monitor Menu version of the "Select Analyzer" screen.

"VIEW MODBUS" Softkey

This softkey displays all MODBUS addresses for the analyzer that was highlighted on the screen when the softkey was pressed. This softkey is not available on the "Select Analyzer" screen when connected to a remote analyzer. In the resulting screen, the "SORT ADDRESS", "SORT TYPE", and "SORT STREAM" softkeys are used to sort the table information in different ways.

"VIEW OPC" Softkey

This softkey will display all OPC (OLE for Process Control) table entries. This softkey is not available on the "Select Analyzer" screen when connected to a remote analyzer.

View and Clear Alarms (Selection 2 on Monitor Menu)

When to Use

This function is provided for maintenance and operations personnel in order to perform the following functions.

> View basic details of alarms that exist in the Maxum II
> Acknowledge the alarms
> Clear alarms

Menu Path

The "View and Clear Alarms" screen can be accessed from the Monitor Menu. If not already displayed, the Monitor Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"View and Clear Alarms" Screen

The screen shows the Alarm number, acknowledgment status, Alarm Time, the relevant application/stream, and the alarm description.


```
App: Six TCDs                                              HOLD
Strm: Stream 5                                  120 >  120 sec
03/19/2008 18:11:01
Alarms


        #    Ackn Time    App/Str   Description
        712  Yes                    !  Warm Start Ver:  4.200 -
                  17:25             21 on   OF_CC_HT_
        687  No            Six TCD  ! Results for cycle    lost
                  17:25   Stream    due to SNE reset
        671  No            Six TCD  ! Database: Failure:    First
                  17:26   Stream    cycle after reset
        677  No            FID/TCD  ++! Next Stream Error
                  18:07

++ indicates multiple occurence
! is fault: ? is warning: + is
Choose item: ‖ and select acti
    ^          V        ACKN      CLEAR     CLEAR
                                            ALL
```

Interpreting Alarm Code Text

The first character of the alarm description text indicates the severity of the alarm.

! Indicates a fault alarm

? Indicates a warning alarm

+ Indicates a note (informational)

++ Indicates that there are multiple occurrences of the same alarm

---

View and Clear Alarms (Monitor Menu), Continued

Softkey Descriptions

Softkey	Use
"ACKN"	This softkey acknowledges the alarm by setting the "Ackn" parameter for the highlighted alarm to "Yes". The current value for this parameter can be seen in the "Ackn" column in the alarm table.
"CLEAR"	This softkey clears the alarm that is highlighted in the alarm table.
"CLEAR ALL"	This softkey clears all alarms in the alarm table.

Alarms (Selection 2 on Maintenance Menu and Configure Menu)

When to Use

This function is provided for maintenance personnel in order to perform the following functions.

> View basic and extended details of alarms that exist in the Maxum II
> Acknowledge the alarms
> Clear alarms

The function of the "Alarms" menu item on the Maintenance Menu and Configure Menu is very similar to the "View and Clear Alarms" function which is available on the Monitor Menu. The only difference is that there is an additional softkey available when the "Alarm" screen is selected on the Maintenance or Configure Menu.

Menu Path

The extended "Alarms" screen can be accessed from the Maintenance Menu or the Configure Menu. If not already displayed, the appropriate menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Alarms" Screen

The "Alarms" screen on the Maintenance Menu or Configure Menu appears similar to the "View and Clear Alarms" screen on the Monitor Menu with the exception of an additional softkey as show below.
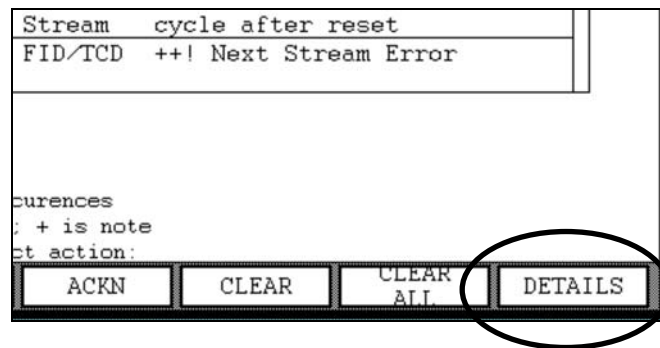
Alarms (Maintenance Menu and Configure Menu), Continued

"DETAILS" Softkey

The "DETAILS" softkey displays a screen with extended information concerning the selected alarm. From this screen you can acknowledge the alarm or clear the alarm from the list. To exit the "Details" screen and return to the "Alarms" screen, press the "Back" softkey.

```
Anlz: 189 OF_CC_HT_
App: Six TCDs                                               HOLD
Strm: Stream 5                                        120 >  120 sec
03/19/2008 18:39:58


        Code / Type   712 Fault
        Acknowledged: 19-MAR-2008 17:41:35.88
        Post Time   : 19-MAR-2008 17:25:36.69
        Latest Time : 19-MAR-2008 17:25:36.69
        Count       : 1
        Cycle Time  : 0.
        App/Stream  :
        Description :
                      Warm Start Ver:
                      4.200 -   21 on
                      OF_CC_HT_




                           ACKN      CLEAR
```

View Streams (Selection 3 on Monitor Menu)

When to Use

This function is provided for maintenance and operations personnel in order to perform the following functions.

> Display basic stream data
> Select the active stream sequence
> Disable and enable streams within a stream sequence

Menu Path

The "View Streams" screen can be accessed from the Monitor Menu. If not already displayed, the Monitor Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"View Streams" Screen

The screen shows the stream sequence name, stream/method names, and the status of each stream.

```
Anlz: 189 OF_CC_HT_
App: Six TCDs                                          HOLD
Strm: Stream 5                              120 >  120 sec
03/19/2008 19:17:05
Stream Sequence : Normal

ACTIVE


 Stream/Method                    Status
  Stream 1/Synthetic               ------
  Stream 2/Synthetic               ------
  Stream 3/Synthetic               ------
  Stream 4/Synthetic               ------
  Stream 5/MetTest                 ------



Choose item: ▐▌ and select action:
┌────────┬────────┬────────┬────────┬─────────┬────────┐
│   ^    │   v    │  NEXT  │   SET  │ DISABLE │        │
│        │        │ SEQNCE │ ACTIVE │         │        │
└────────┴────────┴────────┴────────┴─────────┴────────┘
```

View Streams (Monitor Menu), Continued

Interpreting the Display

In the upper left corner of the information section of the screen is the name of the stream sequence. For the active stream sequence the word "Active" appears just below the name.

The table contains the stream number and method name. The "Status" column indicates whether a stream is currently running, set to run next, or set to run always. A stream that has been disabled will have an asterisk (*) on the left next to the stream number.

Softkey Descriptions

Softkey	Use
"NEXT SEQNCE"	An application may have multiple stream sequences. The "NEXT SEQNCE" softkey is used to toggle through the different defined sequences.
"SET ACTIVE"	This softkey is used to force a different sequence to run. The sequence will begin running after the next stream step.
"DISABLE" & "ENABLE	This softkey enables/disables the stream that is highlighted in the table. Streams within the table are selected using the arrow keys.

Stream Sequences (Selection 4 on Maintenance Menu)

When to Use

This function is provided for maintenance and operations personnel in order to perform the following functions.

> Display basic and extended stream data
> Select the active stream sequence
> Disable and enable streams within a stream sequence
> Make temporary changes to some stream data
> Make temporary modifications to the stream order

The function of the "Stream Sequences" menu item on the Maintenance Menu is very similar to "View Streams" which is available on the Monitor Menu. The primary difference is that there are additional functions available from the "Stream Sequences" screen that are not available on the "View Streams" screen.

Menu Path

The "Stream Sequences" screen can be accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.
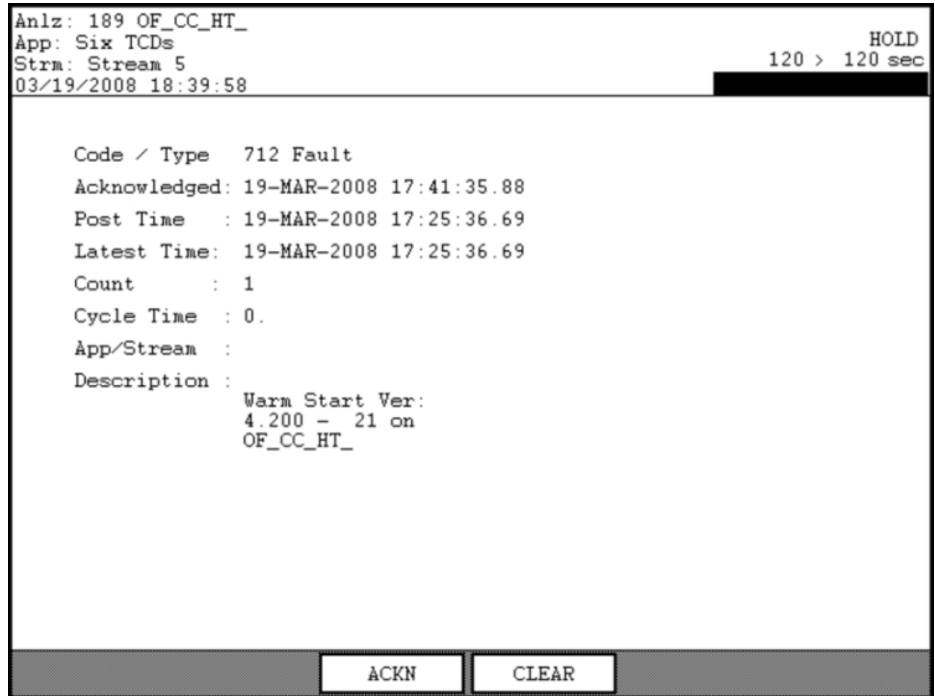
"Stream Sequence" Screen

The screen shows the stream sequence name, stream/method names, and the status of each stream.

Stream Sequences (Maintenance Menu), Continued

Interpreting the Display

In the upper left corner of the information section of the screen is the name of the stream sequence. The type of sequence (normal, calibration, validation, or mixed) is displayed just below the name. For the active stream sequence the word "Active" appears just below the sequence type.

The sequence table contains the stream number and method name. The "Status" column indicates whether a stream is currently running, set to run next, or set to run always. A stream that has been disabled will have an asterisk (*) on the left next to the stream number.

Softkey Descriptions

The following softkeys are available from the "Stream Sequences" screen.

Softkey Descriptions

Softkey	Use
"NEXT SEQNCE"	An application may have multiple stream sequences. The "NEXT SEQNCE" softkey is used to toggle through the different defined sequences.
"SET ACTIVE"	This softkey is used to force a different sequence to run. The sequence will begin running after the next stream step.
"DISABLE" & "ENABLE	This softkey enables/disables the stream that is highlighted in the table. Streams within the table are selected using the arrow keys.
"MORE"	This softkey toggles between two sets of available softkeys.
"SET ALWAYS" & "RESUME SEQ"	The "SET ALWAYS" softkey sets the selected stream to run continuously, disregarding the rest of the sequence. The "RESUME SEQ" softkey will remove the "ALWAYS" designation.
"STREAM STEP"	This softkey advances the "Next" stream once down the sequence list. This has the effect of allowing the user to temporarily skip a stream.
"DETAILS"	This softkey displays a detailed information screen for a stream within the sequence. Information is displayed for the stream that is highlighted when the softkey is pressed.

Stream Sequences (Maintenance Menu), Continued

"DETAILS" Screen

The "DETAILS" softkey displays a screen with extended information concerning the selected stream. From this screen it is possible to temporarily modify the highlighted parameters. However, changes made to the stream sequence should be made in EZChrom. To exit the "Details" screen and return to the "Stream Sequences" screen, press the "Back" softkey.

```
Anlz: 189 OF_CC_HT_                              Fault
App: Six TCDs                                     RUN
Strm: Stream 5                             25 >  120 sec
03/20/2008 10:33:22                       ████████
Stream Sequence Detail


        Name                    Value
        Stream                  Stream 5
        Method                  MetTest
        Enable                  ON
        State                   F Alwy
        CAL level               0
        RUN                     ON
        CAL                     OFF
        Clear All RF            OFF
        Clear Level RF          OFF
        Avg Reps                OFF
        Clear Reps              OFF
        Saved Chrom             OFF
        Baseline                OFF


Choose item: ‖ and select action:
    ┌──────────┐ ┌──────────┐              ┌──────────┐
    │    ^     │ │    V     │              │  MODIFY  │
    └──────────┘ └──────────┘              └──────────┘
```

View Detectors & Realtime Chroms (Selection 4 on Monitor Menu)

When to Use

This function is provided for maintenance and operations personnel in order to view chromatograms in real time.

Menu Path

The "View Detectors & Realtime Chroms" screen can be accessed from the Monitor Menu. If not already displayed, the Monitor Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"View Detectors & Realtime Chroms" Screen

Below is the selection screen for viewing real time chromatograms. Selections exist for each detector.

```
Anlz: 189 OF_CC_HT_
App: Six TCDs                                              RUN
Strm: Stream 1                                    30 >    30 sec
03/20/2008 15:10:31
Detectors & Real-time Chromatograms




            ┌────────────┬──────────┬──────────┬────────┐
            │Name        │Stat      │Value     │Info    │
            ├────────────┼──────────┼──────────┼────────┤
            │TCD L1      │OK        │          │        │
            │TCD U1      │OK        │          │        │
            │TCD L2      │OK        │          │        │
            │TCD U2      │OK        │          │        │
            │TCD L3      │OK        │          │        │
            │TCD U3      │OK        │          │        │
            └────────────┴──────────┴──────────┴────────┘




Choose item: ▌▌ and select action:
┌──────────┬──────────┬──────────────────────┬─────────┐
│    ^     │    V     │                      │  VIEW   │
│          │          │                      │  CHROM  │
└──────────┴──────────┴──────────────────────┴─────────┘
```

View Detectors & Realtime Chroms (Monitor Menu), Continued

**"VIEW CHROM"
Screen**

Below is a real time chromatogram display.

```
Anlz: 189 OF_CC_HT_                                    Fault
App: Six TCDs                                            RUN
Strm: Stream 5                                  59 >  120 sec
03/20/2008 15:24:48
      TCD U3
```

Softkey Descriptions

Softkey	Use
"VIEW CHROM"	This softkey displays the real time chromatogram for the highlighted detector.
"CHANGE MAX Y"	This softkey changes the range of the Y axis for the chromatogram. Using this key, it is possible to zoom in and out for a chromatogram.
"IGNITE"	This softkey is used to ignite a flame type detector (FID or FPD). This softkey only appears when the selected detector is an FID or FPD.

Detectors & Realtime Chroms (Selection 5 on Maintenance Menu)

When to Use

This function is provided for maintenance and operations personnel in order to view chromatograms in real time.

The function of the "Detectors & Realtime Chroms" menu item on the Maintenance Menu is very similar to the similar selection which is available on the Monitor Menu. The primary difference is that there are additional functions available from the Maintenance Menu version of the screen that are not available on the Monitor Menu version.

Menu Path

The "Detectors & Realtime Chroms" screen can be accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Detectors & Realtime Chroms" Screen

Below is the selection screen for viewing real time chromatograms. Selections exist for each detector.

```
Anlz: 189 OF_CC_HT_                                    Fault
App: Six TCDs                                            RUN
Strm: Stream 5                                  95 >  120 sec
03/20/2008 16:08:57                       ████████████████ ▢
Detectors & Real-time Chromatograms




          Name            Status  Value   Balance   Info
          TCD L1          OK
          TCD U1          OK
          TCD L2          OK
          TCD U2          OK
          TCD L3          OK
          TCD U3          OK




Choose item: ▮▮ and select action:
    ┌──────┐ ┌──────┐ ┌─────────┐ ┌────┐ ┌─────────┐ ┌────────┐
    │  ^   │ │  V   │ │ FORCE   │ │    │ │ DETAILS │ │ VIEW   │
    │      │ │      │ │ BALANCE │ │    │ │         │ │ CHROM  │
    └──────┘ └──────┘ └─────────┘ └────┘ └─────────┘ └────────┘
```
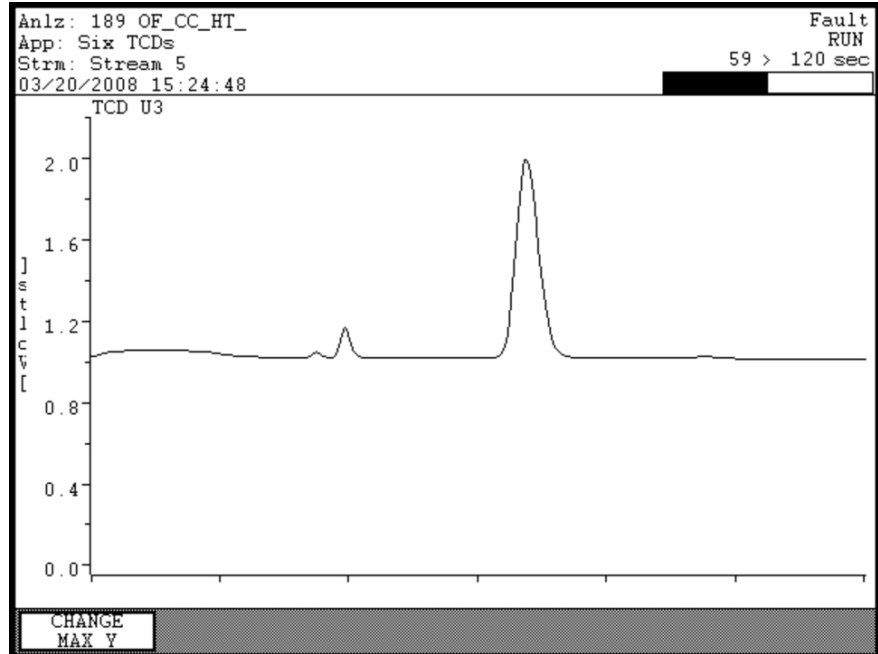
Detectors & Realtime Chroms (Maintenance Menu), Continued

"DETAILS" Screen

Below is an example of the screen displayed for a specific detector when the "DETAILS" softkey is pressed.

Softkey Descriptions

The following softkeys are available from the "Detectors & Realtime Chroms" screen and the applicable sub-screens. Note that the "Back" softkey may be used at any time to navigate to a previous menu.

Softkey	Use
"VIEW CHROM"	This softkey displays the real time chromatogram for the highlighted detector. The resulting real time chromatogram screen is the same whether it is accessed using the Maintenance Menu or the Monitor Menu.
"CHANGE MAX Y"	This softkey, available on the "VIEW CHROM" screen, changes the range of the Y axis for the chromatogram. Using this key, it is possible to zoom in and out for a chromatogram.

Detectors & Realtime Chroms (Maintenance Menu), Continued

Softkey Descriptions (continued)

Softkey	Use
"FORCE BALANCE"	This softkey balances the selected detector.
"IGNITE"	This softkey is used to ignite a flame type detector (FID or FPD). This softkey only appears when the selected detector is an FID or FPD.
"CHART ON-OFF"	This softkey turns the chart recorder output on and off.
"SETUP CHART"	This softkey allows the user to modify the scale and offset of the chart recorder output signal.
"BACK SPACE"	This softkey, available on the "SETUP CHART" and "MODIFY" screens, allows the user to back space while entering data in a field.
"NEXT FIELD"	This softkey, available on the "SETUP CHART" screen, toggles between parameter entry fields.
"DONE"	This softkey, available on the "SETUP CHART" and "MODIFY" screens, confirms changes that have been entered and returns the user to the previous screen. It is similar to an "ACCEPT CHANGES" softkey.
"MODIFY"	This softkey, when displayed, allows the user to change certain details for the detector that affect the display of real time chromatograms. Only parameters which have values shown in reverse video (black background with white lettering) may be modified. A separate data entry screen will be displayed when modifying certain parameters.
"NEXT ITEM"	This softkey produces unpredictable results. DO NOT USE.

Note: The "NEXT ITEM" softkey is known to produce unpredictable results. Do not use this softkey when modifying details.

View Results & Chromatograms (Selection 5 on Monitor Menu)

When to Use

This function is provided for maintenance and operations personnel in order to view the latest qualified or preliminary analytical results.

Menu Path

The "View Results & Chromatograms" screen can be accessed from the Monitor Menu. If not already displayed, the Monitor Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"View Results & Chromatograms" Screen

Below is the selection screen for viewing the latest stored results and chromatograms. Selections exist for each stream. For each stream, results and chromatograms are available for each detector.

```
Anlz: 189 OF_CC_HT_                                    Fault
App: Six TCDs                                            RUN
Strm: Stream 5                                    54 >  120 sec
03/20/2008 19:34:17                            ████████
Results & Chromatograms



              Stream        Date/Time
              Stream 1      03/20/2008 15:16:10
              Stream 2      03/20/2008 10:28:40
              Stream 3      03/20/2008 10:29:41
              Stream 4      03/20/2008 09:35:44
            > Stream 5      03/20/2008 19:31:12
              Stream 30     03/19/2008 19:30:52
              Stream 31
              Stream 32
              Stream 33
              Stream 34




> indicates in progress
Choose item: ▌▌ and select action:
┌──────────┬──────────┬──────────┬──────────┬──────────┐
│    ^     │    v     │  SELECT  │   VIEW   │          │
│          │          │  CHROM   │ RESULTS  │          │
└──────────┴──────────┴──────────┴──────────┴──────────┘
```

View Results & Chromatograms (Monitor Menu), Continued
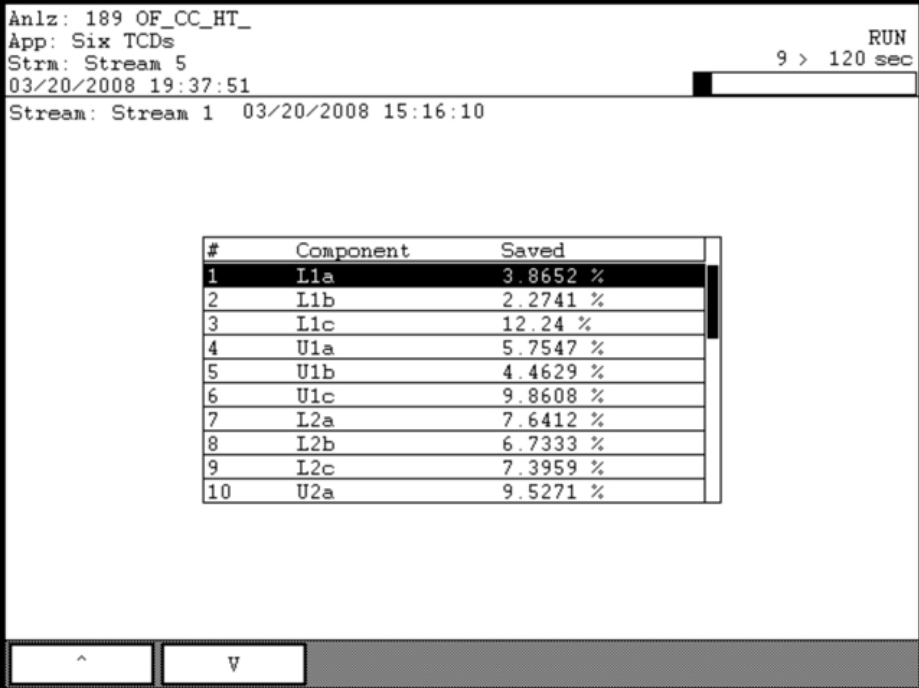
Interpreting the Displays

The display from the "View Results & Chromatograms" screen shows the Stream Name and the Cycle runtime for results. The current stream is identified by the line with ">" on the left.

The "VIEW RESULTS" display screen shows Result ID (peak or group ID), the result name, and the saved value(value that is certified).

On the "DISPLAY CHROM" screen the channel name and cycle time are displayed at the top of the content area.

"VIEW RESULTS" Screen

Below is an example of the screen that is displayed when the "VIEW RESULTS" softkey is pressed.

```
Anlz: 189 OF_CC_HT_
App: Six TCDs                                              RUN
Strm: Stream 5                                        9 >  120 sec
03/20/2008 19:37:51
Stream: Stream 1   03/20/2008 15:16:10




            #    Component      Saved
            1    L1a            3.8652 %
            2    L1b            2.2741 %
            3    L1c            12.24 %
            4    U1a            5.7547 %
            5    U1b            4.4629 %
            6    U1c            9.8608 %
            7    L2a            7.6412 %
            8    L2b            6.7333 %
            9    L2c            7.3959 %
            10   U2a            9.5271 %



         ^           V
```

View Results & Chromatograms (Monitor Menu), Continued

"SELECT CHROM" Screen

To display a chromatogram, press the "SELECT CHROM" softkey and then press the "DISPLAY CHROM" softkey. Below is an example of the resulting screen.

```
Anlz: 189 OF_CC_HT_                                         Fault
App: Six TCDs                                                 RUN
Strm: Stream 5                                        38 >  120 sec
03/20/2008 19:36:10
        Stream 1 : TCD L1                   03/20/2008 15:16:10
 2.40

 2.30

]
s
t 2.20
]
c
v
[ 2.10

 2.00

 1.90
       0       5      10   Cycle Ti15[sec] 20       25      30
              MANUAL        NEXT      DISPLAY
               ZOOM        CHANNEL     CHROM
```
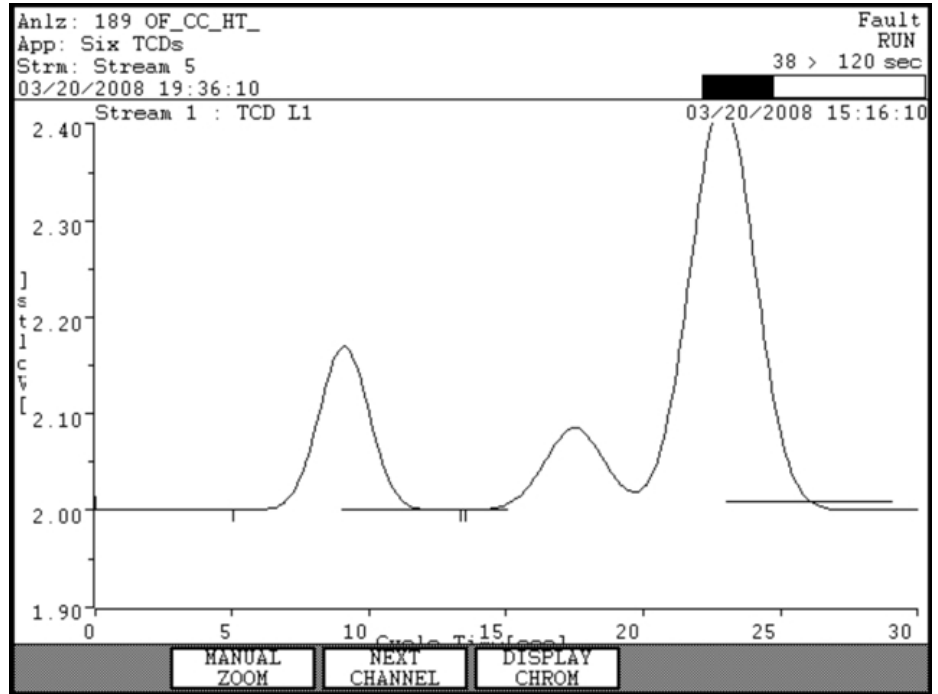
Note:

The display above is taken from the HMI software emulator (refer to the description of the emulator at the beginning of this chapter). There is an additional softkey available on the physical HMI that is not seen on the emulator. The "GRAPHIC ZOOM" softkey is located on the far left side of the softkey bar. The function of this softkey is described later in this section.

View Results & Chromatograms (Monitor Menu), Continued

Softkey Descriptions

The following softkeys are available from the "View Results & Chromatograms" screen and the applicable sub-screens. Note that the "Back" softkey may be used at any time to navigate to a previous menu.

Softkey	Use
"SELECT CHROM"	This softkey allows the user to display chromatograms and select a chromatogram for display.
"NEXT CHANNEL"	This softkey, available from the "SELECT CHROM" screen, is used to display the chromatogram information for the next detector channel. The name of the current channel is displayed at the top of the display area.
"DISPLAY CHROM"	This softkey is used to draw the chromatogram from the stored data. It is used when first entering the "SELECT CHROM" screen or whenever the "NEXT CHANNEL" softkey is pressed.
"MANUAL ZOOM"	This softkey activates a function which allows the user to manually set the X and Y axis limits. This allows the user to zoom in on a specific section of the chromatogram. The "MANUAL ZOOM" function is described in more detail later in this section.
"BACK SPACE"	This softkey, available from the "MANUAL ZOOM" data entry window, allows the user to back space while entering data in a field.
"ACCEPT CHANGE"	This softkey, available from the "MANUAL ZOOM" data entry window, is used to confirm the values entered in the data fields. When it is pressed, the zoomed chromatogram is drawn.
"CANCEL CHANGE"	This softkey, available from the "MANUAL ZOOM" data entry window, is used to cancel the zoom function and return to the original chromatogram.
"NEXT FIELD"	This softkey, available from the "MANUAL ZOOM" data entry window, allows the user to toggle between the available data fields.
"FULL UNZOOM"	This function, available when a zoom function has been used, removes the zoomed chromatogram and redisplays the original chromatogram.

# View Results & Chromatograms (Monitor Menu), Continued

Softkey Descriptions (continued)

Softkey	Use
"GRAPHIC ZOOM"	This softkey activates a function which allows the user to graphically set the X and Y axis limits by defining points on the chromatogram. This allows the user to zoom in on a specific section of the chromatogram. The "GRAPHIC ZOOM" function is described in more detail later in this section.
"HELP" and "REMOVE HELP"	When using "GRAPHIC ZOOM", the numeric keypad is used to move around the screen and select point. The "HELP" softkey, displays a description of the graphical functions of the numerical keypad. The "REMOVE HELP" softkey removes the help display.
"MORE"	This softkey displays the next set of available softkeys.
"SHOW/HIDE ACTL PK"	This softkey displays actual peak annotations on the chromatogram.
"SHOW/HIDE ACTL GP"	This softkey displays actual group annotations on the chromatogram.
"SHOW/HIDE RT WIN"	When this softkey is pressed, lines indicating the retention time window information are shown on the chromatogram.
"VIEW RESULTS"	This softkey displays a screen that shows the numerical results that are stored for the stream.

"MANUAL ZOOM" Function

"MANUAL ZOOM" allows a user to enlarge a portion of a chromatogram. Pressing the softkey opens a small window. In this window the user can input the minimum and maximum values for both the X and Y axes. The user may change any or all values in order to zoom in on particular sections of the screen. To display the zoomed chromatogram, press the "ACCEPT CHANGE" softkey. To switch between fields, press the "NEXT FIELD" softkey. The "BACK SPACE" softkey will delete characters.
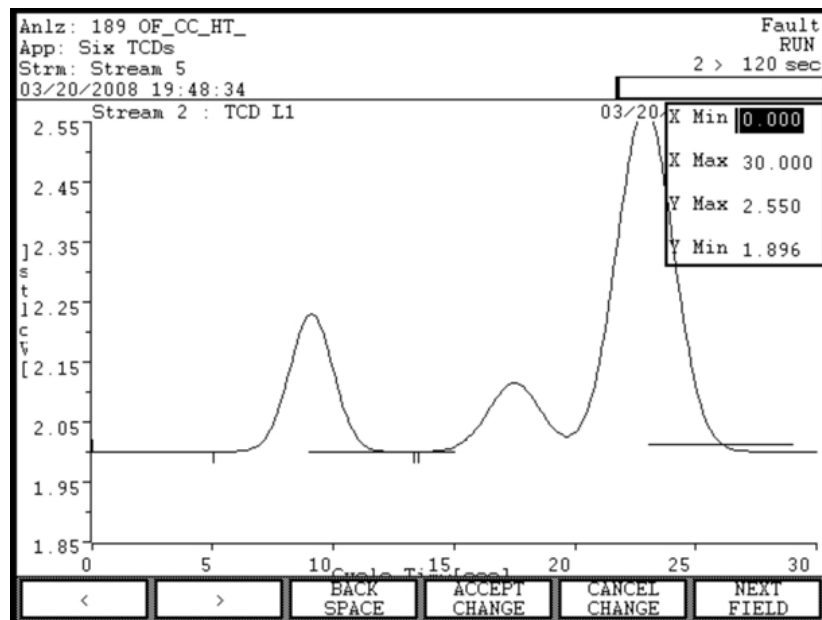
"GRAPHIC ZOOM" Function

"GRAPHIC ZOOM" performs a similar function to "MANUAL ZOOM". However, the "GRAPHIC ZOOM" function allows the user to define a box on the screen that will become the zoomed area. This is done by identifying two points on the screen that become opposite corners of the box. For many users, this visual method is considered easier than manually entering axis limits.
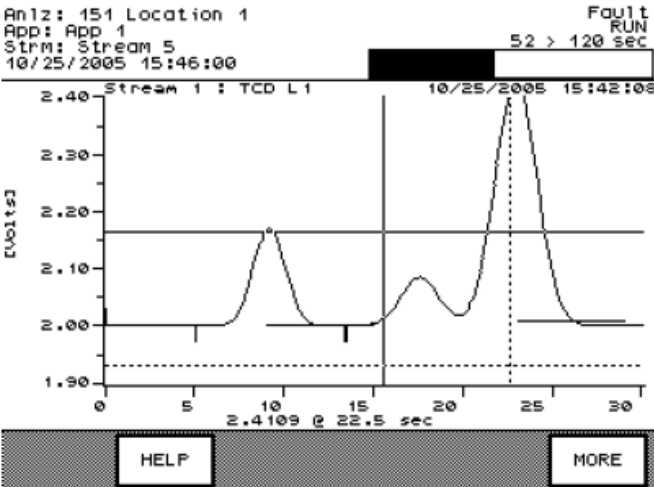
View Results & Chromatograms (Monitor Menu), Continued

"GRAPHIC ZOOM" Instructions

Step	Procedure
1.	Press the "GRAPHIC ZOOM" softkey. Dotted "crosshair" lines will appear in the chromatogram, and the softkey bar will change.
2.	Two points are required to define the zoom area. The first point defined should be the top left corner of the area. The second point defined should be the bottom right corner. The "crosshairs" indicate the location where the points are to be defined for the zoom. The location of a point is changed by using the numeric keypad. The functions of the keys on the keypad are as follows. The arrow keys move the location of the point (as identified by the crosshairs). Once an arrow key is pressed, the point continues to move until a different key is pressed. The "STOP" key stops movement of the crosshair. The "Checkmark" key confirms the selection of a point. The "X" key cancels the "GRAPHIC ZOOM" function. The "100" key is used when the chromatogram is already zoomed. It fully unzooms the chromatogram so that a different zoom area can be defined.

View Results & Chromatograms (Monitor Menu), Continued

"GRAPHIC ZOOM"
Instructions -
Continued

Step	Procedure
3.	Locate and confirm the first point. This should be the top left corner of the desired zoom area. When the point is confirmed (using the checkmark or "." key), the crosshairs switch from dashed lines to solid lines.
4.	Once the first point is defined, crosshairs should appear for the second point. Locate and confirm the second point. This will become the bottom right corner of the desired zoom area. As soon as the second point has been confirmed, the screen will change and the zoomed area will be shown.
Note:	Defining points other than "top left/bottom right" will result in the zoomed area being changed (reversed or flipped).
5.	A zoomed chromatogram can be restored to the original by pressing the "FULL UNZOOM" softkey.

Results & Chromatograms (Selection 6 on Maintenance Menu)

When to Use

This function is provided for maintenance personnel in order to perform the following functions.

> View the latest qualified or preliminary analytical results.

> View archived chromatograms and their associated results.

> Add chromatograms and their associated results to the archives.

The function of the "Results & Chromatograms" menu item on the Maintenance Menu is very similar to the similar selection which is available on the Monitor Menu. The primary difference is that there are additional functions available from the Maintenance Menu version of the screen that are not available on the Monitor Menu version.

Menu Path

The "Results & Chromatograms" screen can be accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"View Results & Chromatograms" Screen

Below is the selection screen for viewing the latest stored results and chromatograms. Selections exist for each stream. For each stream, results and chromatograms are available for each detector.

```
Anlz: 189 OF_CC_HT_                              Fault
App: Six TCDs                                      RUN
Strm: Stream 5                         117 >  120 sec
03/21/2008 15:40:32
Results & Chromatograms


        Stream       Date/Time
        Stream 1     03/20/2008 15:16:10
        Stream 2     03/20/2008 10:28:40
        Stream 3     03/20/2008 10:29:41
        Stream 4     03/20/2008 09:35:44
     >  Stream 5     03/21/2008 15:36:23
        Stream 30    03/19/2008 19:30:52
        Stream 31
        Stream 32
        Stream 33
        Stream 34

> indicates in progress
Choose item: ▐▌ and select action:
  _____  _____  SELECT    VIEW      ADD TO    GO TO
    ^          V      CHROM     RESULTS   ARCHV     ARCHV
```

Results & Chromatograms (Maintenance Menu), Continued

Interpreting the Displays

The display from the "View Results & Chromatograms" screen shows the Stream Name and the Cycle runtime for results. The current stream is identified by the line with ">" on the left.

The "VIEW RESULTS" display screen shows Result ID (peak or group ID), the result name, the buffered value (uncertified value) and the saved value (value that is certified).

On the "DISPLAY CHROM" screen, the channel name and cycle time are displayed at the top of the content area.

The "DETAILS" screen is accessed from the "VIEW RESULTS" screen. It contains detailed data for the results. Parameter names are on the left and values are on the right. Parameters that have values with black backgrounds may be modified using the "MODIFY" softkey.

The "GO TO ARCHV" screen shows a list of data sets that have been archived. The list shows the time stamp, application, and stream for the archived data. The "SELECT CHROM" and "VIEW RESULTS" softkeys on this screen are functionally the same as the softkeys (with identical names) that are available from the main "Results & Chromatograms" screen.

"VIEW RESULTS" Screen

Below is an example of the screen that is displayed when the "VIEW RESULTS" softkey is pressed.

Results & Chromatograms (Maintenance Menu), Continued

"DETAILS" Screen (for Results)

Below is an example of the screen displayed for a set of results when the "DETAILS" softkey is pressed.

```
Anlz: 189 OF_CC_HT_                          Fault
App: Six TCDs                                  RUN
Strm: Stream 5                        5 >  120 sec
03/21/2008 16:20:07

Name                     Value
app/stream/result        100/1/1
result name              L1a
cycle_runtime            03/20/2008 15:16:10
buffered_value           5.001
saved_value              3.865
AO                       0-0
DO                       0-0
value_units              %
decimal places           4
host euhi                100.
logval                   0
trtval                   0
limit                    0-0
compare value            0.


     ^              V
```

"SELECT CHROM" Screen

For the "SELECT CHROM" softkey, the version of the "Results & Chromatograms" function that is included on Maintenance Menu is functionally identical to the similar function included on the Monitor Menu. For a full description of the "SELECT CHROM" function refer to the appropriate section of this chapter which is titled:

> View Results & Chromatograms (Selection 5 on Monitor Menu)

Results & Chromatograms (Maintenance Menu), Continued

"GO TO ARCHV" Screen

Below is an example of the screen that is displayed when the "GO TO ARCHV" softkey is pressed.

```
Anlz: 189 OF_CC_HT_                              Fault
App: Six TCDs                                      RUN
Strm: Stream 5                            100 >  120 sec
03/21/2008 16:23:53                   ██████████████
Archive



   #   Date/Time              Application,Stream
   --- 03/20/2008 15:16:10    Six TCDs, Stream 1
   --- 03/20/2008 10:29:41    Six TCDs, Stream 3
   --- 03/21/2008 16:20:03    Six TCDs, Stream 5




Choose item: ▌▌ and select action:
  ┌─────┐ ┌─────┐ ┌────────┐ ┌────────┐ ┌─────────┐
  │  ^  │ │  V  │ │ DELETE │ │ SELECT │ │  VIEW   │
  └─────┘ └─────┘ └────────┘ │ CHROM  │ │ RESULTS │
                              └────────┘ └─────────┘
```

Note:

On the "GO TO ARCHV" screen there are softkeys named "SELECT CHROM" and "VIEW RESULTS". These two softkeys do not have the same level of function as similar softkeys found on the main screen for "Results & Chromatograms" (Maintenance Menu). However, they are functionally identical to the similar softkeys which are available on the "View Results & Chromatograms" screen on the *Monitor* Menu.

Results & Chromatograms (Maintenance Menu), Continued

Softkey Descriptions

The following softkeys are available from the "Results & Chromatograms" screen and the applicable sub-screens. Note that the "Back" softkey may be used at any time to navigate to a previous menu.

Softkey	Use
"SELECT CHROM"	This softkey allows the user to display chromatograms and select a chromatogram for display.
"NEXT CHANNEL"	This softkey, available from the "SELECT CHROM" screen, is used to display the chromatogram information for the next detector channel. The name of the current channel is displayed at the top of the display area.
"DISPLAY CHROM"	This softkey is used to draw the chromatogram from the stored data. It is used when first entering the "SELECT CHROM" screen or whenever the "NEXT CHANNEL" softkey is pressed.
"MANUAL ZOOM"	This softkey activates a function which allows the user to manually set the X and Y axis limits. This allows the user to zoom in on a specific section of the chromatogram. The "MANUAL ZOOM" function is described in more detail in the previous section, View Results & Chromatograms (Selection 5 on Monitor Menu).
"BACK SPACE"	This softkey, when available, allows the user to back space while entering data in a field.
"ACCEPT CHANGE"	This softkey, when available, is used to confirm the values entered in the data fields. When it is pressed, the zoomed chromatogram is drawn.
"CANCEL CHANGE"	This softkey, when available, is used to cancel the zoom function and return to the original chromatogram.
"NEXT FIELD"	This softkey, when available, allows the user to toggle between the available data fields.
"FULL UNZOOM"	This function, available when a zoom function has been used, removes the zoomed chromatogram and redisplays the original chromatogram.

Results & Chromatograms (Maintenance Menu), Continued

Softkey Descriptions (continued)

Softkey	Use
"GRAPHIC ZOOM"	This softkey activates a function which allows the user to graphically set the X and Y axis limits by defining points on the chromatogram. This allows the user to zoom in on a specific section of the chromatogram. The "GRAPHIC ZOOM" function is described in more detail in the previous section, View Results & Chromatograms (Selection 5 on Monitor Menu).
"HELP" and "REMOVE HELP"	When using "GRAPHIC ZOOM", the numeric keypad is used to move around the screen and select points. The "HELP" softkey displays a description of the graphical functions of the numerical keypad. The "REMOVE HELP" softkey removes the help display.
"MORE"	This softkey, when available, displays the next set of available softkeys.
"SHOW/HIDE ACTL PK"	This softkey displays actual peak annotations on the chromatogram.
"SHOW/HIDE ACTL GP"	This softkey displays actual group annotations on the chromatogram.
"SHOW/HIDE RT WIN"	When this softkey is pressed, lines indicating the retention time window information are shown on the chromatogram.
"VIEW RESULTS"	This softkey displays a screen that shows the numerical results that are stored for the stream. Two versions of this softkey are available under "Results & Chromatograms" (Maintenance Menu). The first version is found under the main screen and is the full version of the "VIEW RESULTS" function. In this version values can be modified and details can be viewed and changed. The second version is found under the "GO TO ARCHV" screen and is a limited version that provides only a display of the basic saved results.

Results & Chromatograms (Maintenance Menu), Continued

Softkey Descriptions (continued)

Softkey	Use
"TRT NOW"	This softkey (Transmit Trigger) is used to transmit data for the selected stream to Modbus or OPC, as configured in the Host table of the analyzer.
"LOG NOW"	This softkey is used to print a standard log report for the selected stream to printers configured in the analyzer's Printer table.
"DETAILS"	This softkey displays a detailed information screen for a specific result in the results table. Details which have their values shown against a black background may be modified using the "MODIFY" softkey.
"MODIFY"	This softkey, when displayed, allows the user to change certain details or values on the results table.
"NEXT ITEM"	This softkey produces unpredictable results. DO NOT USE.
"DONE"	This softkey is used to confirm the input of a parameter change and return to the previous menu. It is similar to an "ACCEPT CHANGES" softkey.
"ADD TO ARCHV"	This softkey is used to save the selected results and chromatogram to an archive table. This archived data may be saved permanently or temporarily and may be loaded to EZChrom workstation software as needed.
"GO TO ARCHV"	This softkey is used to display and manage data that is saved using the "ADD TO ARCHV" function. Results and chromatograms can be displayed and archived data can be deleted.
"DELETE"	Available on the "GO TO ARCHV" screen, this softkey deletes the currently selected archived data.

Note: The "NEXT ITEM" softkey is known to produce unpredictable results. Do not use this softkey when modifying details.

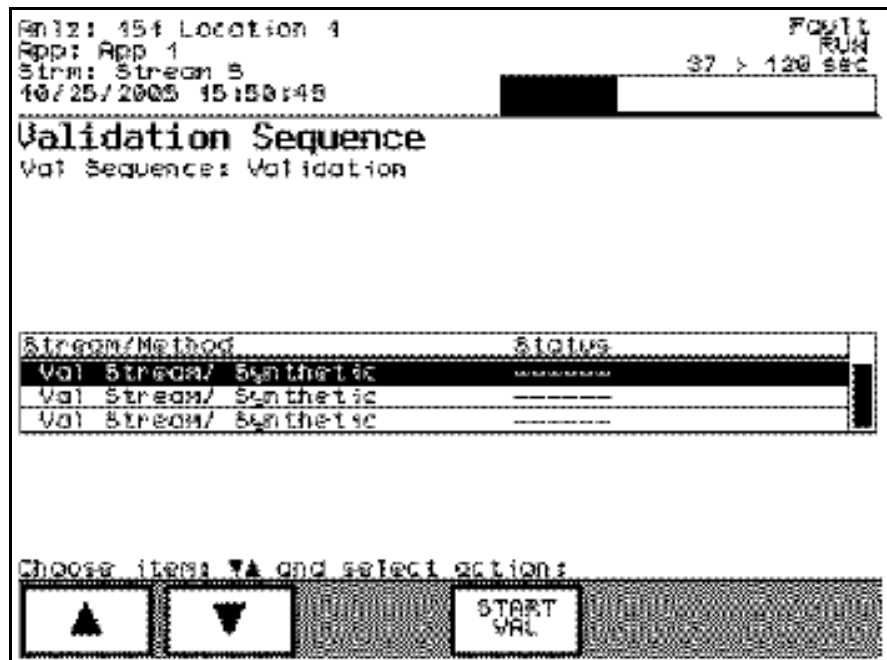# Validation (Selection 6 on Monitor Menu)

When to Use

This function is provided for maintenance and operations personnel in order to validate the analytical results provided by the analyzer.

Menu Path

The "Validation" screen can be accessed from the Monitor Menu. If not already displayed, the Monitor Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.
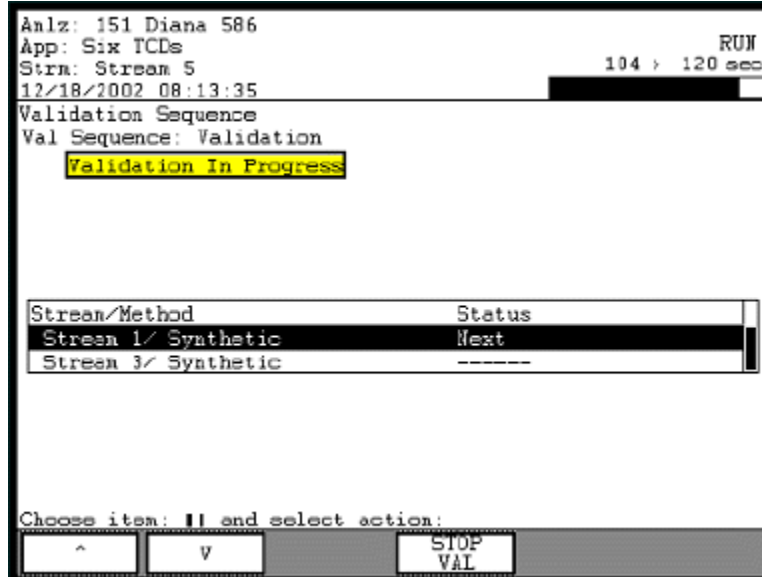
"Validation" Screen

Below is the "Validation" screen available from the Monitor Menu. The "START VAL" softkey will start the validation sequence immediately. If the analyzer is in a Hold status when the "START VAL" softkey is pressed, the "RUN" softkey will appear and must be pressed in order to start validation. The analyzer will remain in "RUN" after the validation is complete.

Validation (Monitor Menu), Continued

"Validation In Progress" Screen

The following screen is displayed when validation is running. The "STOP VAL" softkey will interrupt the validation and change the analyzer status to Hold.

```
Anlz: 151 Diana 586
App: Six TCDs                                        RUN
Strm: Stream 5                            104 >  120 sec
12/18/2002 08:13:35
Validation Sequence
Val Sequence: Validation
     Validation In Progress


Stream/Method                    Status
  Stream 1/ Synthetic            Next
  Stream 3/ Synthetic            ------




Choose item: ↑↓ and select action:
    ^            V            STOP
                             VAL
```

Note:

When validation is completed successfully, the "Validation in Progress" message will be replaced with the "Validation Successful" message. This message will remain part of the "Validation" screen until the next validation. This is true even if the user exits the screen and returns.

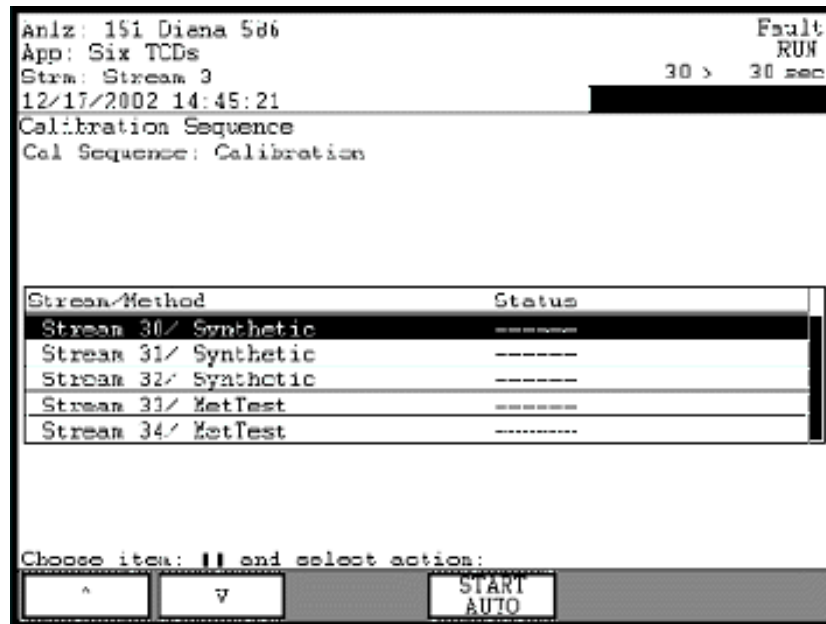# Calibration (Selection 7 on Monitor Menu)

When to Use

This function is provided for maintenance and operations personnel in order to calibrate the analyzer.

Menu Path

The "Calibration" screen can be accessed from the Monitor Menu. If not already displayed, the Monitor Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.
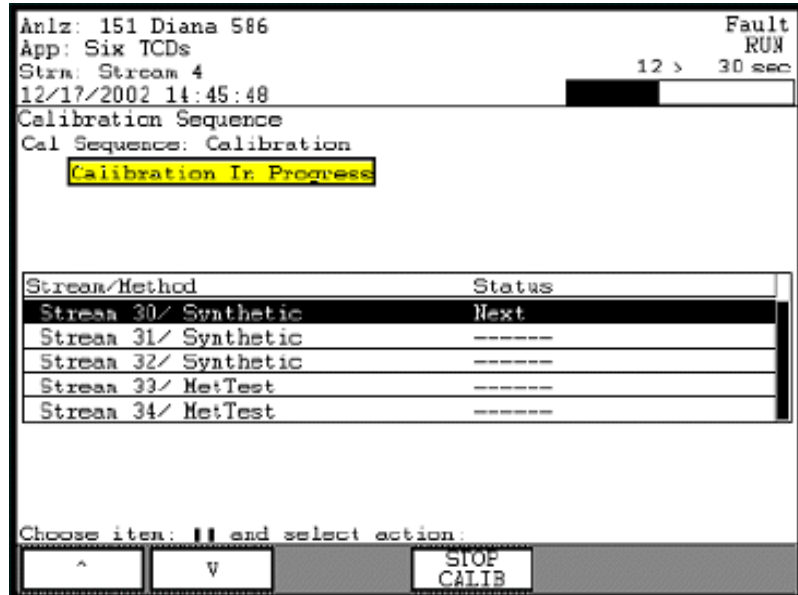
"Calibration" Screen

Below is the "Calibration" screen available from the Monitor Menu. The "START AUTO" softkey will start the calibration sequence as soon as the current cycle completes. If the analyzer is in a hold status when the "START AUTO" softkey is pressed, the "RUN" softkey will appear and must be pressed in order to start calibration. The analyzer will remain in "RUN" after the calibration is complete (continuing with the normal sequence).

Calibration (Monitor Menu), Continued

"Calibration In Progress" Screen

The following screen is displayed when calibration is running. The "STOP CALIB" softkey will interrupt the calibration and change the analyzer status to Hold.

```
Anlz: 151 Diana 586                              Fault
App: Six TCDs                                      RUN
Strm: Stream 4                            12 >   30 sec
12/17/2002 14:45:48                    ████████░░░░░
Calibration Sequence
Cal Sequence: Calibration
   Calibration In Progress

Stream/Method                     Status
  Stream 30/ Synthetic            Next
  Stream 31/ Synthetic            ------
  Stream 32/ Synthetic            ------
  Stream 33/ MetTest              ------
  Stream 34/ MetTest              ------



Choose item: ▮▮ and select action:
┌───────┬───────┬───────┬───────┬───────┐
│   ^   │   V   │       │ STOP  │       │
│       │       │       │ CALIB │       │
└───────┴───────┴───────┴───────┴───────┘
```

Note:

When calibration is completed successfully, the "Calibration in Progress" message will be replaced with the "Calibration Successful" message. This message will remain part of the "Calibration" screen until the next calibration. This is true even if the user exits the screen and returns.

Applications (Selection 3 on Maintenance Menu)

When to Use

This function is provided for maintenance personnel in order to perform the following functions.

- View basic and extended details for applications

- View sequences for an application

- Place an application in or out of service

- Place an application in Run or Hold

- Disable an application

- Halt an application

Menu Path

The "Applications" screen can be accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Applications" Main Screen

Below is the main screen that is displayed when "Applications" is selected from the Maintenance Menu. A selection exists for each available application.
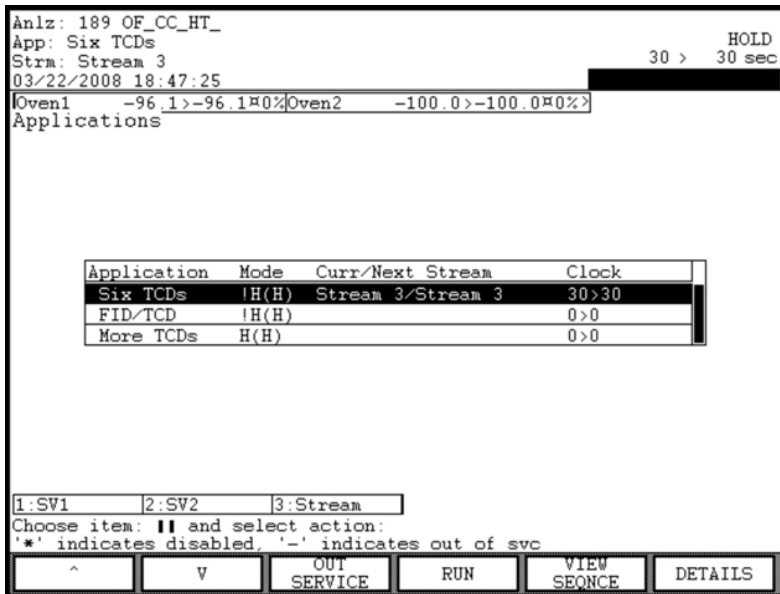
Applications (Maintenance Menu), Continued

"DETAILS" Screen

Below is an example of the screen that is displayed when the "DETAILS" softkey is pressed from the "Applications" menu.

```
Anlz: 189 OF_CC_HT_
App: Six TCDs                                              HOLD
Strm: Stream 3                                     30 >   30 sec
03/22/2008 18:48:15



          Application          Six TCDs (100)
          Run Mode(SNE)        HOLD(HOLD)
          Current Stream       Normal/Stream 3/Synthetic
          Next Stream
          Injection Lag        -3.
          AutoClear alarms?    No
          App. inservice?      Yes
          App. enabled?        Yes
          Auto Cal Enabled?    Yes
          Simulate Clock?      No
          TRT enabled?         Yes
          calibration status   0
          validation status    0
          remote App/Master    0/0



Choose item: ▮▮ and select action:
'*' indicates disabled, '-' indicates out of svc
  ┌─────────┬─────────┬─────────┐
  │    ^    │    V    │  HALT   │
  │         │         │  APP    │
  └─────────┴─────────┴─────────┘
```

"VIEW SEQNCE" Screen

The "VIEW SEQNCE" softkey activates the same function that is activated from the "Stream Sequences" selection on the Maintenance Menu. All softkeys and features are the same. For a full description of this function refer to the appropriate section of this chapter which is titled:

Stream Sequences (Selection 4 on Maintenance Menu)

Applications (Maintenance Menu), Continued

Interpreting the Displays

At the top of the "Applications" screen is the temperature/pressure information bar. This bar shows a simple view of current temperature and pressure for the selected application. To scroll the bar to the left and right, use the numeric keypad keys 8 and 9.

The middle section of the screen is the table of applications. Included on this table for each application is the application name, the Status/Run mode, the current and next stream, and the cycle clock.

The run mode is indicated by letters ("R" for run and "H" for hold). The state "H(H)" indicates that the application is in "Hold". The display "R(R)" indicates that the application is in run. The display "H(R)" indicates that the application has been placed in hold but that a cycle is completing. An exclamation point next to the mode indicates that there is an active fault alarm associated with the application. A question mark next to the mode indicates that there is an active warning alarm associated with the application.

At the bottom of the content area is the valve information bar. This bar shows a simple view of DOs defined for the selected application. Scrolling of the valve bar to the left and right, if possible, is accomplished using the period (.) and dash (-) numeric keypad keys. To toggle the value of the DO, use keypad numeric keypad keys which match the `numbers appearing next to the DO in the bar.

The "DETAILS" screen contains detailed data for the results. Parameter names are on the left and values are on the right. Parameters that have values with black backgrounds may be modified using the "MODIFY" softkey. For the "Applications" screen, all details that can be changed are "Yes/No"

Applications (Maintenance Menu), Continued

Softkey Descriptions

The following softkeys are available from the "Applications" screen and the applicable sub-screens. Note that the "Back" softkey may be used at any time to navigate to a previous menu.

Softkey	Use
"IN SERVICE" & OUT SERVICE"	This softkey places the selected application either in service or out of service. An application that is out of service will not move or transmit results, but will continue to cycle.
"RUN" & "HOLD"	This softkey allows the user to place the currently selected application into either a run or hold mode.
"VIEW SEQNCE"	This softkey activates the "Stream Sequence" screen. This is the same screen which can be accessed by selecting the "Stream Sequence" selection from the Maintenance Menu (selection 4).
"DETAILS"	This softkey displays a detailed information screen for a selected application. Details which have their values shown against a black background may be modified using the "MODIFY" softkey.
"HALT APP"	This softkey halts the selected application. Halting an application will cause immediate cessation of the cycle and will place the application into a hold mode. In addition, a fault alarm is generated which invalidates the results for the current cycle.
"MODIFY"	This softkey, when displayed, allows the user to change certain details or values on the results table. For the "Applications" screen, all details which can be changed are "Yes/No". The "MODIFY" softkey toggles between the "Yes" and "No" values.

Note:

An application may be enabled or disabled by selecting the "Details" screen and modifying the "App. enabled?" parameter. A disabled application cannot be put in the run mode.

Method, Calibration & Validation (Selection 7 on Maintenance Menu)

Description

The "Method, Calibration & Validation" function provides a menu of functions related to the selected method. The following functions are listed on the menu.

       Calibration and Validation

       View and Manage Results and Chromatograms

       Adjust Peaks, Blends, and Factors

       Adjust Flows (Pressure Program)

       Adjust Integration Events

       Adjust the Temperature Program

       Adjust the Channel and Cycle

       View the Event Summary

Note:

Each of the selections on the "Method, Calibration & Validation" menu opens a different sub-screen. For the purposes of this manual, descriptions for each of the sub-screens are contained in separate sections within this chapter.

Menu Path

The "Method, Calibration & Validation" screen can be accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

Method, Calibration & Validation (Maintenance Menu), Continued

"Method, Calibration & Validation" Menu Screen

Below is the menu screen that is displayed when "Method, Calibration & Validation" is selected from the Maintenance Menu. The different selections on the menu are described in later sections of this chapter.

```
Anlz: 189 OF_CC_HT_                                          RUN
App: Six TCDs                                        55 >  120 sec
Strm: Stream 5
03/24/2008 16:11:22
Oven1    -96.1>-96.1¤0%Oven2    -100.0>-100.0¤0%>
Method, Calibration & Validation
Method:MetTest



                      1. Calibration & Validation
                      2. Results & Chromatograms
                      3. Adjust Peaks, Blends & Factors
                      4. Adjust Valve &  Event Times
                      5. Adjust Flows(Pressure Program)
                      6. Adjust Integration Events
                      7. Adjust Temperature Program
                      8. Adjust Channel & Cycle
                      9. View Event Summary




1:SV1        2:SV2        3:Stream
Choose item or use keypad to select # of menu item
 ┌────────┬────────┬────────┬────────┬────────┬────────┐
 │   ^    │   V    │  HOLD  │  NEXT  │ VALVE  │ SELECT │
 │        │        │        │ METHOD │ KEYPAD │        │
 └────────┴────────┴────────┴────────┴────────┴────────┘
```
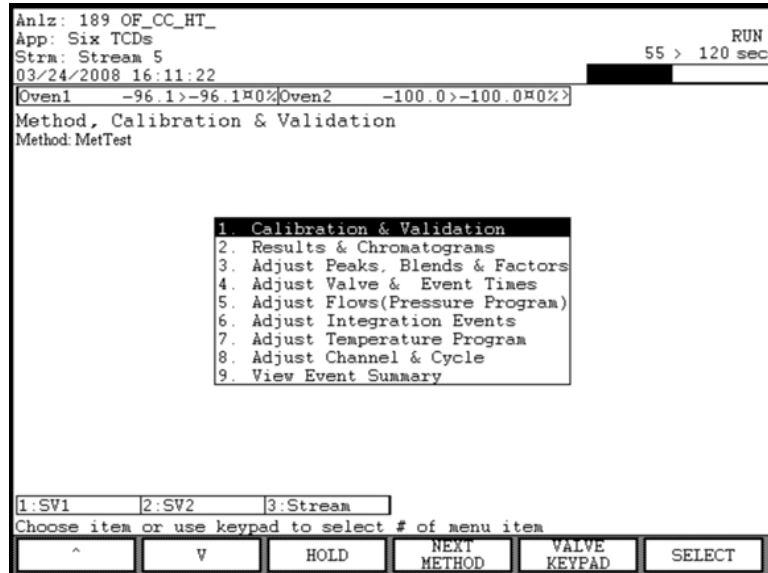
Interpreting the Display

The name of the currently selected method is displayed near the top of the screen just below the screen name. Selections from the menu will be applicable to the selected method. The "NEXT METHOD" softkey is displayed if more than one method exists and is used to change the selected method.

Near the top of the menu screen just above the screen name is the temperature/pressure information bar. This bar shows a simple view of current temperature and pressure for the selected application. If the "VALVE KEYPAD" option is selected (see softkey descriptions), the user may scroll this information bar to the left and right using the numeric keypad keys 8 and 9.

At the bottom of the content area is the valve information bar. This bar shows a simple view of DOs defined for the selected application. If the "VALVE KEYPAD" option is selected (see softkey descriptions), the user may perform the following functions on the valve information bar. Scrolling of the valve bar to the left and right, if possible, is accomplished using the period (.) and dash (-) numeric keypad keys. To toggle the value of the DO, use the numeric keypad keys which match the numbers appearing next to the DO in the bar.

Method, Calibration & Validation (Maintenance Menu), Continued

Softkey Descriptions

The following softkeys are available from the "Method, Calibration & Validation" screen. Softkeys for sub-screens are covered in other sections of this chapter.

Softkey	Use
"RUN" & "HOLD"	This softkey allows the user to place the currently selected application into either a run or hold mode. The current application can be seen in the far top left side of the screen on the status bar.
"NEXT METHOD"	This softkey selects which method is to be applicable to the selections on the "Method, Calibration & Validation" menu. The selections on the menu are applicable to only one method at a time. The selected method is listed just below the menu name.
"VALVE KEYPAD" & "MENU KEYPAD"	This softkey modifies the function of the numeric keypad. For the "Method, Calibration & Validation" menu, the numeric keypad has two sets of possible functions. When the "MENU KEYPAD" softkey is pressed, the user may press number keys to select items from the menu. When the "VALVE KEY"PAD" softkey is pressed, the numeric keypad to is used to operate or navigate the temperature/pressure controller bar and the valve bar (see "Interpreting the Display" on the previous page for more information).
"SELECT"	This softkey, when used with the arrow keys, will select and activate a menu item.

Calibration & Validation (on Method, Calibration & Validation Menu)

Description

"Calibration & Validation" which is selection 1 on the "Method, Calibration & Validation" menu is designed to allow maintenance personnel to perform the following functions.

> Perform Manual or Automatic Calibration
>
> Start a Validation Sequence
>
> View Validation Results
>
> View and/or Modify Calibration Response Factors, Times, and Blends

Note:

The functions of the "Calibration & Validation" screen are similar to the functions for the "Validation" and "Calibration" screens that are accessible from the Monitor Menu. However, there are a few additional features available on the "Calibration and Validation" screen that is available through the Maintenance Menu.

Menu Path

The "Calibration & Validation" screen may be accessed from the "Method, Calibration & Validation" menu. The "Method, Calibration & Validation" menu is accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

Interpreting the Display

The type and name of the stream sequence is displayed just below the name of the screen. The type is either calibration or validation. The normal stream sequence does not display from this screen.

The user can toggle from the calibration sequence to the validation sequence using the "NEXT SEQNCE" softkey.

Calibration & Validation, Continued

"Calibration & Validation" Screen (Calibration)

Below is the menu screen that is displayed when "Calibration & Validation" is selected from the "Method, Calibration & Validation" menu. This is the screen associated with the calibration function.
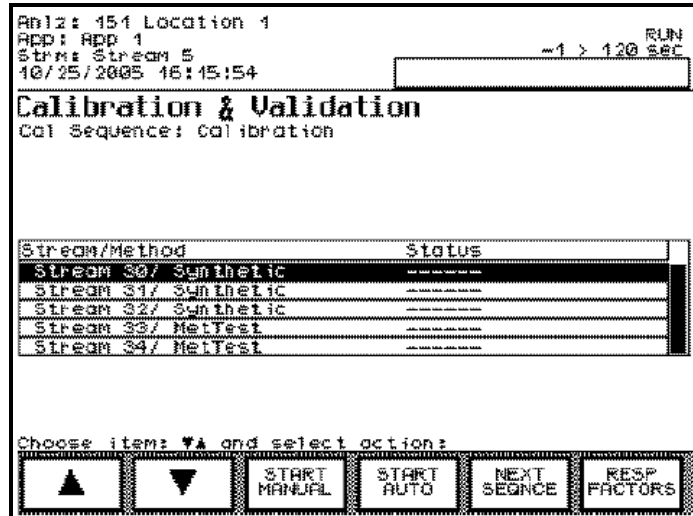
"Calibration & Validation" Screen (Validation)

Below is the menu screen that is displayed when "Calibration & Validation" is selected from the "Method, Calibration & Validation" menu. This is the screen associated with the validation function.
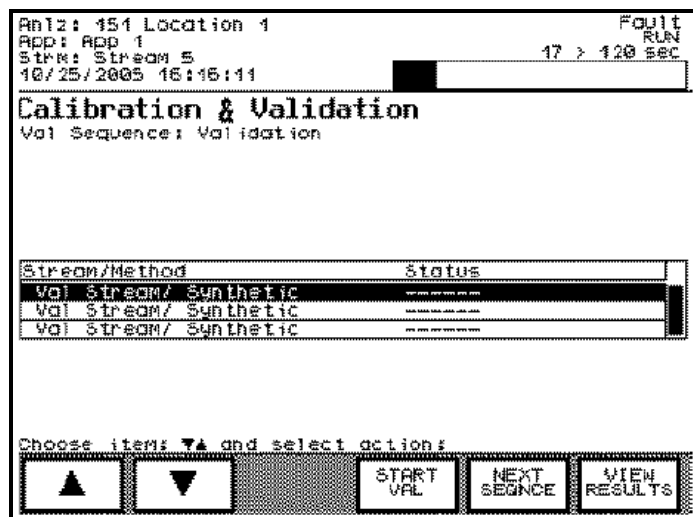
Calibration & Validation, Continued

Calibration Function

Calibration is used within the analyzer to establish and adjust the relationships between peak sizes and sample content. Two types of calibration are available in the Maxum II, manual calibration and autocalibration.

When the "Calibration & Validation" option is selected from the "Method, Calibration & Validation" menu, the initial screen is the screen for the calibration sequence. It is possible to navigate back and forth between the validation sequence and the calibration sequence using the "NEXT SEQNCE" softkey.

From the calibration screen and sub-screens, it is possible to start and stop manual calibration or autocalibration. It is also possible to manually change peak settings for response factors, times, and blends.

Autocalibration operates as follows:

When the "START AUTO" softkey is pressed, the entire calibration sequence displayed will be run (except for disabled streams)

After automatic calibration is finished the analyzer will revert back to the original sequence.

If calibration margins have been entered (refer to the "Blends" screen") and if the measured values are within the margins then the calibration will be accepted and the response factors will be automatically adjusted.

Pressing the "STOP CALIB" softkey during autocalibration will immediately interrupt the calibration sequence.

Manual calibration operates as follows:

The user selects a specific calibration stream from the table.

The "START MANUAL" softkey is pressed. At this point, the analyzer will be automatically placed in hold and the selected stream will automatically be set to always run.

The "RUN" button must be pressed to start calibration. At this point the stream will begin to run continuously until it is manually stopped.

If the "HOLD" softkey is pressed, the calibration will remain active but will be put in a hold status. At this point the user may view the response factors using the "RESP FACTORS" softkey and accept the response factors, if they are satisfactory.

If the "STOP CALIB" softkey is pressed, the calibration will stop and the active sequence will be set back to the normal process sequence.

Calibration & Validation, Continued

"RESP FACTORS" Screen (Factors)

Below is the initial screen that is displayed when the "RESP FACTORS" softkey is pressed while in the calibration screen. This screen allows the user to view and modify the calibration response factors.

```
Anlz: 167 AL-KB-LT-HRVOC_GC_4.2                        Fault
App: App1                                               HOLD
Strm: Stream 1                                422 >  422 sec
03/25/2008 09:13:13
Peak Settings: Factors
Level 1/3

Peak/Channel      New       Resp       New        Chg%
                  Meas      Factor     Factor
Carbon Dioxide   0.3060    192542.4   192542.4        0.
(P1/14)
Ethylene         0.8320    204881.0   204881.0        0.
(P2/14)
Ethane (P3/14)   0.4700    216319.1   216319.1        0.
Acetylene        0.1320    169484.8   169484.8        0.
(P4/14)
Hydrogen         2.0430      6315.22    6315.22       0.
(P5/17)
Oxygen (P6/17)   0.1310    324625.9   324625.9        0.
Nitrogen         8.0380    223824.7   223824.7        0.
(P7/17)
Methane         16.0070    202248.7   202248.7        0.
(P8/17)
Carbon           0.0740    197148.6   197148.6        0.
Monoxide
Press 1-Times, 2-Blend, 3-Factors
Choose item: ▌▌ and select action:
  ┌──────┐┌──────┐┌──────┐┌──────┐┌──────┐┌──────┐
  │  ^   ││  v   ││ NEXT ││MANUAL││ACCEPT││ RE-  │
  │      ││      ││LEVEL ││  RF  ││FACTORS││PROCESS│
  └──────┘└──────┘└──────┘└──────┘└──────┘└──────┘
```

Note:

The initial screen that is displayed when the "RESP FACTORS" softkeys is pressed is for viewing, accepting, and modifying response factors. At the bottom of the content area is a list of other calibration related items that can be viewed and modified. Press 1 to view/modify Peak Times. Press 2 to view/modify Blends. Press 3 to view/modify Response Factors.

Calibration & Validation, Continued

"RESP FACTORS" Screen (Blends)

Below is the screen that is displayed when keypad number 2 ("Blend") is pressed from the "RESP FACTORS" screen. This screen allows the user to change the known concentration ("Blend"). From this screen the user is also able to change the acceptable margin for autocalibration.

```
Anlz: 167 AL-KB-LT-HRVOC_GC_4.2
App: App1                                          HOLD
Strm: Stream 1                              422 >  422 sec
03/25/2008 09:14:06
Peak Settings: Blends
Level 1/3

  Peak/Channel      Blend    New      Margin
                             Blend
  Carbon Dioxide    0.306    none     0.00
  (P1/14)
  Ethylene          0.832    none     0.00
  (P2/14)
  Ethane (P3/14)    0.47     none     0.00
  Acetylene         0.132    none     0.00
  (P4/14)
  Hydrogen          2.04     none     0.00
  (P5/17)
  Oxygen (P6/17)    0.131    none     0.00
  Nitrogen          8.04     none     0.00
  (P7/17)
  Methane           16.01    none     0.00
  (P8/17)
  Carbon            0.074    none     0.00
  Monoxide
Press 1-Times, 2-Blend, 3-Factors
Choose item: ∥ and select action:
   ^          v        NEXT              CHANGE   CHANGE
                       LEVEL             MARGIN   BLEND
```

"RESP FACTORS" Screen (Times)

Below is the screen that is displayed when keypad number 1 ("Times") is pressed from the "RESP FACTORS" screen. This screen allows the user to modify the expected peak retention times. From this screen the user is also able to accept the new peak times.

```
Anlz: 167 AL-KB-LT-HRVOC_GC_4.2
App: App1                                          HOLD
Strm: Stream 1                              422 >  422 sec
03/25/2008 09:15:50
Peak Settings: Times
Level 1/3

  Peak/Channel      Expect   Actual   Rt Time
                    Rt Time  Rt Time  Window
  Carbon Dioxide    55.59    55.10    10.00
  (P1/14)
  Ethylene          71.96    71.40    10.00
  (P2/14)
  Ethane (P3/14)    86.90    86.70    12.00
  Acetylene         115.00   115.70   14.00
  (P4/14)
  Hydrogen          14.50    14.70    6.00
  (P5/17)
  Oxygen (P6/17)    21.70    21.60    8.00
  Nitrogen          34.60    36.40    10.00
  (P7/17)
  Methane           49.90    50.50    10.00
  (P8/17)
  Carbon            125.00   127.10   16.00
  Monoxide
Press 1-Times, 2-Blend, 3-Factors
Choose item: ∥ and select action:
   ^          v        NEXT              ACCEPT   CHANGE
                       LEVEL             TIME     TIME
```

Calibration & Validation, Continued

Softkey Descriptions for Calibration

The following softkeys are available from the "Calibration & Validation" screen under the "Method, Calibration & Validation" menu. The following softkeys are for the calibration portion of the menu function. The softkeys for the validation portion are defined later.

Softkey	Use
"START MANUAL"	This softkey starts the manual calibration function as defined earlier in this section.
"RUN/HOLD"	This softkey toggles the analyzer between the Run and Hold statuses.
"START AUTO"	This softkey starts the autocalibration sequence as defined earlier in this section.
"STOP CALIB"	This softkey stops a currently running calibration sequence and places the analyzer in the Hold status.
"NEXT SEQNCE"	This softkey is used to switch from the calibration sequence to the validation sequence. The validation sequence is described later in this section.
"RESP FACTORS"	This softkey allows the user to modify peak data for the calibration. The initial screen is for viewing, accepting, or modifying response factors. The numerical keypad can be used for activating screens to view, modify, or accept changes to other data. Numerical keys are assigned as follows: 1. Peak Times 2. Blend and Margin 3. Response Factors (default screen)
"MANUAL RF"	This softkey allows the user to define a manual response factor. The manual response factor overrides the calculated response factor. When a manual response factor is entered, it will be preceded by an asterisk(*) in the table. To remove a manual response factor, press the "MANUAL RF" button again and then press "REMOVE".

Calibration & Validation, Continued

Softkey Descriptions for Calibration (continued)

Softkey	Use
"BACK SPACE"	This softkey, when available, allows the user to back space while entering data in a field.
"ACCEPT CHANGE"	This softkey, when available, is used to confirm the values entered in the data fields. When it is pressed the data entry fields disappear and the data is stored.
"CANCEL CHANGE"	This softkey, when available, is used to cancel a change. When it is pressed the data entry fields disappear and any modified entries remain at their original value.
"REMOVE"	This softkey removes a changed parameter (such as a manual response factor or blend) after the data has been changed. The value reverts back to the original value.
"ACCEPT FACTORS"	This softkey accepts the new response factors from the table of response factors. Usually this step is done during manual calibration.
"RE-PROCESS"	If there is a reprocess step configured in the sequence, this softkey will cause the last chromatogram to be reprocessed. Changes made to the peak setup will be applied to the reprocess.
"CHANGE MARGIN"	This softkey is used to change the margin that is used during autocalibration. If the values measured during autocalibration are within the expected margin, then the measured values are automatically accepted and the response factors are adjusted.
"CHANGE BLEND"	This softkey is used to change the blend locally in a temporary location. This new blend will be used in autocalibration, but does not become permanent until new response factors are accepted. To revert to the previous blend value press the "CHANGE BLEND" softkey again and then press the "REMOVE" softkey.

Calibration & Validation, Continued

Softkey Descriptions for Calibration (continued)

Softkey	Use
"CHANGE TIME"	This softkey allows the user to change the peak retention time and retention time window . This will modify the method locally, but will not change the method permanently until ACCEPT TIME is pressed.
"ACCEPT TIME"	This softkey accepts the locally changed peak times. Once a new time is accepted, the method will need to be imported to the workstation in order to see the change in EZChrom.
"NEXT FIELD"	This softkey, when available, allows the user to toggle between the available data fields.
"NEXT LEVEL"	This softkey can be found on the "RESP FACTORS" screen, the "Blends" screen, and the "Times" screen. When available, the "NEXT LEVEL" softkey displays the next calibration level. This softkey will only appear when there is more than one level of calibration programmed. The current level can be found near the top of the screen content area under the title of the screen (e.g. "Level 1/3")

Calibration & Validation, Continued

Validation Function

Validation is used to verify the ability of the analyzer to produce acceptable measurements. When validation is run, a known sample is analyzed and the results are compared against expected values. Results fail validation if they deviate by more than an acceptable margin. When validation fails the analyzer generates a failure message.

When the "Calibration & Validation" option is selected from the "Method, Calibration & Validation" menu, the initial screen is the screen for the calibration sequence. It is possible to navigate to the validation sequence using the "NEXT SEQNCE" softkey.

From the validation screen and sub-screens, it is possible to run validation, view validation results, and modify expected blend values and acceptable margins.

Interpreting the Displays

When "Calibration & Validation" is selected from the "Method, Calibration & Validation" menu, the "NEXT SEQNCE" softkey is used to navigate between available validation and calibration sequences.

The validation results are displayed when the "VIEW RESULTS" softkey is pressed. The display contains information on the peak name, the expected value ("Blend Value"), the value measured during the last validation ("Meas Value"). Also included is information on the percent difference between the expected and measured values ("Change %") and whether the value is within the expected range ("State").

The expected validation settings are displayed when the "VIEW CONFIG" softkey is pressed. This display contains the peak name, the expected blend value and the acceptable deviation margin.

Calibration & Validation, Continued

Validation "VIEW RESULTS" Screen

Below is the screen that is displayed when the "VIEW RESULTS" softkey is pressed. This screen contains the expected and measured validation results along with the PASS/FAIL indication.

```
Anlz: 167 AL-KB-LT-HRVOC_GC_4.2                          Fault
App: App1                                                HOLD
Strm: Stream 1                                   422 >  422 sec
03/25/2008 09:17:39
Calibration & Validation Configuration
Stream: Val 20


   Component      Blend        Meas.       Change  State
   name           value        value       %
   Carbon Dioxide 0.306mol%    0.3048      -0.4    PASS
   Ethylene       0.832mol%    0.8278      -0.5    PASS
   Ethane         0.47mol%     0.4692      -0.2    PASS
   Acetylene      0.132mol%    0.1317      -0.2    PASS
   Hydrogen       2.043mol%    68.831      > 100   FAIL
   Oxygen         0.131mol%    0.1316      0.5     PASS
   Nitrogen       8.038mol%    8.0356      -0.     PASS
   Methane        16.007mol%   15.9971     -0.1    PASS
   Carbon         0.074mol%    0.0764      3.2     PASS
   Monoxide
   Propane        0.162mol%    0.1613      -0.4    PASS


Choose item: ▌▌ and select action:
  ┌─────────┬─────────┬─────────┐
  │    ^    │    v    │  VIEW   │
  │         │         │ CONFIG. │
  └─────────┴─────────┴─────────┘
```

Validation "VIEW CONFIG" Screen

Below is the screen that is displayed when the "VIEW CONFIG" softkey is pressed. It is possible to view and modify expected blend values as well as the acceptable deviation margin.

```
Anlz: 167 AL-KB-LT-HRVOC_GC_4.2                          Fault
App: App1                                                HOLD
Strm: Stream 1                                   422 >  422 sec
03/25/2008 09:18:35
Calibration & Validation Configuration
Stream: Val 20


   #  Component        Blend        Margin
      name             value        %
   1  Carbon Dioxide   0.306mol%    5.
   2  Ethylene         0.832mol%    5.
   3  Ethane           0.47mol%     5.
   4  Acetylene        0.132mol%    5.
   5  Hydrogen         2.043mol%    5.
   6  Oxygen           0.131mol%    5.
   7  Nitrogen         8.038mol%    5.
   8  Methane          16.007mol%   5.
   9  Carbon Monoxide  0.074mol%    5.
   10 Propane          0.162mol%    5.


Choose item: ▌▌ and select action:
  ┌─────────┬─────────┬─────────┐           ┌─────────┐
  │    ^    │    v    │  VIEW   │           │ MODIFY  │
  │         │         │ RESULTS │           │         │
  └─────────┴─────────┴─────────┘           └─────────┘
```

Softkey Descriptions for Calibration

The following softkeys are available from the "Calibration & Validation" screen under the "Method, Calibration & Validation" menu. The following softkeys are for the validation portion of the menu function. The softkeys for the calibration portion were defined previously in this section.

Softkey	Use
"START VAL"	This softkey starts the validation sequence that is displayed. After the validation is complete, the analyzer will automatically revert back to the sequence that was running previously.
"NEXT SEQNCE"	This softkey is used to switch from the calibration sequence to the validation sequence. The calibration sequence was described earlier in this section.
"VIEW RESULTS"	This softkey, when available on the main validation screen or the "VIEW CONFIG" screen, displays a table of the results for the last completed validation. The table displayed is applicable to the currently selected stream on the validation screen (shown with white letters on a black background).
"VIEW CONFIG"	This softkey, available from the "VIEW RESULTS" screen, displays a screen that allows the user to view and modify the validation configuration.
"MODIFY"	This softkey, available from the "VIEW CONFIG" screen, allows the user to change the expected blend values and the acceptable deviation margin values.
"BACK SPACE"	This softkey, when available, allows the user to back space while entering data in a field.
"ACCEPT CHANGE"	This softkey, when available, is used to confirm the values entered in the data fields. When it is pressed the data entry fields disappear and the data is stored.

**Softkey Descriptions
for Calibration
(continued)**

Softkey	Use
"CANCEL CHANGE"	This softkey, when available, is used to cancel a change. When it is pressed the data entry fields disappear and any modified entries remain at their original value.
"NEXT FIELD"	This softkey, when available, allows the user to toggle between the available data fields.

Results & Chromatograms (on Method, Calibration & Validation Menu)

Description

"Results & Chromatograms" which is selection 2 on the "Method, Calibration & Validation" menu is designed to allow maintenance personnel to perform the following functions.

View the latest qualified or preliminary analytical results.

View archived chromatograms and their associated results.

Add chromatograms and their associated results to the archives.

Menu Path

The "Results & Chromatograms" screen may be accessed from the "Method, Calibration & Validation" menu. The "Method, Calibration & Validation" menu is accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

Note:

The "Results & Chromatograms" screen available from the "Method, Calibration & Validation" menu is the same screen that can be accessed as option 6 from the main Maintenance Menu. Refer to the previous section, "Results & Chromatograms (Selection 6 on Maintenance Menu)", for a full description of this screen and all associated sub-screens.

Adjust Peaks, Blends, & Factors (on Method, Calibration & Validation Menu)

Description

"Adjust Peaks, Blends, & Factors" which is selection 3 on the "Method, Calibration & Validation" menu is designed to allow maintenance personnel to perform the following functions related to calibration.

> View and adjust peak expected retention times and retention time windows
>
> View and adjust autocalibration margins and known calibration blends
>
> View and adjust the calibration response factors

Menu Path

The "Adjust Peaks, Blends, & Factors" screen may be accessed from the "Method, Calibration & Validation" menu. The "Method, Calibration & Validation" menu is accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

Note:

The "Adjust Peaks, Blends, & Factors" screens available from the "Method, Calibration & Validation" menu are the same screens that can be accessed from the "Calibration & Validation" selection of the same menu. These screens are described in detail previously in this chapter.

For a full description of the "Peaks, Blends, & Factors" screens, refer to the section titled:

> "Calibration & Validation (on Method, Calibration & Validation Menu)"

Adjust Valve & Event Times (on Method, Calibration & Validation Menu)

Description
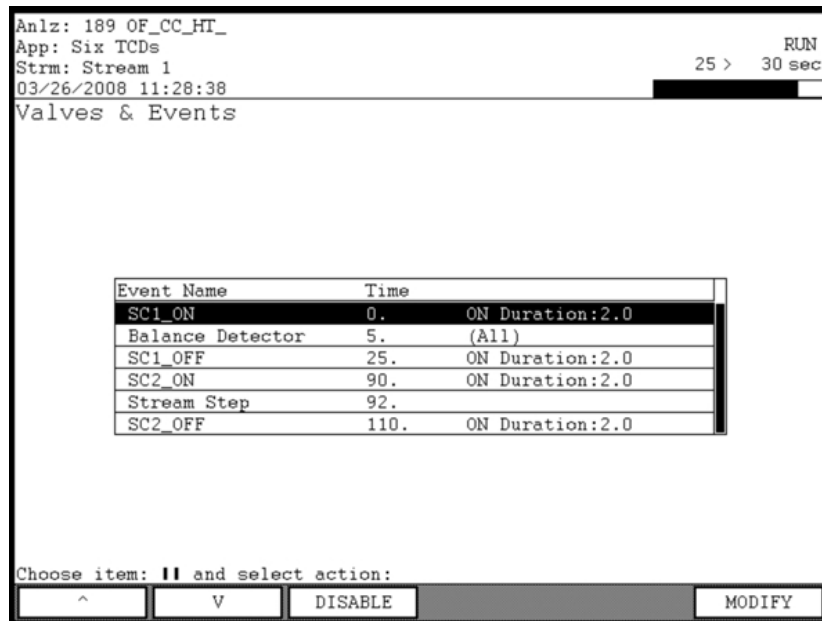
"Adjust Valve & Event Times" which is selection 4 on the "Method, Calibration & Validation" menu is designed to allow maintenance personnel to view and adjust the timing and duration of valve switching and other events. It is also possible to disable and enable events from this screen.

Menu Path

The "Adjust Valve & Event Times" screen may be accessed from the "Method, Calibration & Validation" menu. The "Method, Calibration & Validation" menu is accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Adjust Valve & Event Times" Screen

Below is the screen that is displayed when the "Adjust Valve & Event Times" menu item is selected from the "Method, Calibration & Validation Menu".

```
Anlz: 189 OF_CC_HT_
App: Six TCDs                                          RUN
Strm: Stream 1                                   25 >  30 sec
03/26/2008 11:28:38
Valves & Events




             Event Name        Time
             SC1_ON            0.       ON Duration:2.0
             Balance Detector  5.       (All)
             SC1_OFF           25.      ON Duration:2.0
             SC2_ON            90.      ON Duration:2.0
             Stream Step       92.
             SC2_OFF           110.     ON Duration:2.0




Choose item: ‖ and select action:
     ^          V       DISABLE                    MODIFY
```

Adjust Valve & Event Times, Continued

Interpreting the Display

The content area of the "Adjust Valve & Event Times" screen contains entries for each programmed valve event and for basic analyzer events. Only the event time and the duration of the event can be modified from the "Adjust Valve & Event Times" screen. In addition, the event may be disabled and enabled.

All additional setup functions for valves and events must be performed using the EZChrom program.

Softkey Descriptions

The following softkeys are available from the "Adjust Valve & Event Times" screen.

Softkey	Use
"DISABLE" and "ENABLE"	This softkey allows the user to disable and enable the selected event. An event will not be used if it is disabled.
"MODIFY"	This softkey allows the user to change the start time and duration of the selected event.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"ACCEPT CHANGE"	This softkey is used to confirm the values entered in the data fields. When it is pressed the data entry fields disappear and the data is stored.
"CANCEL CHANGE"	This softkey is used to cancel a change. When it is pressed the data entry fields disappear and any modified entries remain at their original value.
"NEXT FIELD"	This softkey allows the user to toggle between the available data fields.

Adjust Flows (on Method, Calibration & Validation Menu)

Description

"Adjust Flows (Pressure Program)" which is selection 5 on the "Method, Calibration & Validation" menu is designed to allow maintenance personnel to view and adjust the pressure program for the analyzer.

Note:

Gas flow rates within the Maxum II are regulated by adjusting the pressure. When adjusting flows (pressures) it is very important to pay close attention to the status of each associated valve. If the valve positions are incorrect, the measured flow will be incorrect.

Menu Path

The "Adjust Flows (Pressure Program)" screen may be accessed from the "Method, Calibration & Validation" menu. The "Method, Calibration & Validation" menu is accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Adjust Flows (Pressure Program)" Screen

Below is the screen that is displayed when the "Adjust Flows (Pressure Program)" menu item is selected from the "Method, Calibration & Validation" menu.

```
Anlz: 218 CoopTCD-2
App: App 3                                              HOLD
Strm: Strm22                                    55 >  112 sec
12-01-1996 22:25:55                           ██████████
Flows(Pressure Program)




             Pres Ctl      Mode  Dura  Times    Setpt
                                 tion
             RC-1(30)      HOLD  0.    -8->-8   23.2 psig
             RC-2(31)      HOLD  0.    -8->-8   17.2 psig




1:SS03      2:SV3      3:CV3      4:Stream 1
Choose item: ▌▌ and select action:
    ^            V        DISABLE    CALC      MODIFY
                                     FLOW
```
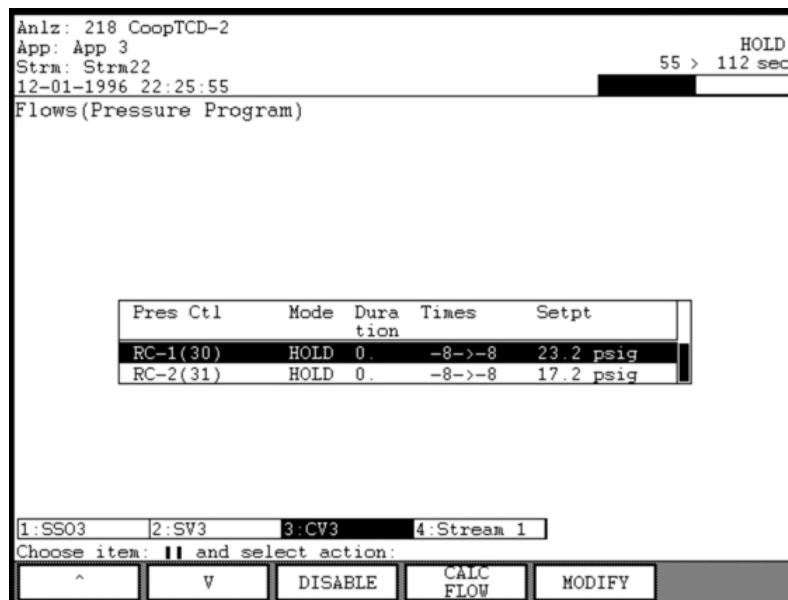
Adjust Flows, *Continued*

Interpreting the Display

The content area of the "Adjust Flows (Pressure Program)" screen contains information concerning the current pressure program. Included are the pressure controller name, the operating mode, the duration of the pressure setting, the calculated time of the pressure setting in seconds, and the pressure set point.

At the bottom of the content area is the valve information bar. This bar gives a basic indication of the status of each valve. When a valve is operated, the background on the valve bar for that valve toggles between white and black. Valves can be operated using the HMI. To operate a valve, use the numeric keypad key that matches the number next to the valve name. Scrolling of the valve bar to the left and right, if possible, is accomplished using the period (.) and dash (-) numeric keypad keys.

Calculating a Pressure Set Point Using "CALC FLOW"

The "CALC FLOW" feature is used to fine-tune the pressure program. The analyzer can be used to determine the proper pressure set point needed to achieve a desired flow rate. The following steps describe how to use the "CALC FLOW" feature.

1. Verify that all valves are in the desired state

2. Measure the flow rate manually.

3. From the "Adjust Flows" screen: Verify that the correct line of the pressure program is selected and press the "CALC FLOW" softkey.

4. In the first field enter the flow rate that was measured

5. Press the "NEXT FIELD" softkey and enter the desired flow rate in the second field

6. The "CALC FLOW" softkey now appears again. Press it to have the analyzer calculate the pressure necessary to achieve the desired flow.

7. Press "ACCEPT CHANGE" to accept the recommended pressure setting ("CANCEL CHANGE" to reject).

8. Re-measure the flow rate manually. If the flow rate is not correct perform the "CALC FLOW" process again.

It may take two or more tries to fine-tune the pressure to achieve the desired flow rate.

Adjust Flows, Continued

Softkey Descriptions

The following softkeys are available from the "Adjust Flows (Pressure Program)" screen.

Softkey	Use
"DISABLE" and "ENABLE"	This softkey allows the user to disable and enable the selected event. An event will not be used if it is disabled.
"MODIFY"	This softkey allows the user to change the pressure set point and the duration of the pressure event.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"ACCEPT CHANGE"	This softkey is used to confirm the values entered in the data fields. When it is pressed the data entry fields disappear and the data is stored.
"CANCEL CHANGE"	This softkey is used to cancel a change. When it is pressed the data entry fields disappear and any modified entries remain at their original value.
"NEXT FIELD"	This softkey allows the user to toggle between the available data fields.
"CALC FLOW"	This softkey allows the user to calculate the needed pressure set point that is required to achieve a desired flow rate. The calculate flow feature is described in detail on the previous page of this section.

Adjust Integration Events (on Method, Calibration & Validation Menu)

Description

"Adjust Integration Events" which is selection 6 on the "Method, Calibration & Validation" menu is designed to allow maintenance personnel to view or modify information for integration timed events for a selected method channel.

Menu Path

The "Adjust Integration Events" screen may be accessed from the "Method, Calibration & Validation" menu. The "Method, Calibration & Validation" menu is accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Adjust Integration Events" Screen

Below is the screen that is displayed when the "Adjust Integration Events" menu item is selected from the "Method, Calibration & Validation" menu.

```
Anlz: 218 CoopTCD-2
App: App 3                                              HOLD
Strm: Strm22                                     55 >  112 sec
13-01-1996 00:32:04
Integration Events
Channel: R-L3(4)




         ┌─────────────────────┬─────────┬────────┬────────┐
         │ Integration Event   │ Value   │ Start  │ Stop   │
         ├─────────────────────┼─────────┼────────┼────────┤
         │*Minimum Area        │ 9000.   │ 11.64  │ 18.209 │
         │ Width               │ 2.      │ 17.855 │ 18.707 │
         │*Front Tangent skim  │0.       │ 18.753 │ 27.297 │
         │ Threshold           │ 550.    │ 51.527 │ 60.509 │
         │ Integration Off     │ 0.      │ 53.    │ 100.   │
         └─────────────────────┴─────────┴────────┴────────┘




Choose item: ‖ and select action:
┌────────┐┌────────┐┌────────┐┌────────┐        ┌────────┐
│   ^    ││   V    ││ ENABLE ││  NEXT  │        │ MODIFY │
│        ││        ││        ││CHANNEL │        │        │
└────────┘└────────┘└────────┘└────────┘        └────────┘
```

Adjust Integration Events, Continued

Interpreting the Display

The content area of the "Adjust Integration Events" screen contains the integration event type, integration event value, and the start and stop times of the integration event. Values and/or times which are optional for an event type are shown as zeros in the table.

The information displayed is applicable to a specific method channel. The name of the current channel is displayed at the top of the screen content area under the screen title. Use the "NEXT CHANNEL" softkey to step through the different available channels.

Softkey Descriptions

The following softkeys are available from the "Adjust Integration Events" screen.

Softkey	Use
"DISABLE" and "ENABLE"	This softkey allows the user to disable and enable the selected integration event. An event will not be used if it is disabled.
"NEXT CHANNEL"	This softkey is used to display the integration event information for the next method channel. The name of the current channel is displayed at the top of the screen content area.
"MODIFY"	This softkey allows the user to change the start and stop times and the value for the selected integration event.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"ACCEPT CHANGE"	This softkey is used to confirm the values entered in the data fields. When it is pressed the data entry fields disappear and the data is stored.
"CANCEL CHANGE"	This softkey is used to cancel a change. When it is pressed the data entry fields disappear and any modified entries remain at their original value.
"NEXT FIELD"	This softkey allows the user to toggle between the available data fields.

Adjust Temperature Program (on Method, Calibration & Validation Menu)

Description

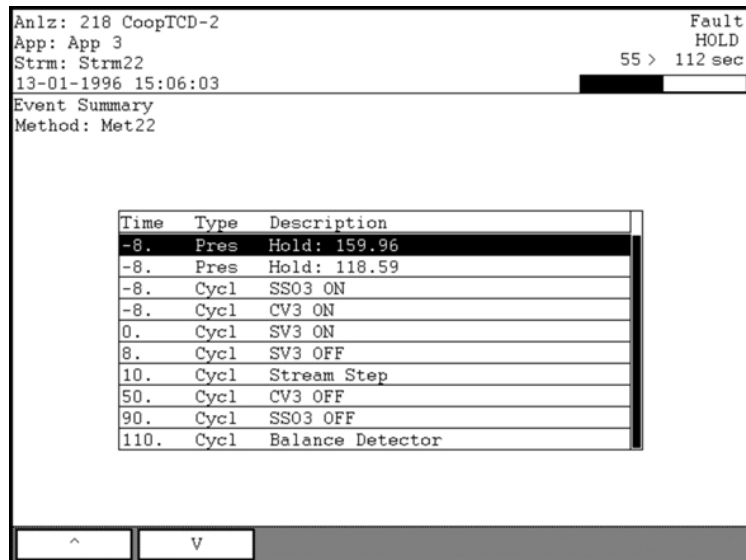"Adjust Temperature Program" which is selection 7 on the "Method, Calibration & Validation" menu is designed to allow maintenance personnel to modify the oven temperature program settings related to the method.

Menu Path

The "Adjust Temperature Program" screen may be accessed from the "Method, Calibration & Validation" menu. The "Method, Calibration & Validation" menu is accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Adjust Temperature Program" Screen

Below is the screen that is displayed when the "Adjust Temperature Program" menu item is selected from the "Method, Calibration & Validation" menu.
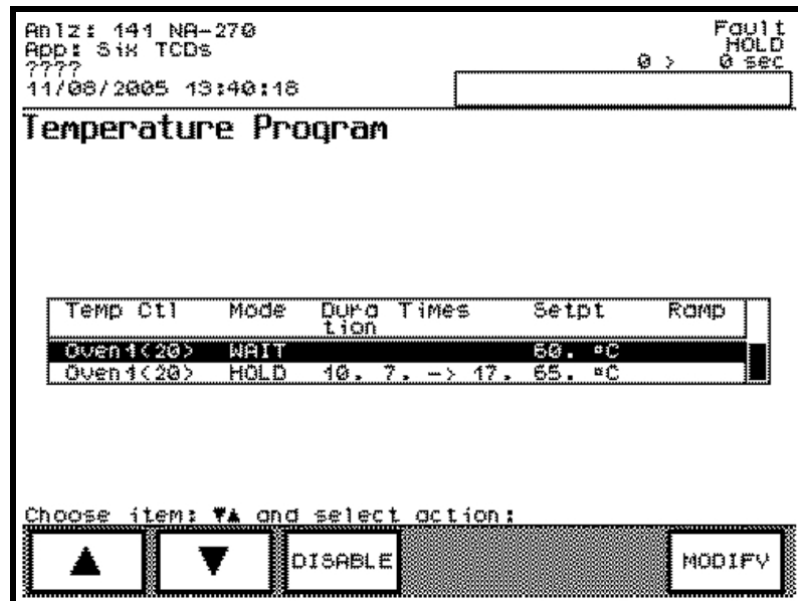
Adjust Temperature Program, Continued

Interpreting the Display

The content area of the "Adjust Temperature Program" screen shows the temperature controller name, the mode (Hold or Wait), the duration of the action, the calculated time for the action (in seconds), the temperature set point, and the temperature ramp rate (if configured).

Softkey Descriptions

The following softkeys are available from the "Adjust Temperature Program" screen.

Softkey	Use
"DISABLE" and "ENABLE"	This softkey allows the user to disable and enable the selected temperature program event. An event will not be used if it is disabled.
"MODIFY"	This softkey allows the user to change the duration, setpoint, and ramp rate of the selected temperature program event.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"ACCEPT CHANGE"	This softkey is used to confirm the values entered in the data fields. When it is pressed the data entry fields disappear and the data is stored.
"CANCEL CHANGE"	This softkey is used to cancel a change. When it is pressed the data entry fields disappear and any modified entries remain at their original value.
"NEXT FIELD"	This softkey allows the user to toggle between the available data fields.

Adjust Channel & Cycle (on Method, Calibration & Validation Menu)

Description

"Adjust Channel & Cycle" which is selection 8 on the "Method, Calibration & Validation" menu is designed to allow maintenance personnel to perform the following functions.

Disable and enable detector method channels

Modify start and stop times for data acquisition for specific channels

Turn baseline correction on and off

Modify the cycle start and stop times for the method. Injection lag time can be changed as well.

Menu Path

The "Adjust Channel & Cycle" screen may be accessed from the "Method, Calibration & Validation" menu. The "Method, Calibration & Validation" menu is accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Adjust Channel & Cycle" Screen

Below is the screen that is displayed when the "Adjust Channel & Cycle" menu item is selected from the "Method, Calibration & Validation" menu.

```
Anlz: 189 OF_CC_HT_                                      Warning
App: Six TCDs                                               HOLD
Strm: Stream 3                                   27 >     30 sec
03/27/2008 10:40:41                         ████████████
Channel & Cycle
Start: -3.0
Stop: 30.0




        #   Detector          Start     Stop    Rate    Bsln
        0.  TCD L1            0.       30.      10      ON
        1.  TCD U1            0.       30.      10      OFF
        2.  TCD L2            0.       30.      10      OFF
        3.  TCD U2            0.       30.      10      OFF
        4.  TCD L3            0.       30.      10      OFF
        5.  TCD U3            0.       30.      10      OFF




Choose item: ▌▌ and select action:
┌─────────┐┌─────────┐┌─────────┐┌─────────┐┌─────────┐┌─────────┐
│    ^    ││    v    ││ DISABLE ││ CHANGE  ││ BASELN  ││ CHANGE  │
│         ││         ││         ││ CHANNEL ││  OFF    ││ CYCLE   │
└─────────┘└─────────┘└─────────┘└─────────┘└─────────┘└─────────┘
```

Adjust Channel & Cycle, Continued

Interpreting the Display

The central section of the content area of the "Adjust Channel & Cycle" screen shows the method detector channel settings. Information displayed includes the channel number, detector channel name, start time for data acquisition, stop time for data acquisition, data sample rate, and whether the baseline is on or off.

Displayed at the top of the content area (just below the title of the screen), is the cycle start and stop time. This information can be modified using the "CHANGE CYCLE" softkey.

Softkey Descriptions

The following softkeys are available from the "Adjust Channel & Cycle" screen.

Softkey	Use
"DISABLE" and "ENABLE"	This softkey allows the user to disable and enable the selected detector channel.
"CHANGE CHANNEL"	This softkey allows the user to change the starting and stopping times for data acquisition for a selected channel.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"ACCEPT CHANGE"	This softkey is used to confirm the values entered in the data fields. When it is pressed the data entry fields disappear and the data is stored.
"CANCEL CHANGE"	This softkey is used to cancel a change. When it is pressed the data entry fields disappear and any modified entries remain at their original value.
"NEXT FIELD"	This softkey allows the user to toggle between the available data fields.
"BASELN ON" & "BASELN OFF"	This softkey activates/deactivates the baseline correction feature.
"CHANGE CYCLE"	This softkey is used to modify the cycle time for the method. The start and stop times may be defined and can include an injection lag time (negative start time).

View Event Summary (on Method, Calibration & Validation Menu)

Description

"View Event Summary" which is selection 9 on the "Method, Calibration & Validation" menu is designed to allow maintenance personnel to view an ordered list of events relating to the current method. These include valve events, temperature events, pressure events, programs, stream step, and detector balance. Only basic information is displayed and data cannot be changed from this screen. The data displayed for each event includes the event time, event type, and the name of the event (description).

Menu Path

The "View Event Summary" screen may be accessed from the "Method, Calibration & Validation" menu. The "Method, Calibration & Validation" menu is accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"View Event Summary" Screen

Below is the screen that is displayed when the "View Event Summary" menu item is selected from the "Method, Calibration & Validation" menu.

```
Anlz: 218 CoopTCD-2                                    Fault
App: App 3                                             HOLD
Strm: Strm22                                   55 >  112 sec
13-01-1996 15:06:03                          ▮▮▮▮▮
Event Summary
Method: Met22



           ┌──────┬──────┬─────────────────────┐
           │Time  │Type  │Description          │
           ├──────┼──────┼─────────────────────┤
           │-8.   │Pres  │Hold: 159.96         │
           │-8.   │Pres  │Hold: 118.59         │
           │-8.   │Cycl  │SSO3 ON              │
           │-8.   │Cycl  │CV3 ON               │
           │0.    │Cycl  │SV3 ON               │
           │8.    │Cycl  │SV3 OFF              │
           │10.   │Cycl  │Stream Step          │
           │50.   │Cycl  │CV3 OFF              │
           │90.   │Cycl  │SSO3 OFF             │
           │110.  │Cycl  │Balance Detector     │
           └──────┴──────┴─────────────────────┘


   ┌──────────┬──────────┐
   │    ^     │    V     │
   └──────────┴──────────┘
```

Softkeys

There are no special softkeys available from the "View Event Summary" screen.

App I/O, Temperature & Pressure (Selection 8 on Maintenance Menu)

Description

The "App I/O, Temperature & Pressure" function provides a menu of functions related to the selected application. Included are different types of input/output information for peripheral analyzer devices such as detectors and temperature controllers. Also included is input/output information for other external devices such as remote analyzers or other devices. The following functions are listed on the menu.

> Analog Input
>
> Analog Output
>
> Digital Input
>
> Digital Output
>
> Temperature Controller
>
> Pressure Controller

The I/O screens are used for troubleshooting, to verify that data is being sent or received, and to manually control a particular I/O.

Note:

Each of the selections on the "App I/O, Temperature & Pressure" menu opens a different sub-screen. For the purposes of this manual, descriptions for each of the sub-screens are contained in separate sections within this chapter.

Menu Path

The "App I/O, Temperature & Pressure" menu can be accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

App I/O, Temperature & Pressure (Maintenance Menu), Continued

"App I/O, Temperature & Pressure" Menu Screen

Below is the menu screen that is displayed when "App I/O, Temperature & Pressure" is selected from the Maintenance Menu. The different selections on the menu are described in later sections of this chapter.

```
Anlz: 218 CoopTCD-2                               Fault
App: App 3                                         HOLD
Strm: Strm22                               55 >  112 sec
13-01-1996 19:20:32                      ████████
App I/O, Temperature & Pressure




                      ┌──────────────────────────┐
                      │ 1. Analog Input          │
                      │ 2. Analog Output         │
                      │ 3. Digital Input         │
                      │ 4. Digital Output        │
                      │ 5. Temperature Controller│
                      │ 6. Pressure Controller   │
                      └──────────────────────────┘




Choose item: ▐▌, ENTER; or:
Press number of item on keypad
┌─────────┬─────────┬──────────────────┬──────────┐
│    ^    │    V    │                  │  SELECT  │
└─────────┴─────────┴──────────────────┴──────────┘
```
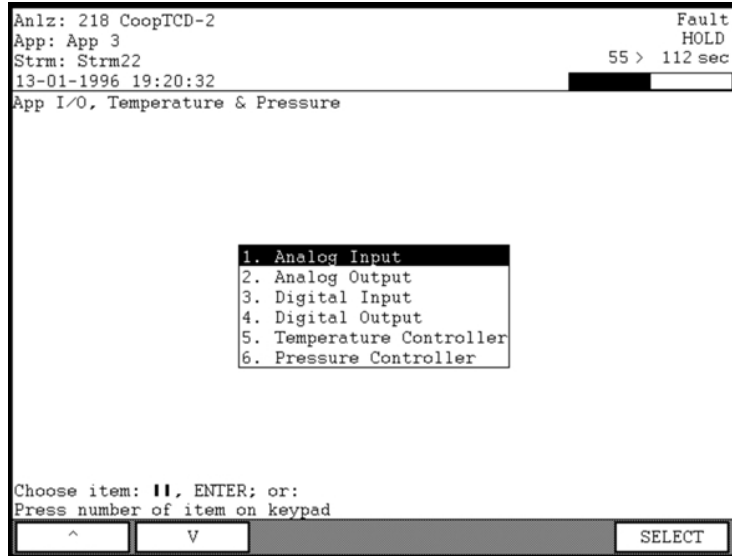
Interpreting the Display

The functions listed on the "App I/O, Temperature & Pressure" menu are used to display and modify data for the currently selected application. The name of the currently selected application is displayed in the second line of the status bar (top of the HMI screen). The "NEXT APP" softkey, which is available when the Maintenance Menu is displayed, changes the selected application.

Softkey Description

The only extra softkey available from the "App I/O, Temperature & Pressure" screen is the "SELECT" softkey. This softkey, when used with the arrow keys, will select and activate a menu item. It is also possible to use the numeric keypad to directly select menu items.

Analog Input (on App I/O, Temp & Pressure Menu)

Description

"Analog Input", which is selection 1 on the "App I/O, Temp & Pressure" menu, is designed to allow maintenance personnel to perform the following functions.

> View the details of analog inputs
> Modify specific aspects of analog inputs

An analog input is an I/O signal which is brought into an analyzer from other equipment. The equipment can be internal to the analyzer such as detectors. The equipment may also be external to the analyzer such as devices connected through a CAN Extension Unit.

The I/O screens are used for troubleshooting, to verify that data is being sent or received, and to manually control a particular I/O.

Menu Path

The "Analog Input" screen may be accessed from the "App I/O, Temp & Pressure" menu. The "App I/O, Temp & Pressure" menu is accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Analog Input" Screen

Below is the screen that is displayed when the "Analog Input" menu item is selected from the "App I/O, Temp & Pressure" menu.

```
Anlz: 189 OF_CC_HT_                                      Warning
App: Six TCDs                                               HOLD
Strm: Stream 3                                    30 >    30 sec
03/28/2008 11:04:52
I/O: Analog Input


      #     Name              Current Value    Stat    Scan
      100   *TCD L1 Meas                       NoSCN   15
      101   *TCD L1 BalSig    0. %             OK      15
      110   *TCD U1 Meas      0. mVolts        OK      15
      111   *TCD U1 BalSig    0. %             OK      15
      120   *TCD L2 Meas      0. mVolts        OK      15
      121   *TCD L2 BalSig    0. %             OK      15
      130   *TCD U2 Meas      0. mVolts        OK      15
      131   *TCD U2 BalSig    0. %             OK      15
      140   *TCD L3 Meas      0. mVolts        OK      15
      141   *TCD L3 BalSig    0. %             OK      15
      150   *TCD U3 Meas      0. mVolts        OK      15
      151   *TCD U3 BalSig    0. %             OK      15


Choose item: ↕ and select action:
  ┌─────────┐ ┌─────────┐ ┌─────────┐          ┌─────────┐
  │    ^    │ │    V    │ │ ENABLE  │          │ DETAILS │
  └─────────┘ └─────────┘ └─────────┘          └─────────┘
```

Analog Input, Continued

Interpreting the Display

The central section of the content area contains the list of analog inputs related to the current application. The name of the currently selected application is displayed in the second line of the status bar (top of the HMI screen). The analog input table includes the identifier number (#) for the analog input, the name, the current value for the input, the status, and the scan rate.

The scan rate is the time frequency that the system will check the status of the analog input.

The two most common values for the status are "OK and "NOSCN". "NOSCN" is the status when the I/O is not enabled. Other common values for the status include NOREM (Remote I/O not responding), NOID (hardware ID not valid), INIT (I/O not initialized), and COMM (communication error).

The name of the analog input will be preceded by an asterisk(*) when the I/O is disabled. If it is disabled, the current value, if shown, is not valid.

"DETAILS" Screen

Below is the screen that is displayed when the "DETAILS" softkey is selected from the "Analog Input" screen. The details are specific to the analog input value that was selected when the "DETAILS" softkey was pressed.

Softkey Descriptions

The following softkeys are available from the "Analog Input" screen and the associated sub-screens.

Softkey	Use
"DISABLE" and "ENABLE"	This softkey allows the user to disable and enable the selected analog input.
"DETAILS"	This softkey displays a detailed information screen for the selected analog input. Details which have their values shown against a black background may be modified using the "MODIFY" softkey.
"MODIFY"	This softkey, when displayed, allows the user to change certain details or values relating to the selected analog input. Some changes toggle the selected value, and other changes cause a modification screen to display.
"GO TO ORIG"	When modifying details and a list of multiple preset values is available for selection, this softkey appears. It allows the user to return to the original value that was set when the "MODIFY" softkey was pressed.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"NEXT ITEM"	This softkey produces unpredictable results. DO NOT USE.
"DONE"	This softkey is used to confirm the input of a parameter change and return to the previous menu. It is similar to an "ACCEPT CHANGES" softkey.

Note:

The "NEXT ITEM" softkey is known to produce unpredictable results. Do not use this softkey when modifying details.

Analog Output (on App I/O, Temp & Pressure Menu)

Description

"Analog Output", which is selection 2 on the "App I/O, Temp & Pressure" menu, is designed to allow maintenance personnel to perform the following functions.

> View the details of analog outputs
> Modify specific aspects of analog outputs

An analog output is a signal sent from an analyzer to other equipment. The equipment can be internal to the analyzer such as an oven heater. The equipment may also be external to the analyzer such as devices connected through a CAN Extension Unit.

The I/O screens are used for troubleshooting, to verify that data is being sent or received, and to manually control a particular I/O.

Menu Path

The "Analog Output" screen may be accessed from the "App I/O, Temp & Pressure" menu. The "App I/O, Temp & Pressure" menu is accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Analog Output" Screen

Below is the screen that is displayed when the "Analog Output" menu item is selected from the "App I/O, Temp & Pressure" menu.

```
Anlz: 189 OF_CC_HT_
App: Six TCDs                                        HOLD
Strm: Stream 3                               30 >   30 sec
03/28/2008 11:10:33
I/O: Analog Output


        #     Name              Value        Stat
        300   Oven1 SetPt       0.  °C        OK
        301  *Oven1 RampRt      0.  °C/min    OK
        302  *Oven1 MaxDev      0.  °C        OK
        303   Oven1 RCalibGain  0.            OK
        304   Oven1 MaxT        0.  °C        OK
        310   Oven2 SetPt       0.  °C        OK
        311  *Oven2 RampRt      0.  °C/min    OK
        312  *Oven2 MaxDev      0.  °C        OK
        313   Oven2 RCalibGain  0.            OK




Choose item: ▮▮ and select action:
    ^        V      DISABLE            DETAILS   MODIFY
```

Analog Output, Continued

Interpreting the Display

The central section of the content area contains the list of analog outputs related to the current application. The name of the currently selected application is displayed in the second line of the status bar (top of the HMI screen). The analog output table includes the identifier number (#) for the analog output, the name, the current value, and the status.

The two most common values for the status are "OK and "NOSCN". "NOSCN" is the status when the I/O is not enabled. Other common values for the status include NOREM (Remote I/O not responding), NOID (hardware ID not valid), INIT (I/O not initialized), and COMM (communication error).

The name of the analog output will be preceded by an asterisk(*) when the I/O is disabled. If it is disabled, the current value, if shown, is not valid.

"DETAILS" Screen

Below is the screen that is displayed when the "DETAILS" softkey is selected from the "Analog Output" screen. The details are specific to the analog output value that was selected when the "DETAILS" softkey was pressed.

```
Anlz: 189 OF_CC_HT_                                          HOLD
App: Six TCDs
Strm: Stream 3                                        30 >   30 sec
03/28/2008 11:14:40


        Name          Value
        ID            300
        Name          Oven1 SetPt
        Enable        Yes
        Man Setpt     55. 'C
        Cur Setpt     0. 'C
        Status        OK (0)
        Zero          -100. 'C
        Fullscale     900. 'C
        Datatype      1 0-20 ma
        Hardware IO   11:DPM-1 TC-1 SET-1(3) 11:4-4.1-1.2.3
        Alarm Limit   0-0
        Units         'C



Choose item: || and select action:
  [  ^  ]  [  V  ]                              [ MODIFY ]
```

Analog Output, Continued

Softkey Descriptions

The following softkeys are available from the "Analog Output" screen and the associated sub-screens.

Softkey	Use
"DISABLE" and "ENABLE"	This softkey allows the user to disable and enable the selected analog output.
"DETAILS"	This softkey displays a detailed information screen for the selected analog output. Details which have their values shown against a black background may be modified using the "MODIFY" softkey.
"MODIFY"	This softkey, when displayed, allows the user to change certain details or values relating to the selected analog output. Some changes toggle the selected value, and other changes cause a modification screen or modification window to display.
"GO TO ORIG"	When modifying details and a list of multiple preset values is available for selection, this softkey appears. It allows the user to return to the original value that was set when the "MODIFY" softkey was pressed.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"NEXT ITEM"	This softkey produces unpredictable results. DO NOT USE.
"DONE"	This softkey is used to confirm the input of a parameter change and return to the previous menu. It is similar to an "ACCEPT CHANGES" softkey.

Note:

The "NEXT ITEM" softkey is known to produce unpredictable results. Do not use this softkey when modifying details.

Digital Input (on App I/O, Temp & Pressure Menu)

Description

"Digital Input", which is selection 3 on the "App I/O, Temp & Pressure" menu, is designed to allow maintenance personnel to perform the following functions.

> View the details of digital input signals
> Modify specific aspects of digital inputs

A digital input is an I/O signal with a value of either "ON" or "OFF". It may indicate information such as an alarm status (alarm or no alarm) or operating information (such as flame out on a detector).

The I/O screens are used for troubleshooting, to verify that data is being sent or received, and to manually control a particular I/O.

Menu Path

The "Digital Input" screen may be accessed from the "App I/O, Temp & Pressure" menu. The "App I/O, Temp & Pressure" menu is accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Digital Input" Screen

Below is the screen that is displayed when the "Digital Input" menu item is selected from the "App I/O, Temp & Pressure" menu.

Digital Input, Continued

Interpreting the Display

The central section of the content area contains the list of digital inputs related to the current application. The name of the currently selected application is displayed in the second line of the status bar (top of the HMI screen). The digital input table includes the identifier number (#) for the digital input, the name, the current value for the input, the status, and the scan rate.

The scan rate is the time frequency that the system will check the status of the digital input.

The two most common values for the status are "OK and "NOSCN". "NOSCN" is the status when the I/O is not enabled. Other common values for the status include NOREM (Remote I/O not responding), NOID (hardware ID not valid), INIT (I/O not initialized), and COMM (communication error).

The name of the digital input will be preceded by an asterisk(*) when the I/O is disabled. If it is disabled, the current value, if shown, is not valid.

"DETAILS" Screen

Below is the screen that is displayed when the "DETAILS" softkey is selected from the "Digital Input" screen. The details are specific to the digital input value that was selected when the "DETAILS" softkey was pressed.

```
Anlz: 189 OF_CC_HT_
App: Six TCDs                                        HOLD
Strm: Stream 3                               30 >   30 sec
03/28/2008 11:15:10


        Name            Value
        ID              300
        Name            Oven1 OTS
        Enable          Yes
        Value           false OFF
        Status          OK
        Text0           OFF
        Text1           ON
        Scan Rate       15
        Hardware IO     11:DPM-1 TC-1 OVER-1(3) 11:4-4.1-1.3.3
        Alarm Limit     0-0



Choose item: || and select action:
  _____         _____
  |  ^  |       |  V  |                        MODIFY
```

Digital Input, Continued

Softkey Descriptions

The following softkeys are available from the "Digital Input" screen and the associated sub-screens.

Softkey	Use
"DISABLE" and "ENABLE"	This softkey allows the user to disable and enable the selected digital input.
"DETAILS"	This softkey displays a detailed information screen for the selected digital input. Details which have their values shown against a black background may be modified using the "MODIFY" softkey.
"MODIFY"	This softkey, when displayed, allows the user to change certain details or values relating to the selected digital input. Some changes toggle the selected value, and other changes cause a modification screen to display.
"GO TO ORIG"	When modifying details and a list of multiple preset values is available for selection, this softkey appears. It allows the user to return to the original value that was set when the "MODIFY" softkey was pressed.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"NEXT ITEM"	This softkey produces unpredictable results. DO NOT USE.
"DONE"	This softkey is used to confirm the input of a parameter change and return to the previous menu. It is similar to an "ACCEPT CHANGES" softkey.

Note:

The "NEXT ITEM" softkey is known to produce unpredictable results. Do not use this softkey when modifying details.

Digital Output (on App I/O, Temp & Pressure Menu)

Description

"Digital Output", which is selection 4 on the "App I/O, Temp & Pressure" menu, is designed to allow maintenance personnel to perform the following functions.

> View the details of digital outputs
> Set a selected output "ON" or "OFF"
> Modify specific aspects of digital outputs

A digital output is an I/O signal with a value of either "ON" or "OFF". It is typically used to perform actions such as changing the status of a valve, injecting a sample, or igniting a detector flame.

The I/O screens are used for troubleshooting, to verify that data is being sent or received, and to manually control a particular I/O.

Menu Path

The "Digital Output" screen may be accessed from the "App I/O, Temp & Pressure" menu. The "App I/O, Temp & Pressure" menu is accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Digital Output" Screen

Below is the screen that is displayed when the "Digital Output" menu item is selected from the "App I/O, Temp & Pressure" menu.

Digital Output, Continued

Interpreting the Display

The central section of the content area contains the list of digital outputs related to the current application. The name of the currently selected application is displayed in the second line of the status bar (top of the HMI screen). The digital output table includes the identifier number (#) for the digital output, the name, the current value, and the status.

The name of the digital output will be preceded by an asterisk(*) when the I/O is disabled. If it is disabled, the current value, if shown, is not valid.

The two most common values for the status are "OK and "NOSCN". "NOSCN" is the status when the I/O is not enabled. Other common values for the status include NOREM (Remote I/O not responding), NOID (hardware ID not valid), INIT (I/O not initialized), and COMM (communication error).

"DETAILS" Screen

Below is the screen that is displayed when the "DETAILS" softkey is selected from the "Digital Output" screen. The details are specific to the digital output value that was selected when the "DETAILS" softkey was pressed.

Digital Output, Continued

Softkey Descriptions

The following softkeys are available from the "Digital Output" screen and the associated sub-screens.

Softkey	Use
"DISABLE" and "ENABLE"	This softkey allows the user to disable and enable the selected digital output.
"DETAILS"	This softkey displays a detailed information screen for the selected digital output. Details which have their values shown against a black background may be modified using the "MODIFY" softkey.
"MODIFY"	This softkey, when displayed, allows the user to change certain details relating to the selected digital output. Some changes toggle the selected value, and other changes cause a modification screen or modification window to display.
"GO TO ORIG"	When modifying details and a list of multiple preset values is available for selection, this softkey appears. It allows the user to return to the original value that was set when the "MODIFY" softkey was pressed.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"NEXT ITEM"	This softkey produces unpredictable results. DO NOT USE.
"DONE"	This softkey is used to confirm the input of a parameter change and return to the previous menu. It is similar to an "ACCEPT CHANGES" softkey.
"ON" , "OFF", and "PULSE"	This softkey is used to turn the digital output on or off. If the digital output signal is a pulsed output, then the softkey reads "PULSE".

Note:

The "NEXT ITEM" softkey is known to produce unpredictable results. Do not use this softkey when modifying details.

Temperature Controller (on App I/O, Temp & Pressure Menu)

Description

"Temperature Controller", which is selection 5 on the "App I/O, Temp & Pressure" menu, is designed to allow maintenance personnel to perform the following functions.

> View oven(s) operating temperatures and set point
> Enable or disable oven temperature controller(s)
> Adjust temperature set point for each oven
> View and modify specific operating details for each oven

Menu Path

The "Temperature Controller" screen may be accessed from the "App I/O, Temp & Pressure" menu. The "App I/O, Temp & Pressure" menu is accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Temperature Controller" Screen

Below is the screen that is displayed when the "Temperature Controller" menu item is selected from the "App I/O, Temp & Pressure" menu.
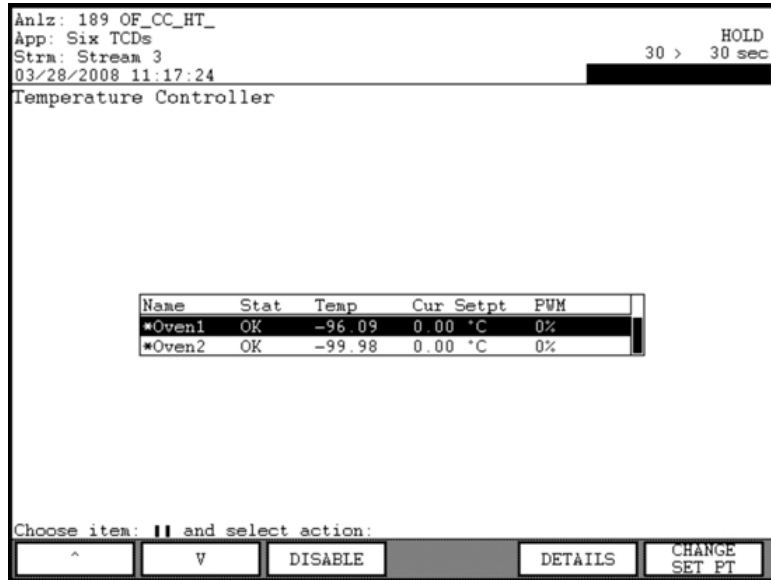
Temperature Controller, Continued

Interpreting the Display

The central section of the content area displays information about the operating parameters for the installed temperature controllers. Included in the display is the name, status, current temperature, current set point (desired temperature), and PWM (pulse width modulation).

The PWM parameter shows the percentage of heat presently called for the controller.

The name of the temperature controller will be preceded by an asterisk(*) when it is disabled.

"DETAILS" Screen

Below is the screen that is displayed when the "DETAILS" softkey is selected from the "Temperature Controller" screen. The details are specific to the temperature controller that was selected when the "DETAILS" softkey was pressed.

```
Anlz: 189 OF_CC_HT_                                    Warning
App: Six TCDs                                             HOLD
Strm: Stream 3                              30 >     30 sec
03/28/2008 11:25:13                     ████████████████

        Name                Value
        Id                  20
        Name                Oven1
        Status              OK  0
        Temp                -96.0937 °C
        Man Setpt           55.0000 °C
        Cur Setpt           0.0000 °C
        Target Setpt        -96.0937 °C
        PWM                 0.3906 %
        Ramp                *0.0000 °C/min
        Max Dev             *2.0000 °C
        Gain                1.004000
        Max Temp            225.0000 °C
        Deviation           -99.9847 °C
        En/Disable          EN
        Max Wait            30 sec
        wait delta          2.0000 °C


Choose item: ▮▮ and select action:
    ┌──────┐ ┌──────┐                              ┌────────┐
    │   ^  │ │   V  │                              │ MODIFY │
    └──────┘ └──────┘                              └────────┘
```

Temperature Controller, Continued

Softkey Descriptions

The following softkeys are available from the "Temperature Controller" screen and the associated sub-screens.

Softkey	Use
"DISABLE" and "ENABLE"	This softkey allows the user to disable and enable the selected temperature controller.
"DETAILS"	This softkey displays a detailed information screen for the selected temperature controller. Details which have their values shown against a black background may be modified using the "MODIFY" softkey.
"CHANGE SET PT"	This softkey is used to modify the desired temperature set point for the selected temperature controller.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"ACCEPT CHANGE"	This softkey is used to confirm the values entered in the data fields. When it is pressed the data entry fields disappear and the data is stored.
"CANCEL CHANGE"	This softkey is used to cancel a change. When it is pressed the data entry fields disappear and any modified entries remain at their original value.
"MODIFY"	This softkey, when displayed, allows the user to change certain details or values relating to the selected temperature controller. Some changes toggle the selected value, and other changes cause a modification screen to display.
"GO TO ORIG"	When modifying details and a list of multiple preset values is available for selection, this softkey appears. It allows the user to return to the original value that was set when the "MODIFY" softkey was pressed.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.

Temperature Controller, Continued

Softkey Descriptions (continued)

Softkey	Use
"NEXT ITEM"	This softkey produces unpredictable results. DO NOT USE.
"DONE"	This softkey is used to confirm the input of a parameter change and return to the previous menu. It is similar to an "ACCEPT CHANGES" softkey.

Note: The "NEXT ITEM" softkey is known to produce unpredictable results. Do not use this softkey when modifying details.

Pressure Controller (on App I/O, Temp & Pressure Menu)

Description

"Pressure Controller", which is selection 6 on the "App I/O, Temp & Pressure" menu, is designed to allow maintenance personnel to perform the following functions.

> Enable or disable an Electronic Pressure Controller (EPC)
> View current pressure output for each EPC
> Modify the set point pressure for an EPC
> View and modify specific operating details for an EPC

Menu Path

The "Pressure Controller" screen may be accessed from the "App I/O, Temp & Pressure" menu. The "App I/O, Temp & Pressure" menu is accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Pressure Controller" Screen

Below is the screen that is displayed when the "Pressure Controller" menu item is selected from the "App I/O, Temp & Pressure" menu.

```
Anlz: 189 OF_CC_HT_
App: Six TCDs                                          HOLD
Strm: Stream 3                              30 >    30 sec
03/28/2008 11:22:24
Pressure Controller




            Name      Stat    Pres     Cur Setpt
           *EPC1      OK                0.00 PSIG
           *EPC2      OK                0.00 PSIG




1:SV1        2:SV2       3:Stream    4:TCD L1 I  >
Choose item: ‖ and select action:
┌─────────┬─────────┬─────────┬─────────┬─────────┬─────────┐
│    ^    │    V    │ ENABLE  │         │ DETAILS │ CHANGE  │
│         │         │         │         │         │ SET PT  │
└─────────┴─────────┴─────────┴─────────┴─────────┴─────────┘
```

Pressure Controller, Continued

Interpreting the Display

The central section of the content area contains the list of pressure controllers (EPCs) related to the current application. The name of the currently selected application is displayed in the second line of the status bar (top of the HMI screen). The EPC table includes the name of the EPC, the status, the current pressure, and the current pressure set point.

The name of the EPC will be preceded by an asterisk(*) when it is disabled.

"DETAILS" Screen

Below is the screen that is displayed when the "DETAILS" softkey is selected from the "Pressure Controller" screen. The details are specific to the pressure controller that was selected when the "DETAILS" softkey was pressed.

```
Anlz: 189 OF_CC_HT_
App: Six TCDs                                              HOLD
Strm: Stream 3                                    30 >   30 sec
03/28/2008 11:23:50

        Name                Value
        ID                  30
        Name                EPC1
        Status              OK 0
        Pres                *0.0000 psig
        Man Setpt           *0.0000 psig
        Cur Setpt           0.0000 psig
        Target Setpt        *0.0000 psig
        Max Pres            *0.0000 psig
        Max Dev             *0.0000 psig
        Deviation           *0.0000 psig
        Enable              *DIS
        Out of Control      *OK
        Max Wait            30 sec
        wait delta          2.0000 psig
        wait enable         EN
        EPC type            1


Choose item: ‖ and select action:
   ^          V                              MODIFY
```

Pressure Controller, Continued

Softkey Descriptions

The following softkeys are available from the "Pressure Controller" screen and the associated sub-screens.

Softkey	Use
"DISABLE" and "ENABLE"	This softkey allows the user to disable and enable the selected pressure controller
"DETAILS"	This softkey displays a detailed information screen for the selected pressure controller. Details which have their values shown against a black background may be modified using the "MODIFY" softkey.
"CHANGE SET PT"	This softkey is used to modify the desired pressure set point for the selected pressure controller.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"ACCEPT CHANGE"	This softkey is used to confirm the values entered in the data fields. When it is pressed the data entry fields disappear and the data is stored.
"CANCEL CHANGE"	This softkey is used to cancel a change. When it is pressed the data entry fields disappear and any modified entries remain at their original value.
"MODIFY"	This softkey, when displayed, allows the user to change certain details relating to the selected pressure controller. Some changes toggle the selected value, and other changes cause a modification screen or modification window to display.
"GO TO ORIG"	When modifying details and a list of multiple preset values is available for selection, this softkey appears. It allows the user to return to the original value that was set when the "MODIFY" softkey was pressed.

Pressure Controller, Continued

Softkey Descriptions (continued)

Softkey	Use
"NEXT ITEM"	This softkey produces unpredictable results. DO NOT USE.
"DONE"	This softkey is used to confirm the input of a parameter change and return to the previous menu. It is similar to an "ACCEPT CHANGES" softkey.
"ON" , "OFF", and "PULSE"	This softkey is used to turn the digital output on or off. If the digital output signal is a pulsed output, then the softkey reads "PULSE".

Note:

The "NEXT ITEM" softkey is known to produce unpredictable results. Do not use this softkey when modifying details.

Save To Flash (Selection 9 on Maintenance and Configure Menus)

Description

The "Save To Flash" function is found on both the Maintenance Menu and the Configure Menu. It is used to permanently save the settings and data contents of the GC to the compact flash memory card.

Menu Path

The "Save To Flash" function can be accessed from either the Maintenance Menu or the Configure Menu. If not already displayed, the Maintenance Menu and Configure Menu are obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Save To Flash" Dialog Window

When the "Save To Flash" menu item is selected from either the Maintenance Menu or the Configure Menu, the following dialog box is displayed.

```
Anlz: 218 CoopTCD-2
App: App 3                                              HOLD
Strm: Strm22                                     55 >  112 sec
15-01-1996 02:02:50

1.Sel    Press Save To Flash(9)
2.Ala      to Confirm
3.App      Back to Cancel
4.Str
5.Detectors & Realtime Chroms
6.Results & Chromatograms
7.Method, Calibration & Validation
8.App I/O, Temperature & Pressure
9.Save To Flash
```
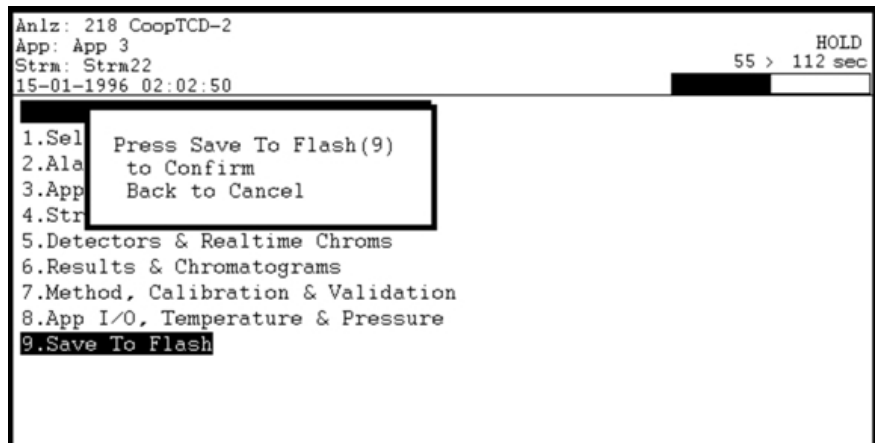
Operator Action

Press "9" on the numeric keypad to confirm the "Save To Flash" function. To cancel the function and return to the menu, press the "Back" softkey.

While the save is progressing the system displays the following message.

```
Saving to Flash
Please Wait"
```

System Setup (Selection 1 on Configure Menu)

When to Use

This function allows a user to view and modify the following types of system settings information.

> Version information for the software
> Communications information\
> Information regarding the load (boot) process
> Time and date settings
> Information regarding the HMI display
> System IP (Internet Protocol) settings

Each of these information types are accessible from screens which are activated by softkeys that are displayed when the "System Settings" is selected.

Menu Path

The "System Setup" screen can be accessed from the Configure Menu. If not already displayed, the Configure Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

Using the Settings Screens

Six different screens of system settings information are available for viewing. These screens are accessible using softkeys that are displayed on the softkey bar.

There are three types of information listed for each system setting displayed. These include the setting name, the current value for the setting, and (usually) a number that is used to select the setting for editing.

For most other HMI screens the arrow keys are used to select data for modifying. On the settings screens, the numeric keypad is used to select settings. Any setting that has a number listed in the left column of the table may be modified. Press the numeric keypad number that corresponds to the setting. Either a small editing window or a new screen will be displayed.

Any setting that does not have a number displayed in the left hand column is read only and cannot be changed on the HMI.

Individual system settings are described later in this section.

System Setup (Configure Menu), Continued

Softkey Descriptions

The following softkeys are available from the various "System Setup" screens and the associated sub-screens.

Softkey	Use
"VERSION INFO"	This softkey displays the version screen. This screen contains information relating to the current loaded version of the software, database, BIOS, etc.
"COMM INFO"	This softkey displays the communications settings screen. This screen contains information relating to aspects of communication other than Internet Protocol (IP). Included is information such as the analyzer ID, MODBUS information, and Advance Data Highway information.
"LOAD INFO"	This softkey displays the load settings screen. This screen contains information relating to the system boot process.
"TIME INFO"	This softkey displays the time and date information screen. This screen contains information relating to the date and time, including daylight savings time and the time zone.
"DISPLAY INFO"	This softkey displays the display information screen. This screen contains information relating to the HMI display, including language, date format, and how softkeys are displayed.
"IP SET INFO"	This softkey displays the IP settings screen. This screen contains information relating to Internet Protocol settings.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"ACCEPT CHANGE"	This softkey is used to confirm the values entered in the data fields. When it is pressed the data entry fields disappear and the data is stored.
"CANCEL CHANGE"	This softkey is used to cancel a change. When it is pressed the data entry fields disappear and any modified entries remain at their original value.

System Setup (Configure Menu), Continued

Softkey Descriptions (continued)

Softkey	Use
"GO TO ORIG"	This softkey is displayed when a user is modifying a setting and a new window appears showing a list of multiple preset values which is available for selection. This softkey allows the user to return to the original value on the list that was set when the screen was first displayed.
"DONE"	This softkey is used to confirm the input of a parameter change and return to the previous menu. It is similar to an "ACCEPT CHANGES" softkey.

"VERSION INFO" Screen

Below is the screen that is displayed when the "VERSION INFO" softkey is selected after the "System Setup" menu item is selected from the configure menu. The "VERSION INFO" screen is the initial default screen that is displayed when "System Setup" is selected. The individual settings displayed on the setup screens are described later in this section.

```
Anlz: 189 OF_CC_HT_                                    Fault
App: Six TCDs                                           HOLD
Strm: Stream 3                                  0.5 > 0.5 min
03/29/2008 22:09:39
System: Version Information



         #   Name                    Value
             OS Version              V4.2.1 Dec 16 2005
             Database version        4.200-21
             DM version              4.200-05
             Text Version            4.200-04
             Remote DM version       4.200-05
             Bios Version            04.11




Press # of item to Edit or
Change Area of Interest:
 VERSION    COMM      LOAD      TIME     DISPLAY    IP SET
  INFO      INFO      INFO      INFO      INFO       INFO
```

System Setup (Configure Menu), Continued

"COMM INFO" Screen

Below is the screen that is displayed when the "COMM INFO" softkey is selected after the "System Setup" menu item is selected from the configure menu. The individual settings displayed on the setup screens are described later in this section.

```
Anlz: 189 OF_CC_HT_                                          HOLD
App: Six TCDs                                        0.5 > 0.5 min
Strm: Stream 3
03/29/2008 22:10:42
System: Communication Settings



         #   Name                    Value
         1   Logical Analyzer ID     189
             Analyzer name           OF_CC_HT_
         3   ADH loop                0
         4   ADH unit                0
         5   Device Type             16 Maxum
         6   ADH Default             1
             Application
             MODBUS port             1:19200.n.8.1
             Serial Number           123456
         9   EMail IP adr




Press # of item to Edit or
Change Area of Interest:
  VERSION      COMM       LOAD       TIME      DISPLAY     IP SET
   INFO        INFO       INFO       INFO       INFO        INFO
```

"LOAD INFO" Screen

Below is the screen that is displayed when the "LOAD INFO" softkey is selected after the "System Setup" menu item is selected from the configure menu. The individual settings displayed on the setup screens are described later in this section.

```
Anlz: 189 OF_CC_HT_                                          HOLD
App: Six TCDs                                        0.5 > 0.5 min
Strm: Stream 3
03/29/2008 22:11:16
System: Load Settings



         #   Name                    Value
         1   boot                    0
         2   options                 0
             system special
             command file            osnau.cmd
         5   TFTP Host IP            161.218.54.139
         6   start mode              1
             boot date               03/29/2008 20:36:30
             boot count              12
             DB last save            03/28/2008 22:15:25
         0   DB save interval        0 0:1




Press # of item to Edit or
Change Area of Interest:
  VERSION      COMM       LOAD       TIME      DISPLAY     IP SET
   INFO        INFO       INFO       INFO       INFO        INFO
```

System Setup (Configure Menu), Continued

"TIME INFO" Screen

Below is the screen that is displayed when the "TIME INFO" softkey is selected after the "System Setup" menu item is selected from the configure menu. The individual settings displayed on the setup screens are described later in this section.

```
Anlz: 189 OF_CC_HT_                              Fault
App: Six TCDs                                     HOLD
Strm: Stream 3                           0.5 >  0.5 min
03/29/2008 22:11:57
System: Time Settings



            #   Name                Value
            1   Local Date          03.29.2008
            2   Local Time          22.11.57
            3   TimeZone            360
            4   day light on        4.1.0.120
            5   day light off       10.5.0.120




Press # of item to Edit or
Change Area of Interest:
 VERSION    COMM     LOAD     TIME    DISPLAY   IP SET
  INFO      INFO     INFO     INFO     INFO      INFO
```

"DISPLAY INFO" Screen

Below is the screen that is displayed when the "DISPLAY INFO" softkey is selected after the "System Setup" menu item is selected from the configure menu. The individual settings displayed on the setup screens are described later in this section.

```
Anlz: 189 OF_CC_HT_                              Fault
App: Six TCDs                                     HOLD
Strm: Stream 3                           0.5 >  0.5 min
03/29/2008 22:12:41
System: Display Settings



            #   Name                Value
            1   date format         1 MM.DD.YYYY
            2   Display solenoids    1 R/W
            3   cycle time format   2 min
            4   Language            1 English
            5   Button ICON         0 No
            6   Display Markers     1 Yes
            7   Display temp ctl    1 Yes
            8   Display pres        1 Yes



Press # of item to Edit or
Change Area of Interest:
 VERSION    COMM     LOAD     TIME    DISPLAY   IP SET
  INFO      INFO     INFO     INFO     INFO      INFO
```

System Setup (Configure Menu), Continued

"IP SET INFO" Screen

Below is the screen that is displayed when the "IP SET INFO" softkey is selected after the "System Setup" menu item is selected from the configure menu. The individual settings displayed on the setup screens are described later in this section.

```
Anlz: 189 OF_CC_HT_                                        Fault
App: Six TCDs                                               HOLD
Strm: Stream 3                                    0.5 >  0.5 min
03/29/2008 22:13:11
System: IP Settings


        #   Name                      Value
        1   LAN 1 IP adr              161.218.54.189
        2   LAN 1 IP mask             255.255.255.0
            LAN 1 media               10BaseT
            LAN 1 MAC adr             00-C0-C9-00-29-0C
        5   Router IP adr             161.218.54.1
        6   SYSLOG IP adr             255.0.1.1
        7   Time Server IP adr        192.168.1.1
        8   LAN 2 IP adr              192.168.144.1 C
        9   LAN 2 IP mask             255.255.255.0



Press # of item to Edit or
Change Area of Interest:
  VERSION     COMM      LOAD      TIME     DISPLAY    IP SET
   INFO       INFO      INFO      INFO      INFO      INFO
```

System Setup (Configure Menu), Continued

Screen Line Definitions

The following table defines each of the entries on the settings screens.

Information Line	Definition	Modify or Read Only
Version Info Screen		
OS Version	The current version and date of the software loaded on the analyzer.	Read Only
Database Version	The current version of the database loaded on the analyzer.	Read Only
DM Version	The current version of the data manager loaded on the analyzer.	Read Only
Text Version	The current version of the language loaded on the analyzer.	Read Only
Remote DM Version	The current version of the data manager loaded on the analyzer	Read Only
BIOS Version	The current version of the BIOS (Basic Input/Output System) firmware.	Read Only
Communications Info Screen		
Logical Analyzer ID	Shows the unique logical ID of the analyzer for the network. Must be < 255 if communicating with Optichrom GCs.	Modify
Analyzer Name	Shows the name of the analyzer. This can be edited in the System Manager>System Control Table	Read Only

System Setup (Configure Menu), Continued

**Screen Line
Definitions
(continued)**

Information Line	Definition	Modify or Read Only
Communications Info Screen (continued)		
ADH Loop	Shows the selected data highway loop. This must be unique to communicate on the Advance Data Hiway. This is required for communication with Optichrom GCs.	Modify
ADH Unit	Shows the selected data highway unit number. This must be unique to communicate on the Advance Data Hiway. This is required for communication with Optichrom GCs.	Modify
Device Type	Specifies the type of device (Maxum, NAU, etc.). This primarily impacts the look of the unit in System Manager.	Modify
ADH Default Application	Shows the default data highway application.. This is important for some Optichrom commands	Read Only
MODBUS port	Communication settings for Modbus RTU. This can be edited in the System Manager>System Control Table.	Read Only
Serial Number	This is set at the time the unit is created.	Read Only
Email IP Address	This is used with the printer table to get email reports. This may be a security issue for some sites.	Modify

System Setup (Configure Menu), Continued

Screen Line Definitions (continued)

Information Line	Definition	Modify or Read Only
Load Info Screen		
boot	Shows the boot parameter. Used internally, contact Customer Service for help.	Modify
options	Allows options to be specified. Used internally, contact Customer Service for help.	Modify
system special	Used internally, contact Customer Service for help.	Read Only
command file	Shows the command file in use. Used internally, contact Customer Service for help.	Read Only
TFTP Host IP	Shows the TFTP Host IP address. Used internally, contact Customer Service for help.	Modify
Start mode	Shows the code for start mode. Used internally, contact Customer Service for help.	Modify
boot date	Shows the last date and time the system was rebooted.	Read Only
boot count	Shows how many times the system has been booted.	Read Only
DB last save	Shows the last date and time the database was saved.	Read Only
DB save interval	Shows the interval of time between automatic database save operations. The information is in the format "dd hh:mm"	Modify

System Setup (Configure Menu), Continued

Screen Line Definitions (continued)

Information Line	Definition	Modify or Read Only
Time Info Screen		
Local Date	Displays the current date.	Modify
Local Time	Displays the current time.	Modify
TimeZone	Indicates the longitude of the current analyzer location in minutes west of GMT (negative numbers are "minutes east"). For example, the value is 360 for United States Central Time.	Modify
day light on	Indicates the month, week, day of week, and minute when the system will turn on daylight savings time. Example: 4.1.0.120 means that daylight savings turns on in the first week (1) of April (4) on a Sunday (0) at 2 AM (120 minutes into the day).	Modify
day light off	Indicates the month, week, day of week, and minute when the system will turn off daylight savings time. Example: 10.5.0.120 means that daylight savings time will end the last week (5) in October (10) on a Sunday (0) at 2 AM (120 into the day).	Modify

System Setup (Configure Menu), Continued

Screen Line Definitions (continued)

Information Line	Definition	Modify or Read Only
Display Info Screen		
Date Format	Sets format of date. The value is 1 for the US (MM.DD.YYYY) or 2 for Europe (DD.MM.YYYY).	Modify
Display solenoids	Displays the solenoid valve information at the bottom of some screens. The possible values are no display (no), read and write (R/W), and read only (RO).	Modify
Cycle time format	Indicates whether the cycle time is shown in minutes or seconds.	Modify
Language	Indicates whether the language used is French, German, Spanish, or American English.	Modify
Button ICON	Indicates how softkeys are to be displayed. A value of "0" displays words (as described in this manual). A value of 1 displays icons instead of words for some softkeys.	Modify
Display Markers	Indicates whether markers are to be displayed on chromatograms.	Modify
Display temp ctl	Indicates whether the temperature controller information is to be displayed at the top of some screens.	Modify
Display pres	Indicates whether the pressure controller information is to be displayed at the top of some screens.	Modify

System Setup (Configure Menu), Continued

Screen Line Definitions (continued)

Information Line	Definition	Modify or Read Only
IP Settings Info Screen		
LAN 1 IP adr	Shows the IP address of the analyzer on the network.	Modify
LAN 1 IP mask	Shows the IP subnet mask for the analyzer.	Modify
LAN 1 media	Shows the type of network cable that is in use; example 10BaseT.	Read Only
LAN 1 MAC adr	Shows the MAC address for the analyzer.	Read Only
Router IP adr	Shows the gateway IP address.	Modify
SYSLOG IP adr	Shows the IP address for the system log. This is used for compact flash debug collection. The default is 255.0.1.1.	Modify
Time Server IP adr	Shows the IP address of the server which controls the time of day for the analyzer.	Modify
LAN 2 IP adr	Shows the IP address of the Sensor Near Electronics Controller (SNECON).	Modify
LAN 2 IP mask	Shows the IP subnet mask of the Sensor Near Electronics Controller (SNECON).	Modify

Printers (Selection 3 on Configure Menu)

Description

This screen displays the printers that are attached to the network. From the "Details" screen changes can be made to some parameters.

Menu Path

The "Printers" function can be accessed from the Configure Menu. If not already displayed, the Configure Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Printers" Screen

Below is the screen that is displayed when the "Printers" menu item is selected from the Configure Menu.

```
Anlz: 218 CoopTCD-2                                      Fault
App: App 3                                               HOLD
Strm: Strm22                                       55 > 112 sec
16-01-1996 17:33:56                        ████████████
Printers

    ┌──────────────────────────────────────────────────────┐
    │ID      Name      Type    Address                      │
    │2.:     ADH       ADH     7/12@161.218.54.116          │
    │        printer 7 standar                              │
    │        12        d                                    │
    ├──────────────────────────────────────────────────────┤
    │1.C:                                                   │
    │3.:     ADH       ADH     3/18@161.218.54.104          │
    │        printer 3 standar                              │
    │        18        d                                    │
    │4.:     ADH       ADH     3/26@161.218.54.71           │
    │        printer 3 standar                              │
    │        26        d                                    │
    │5.:     ADH       ADH     3/16@192.168.1.1             │
    │        printer 3 standar                              │
    │        16        d                                    │
    │6.:     ADH       ADH     3/21@192.168.1.1             │
    │        printer 3 standar                              │
    │        21        d                                    │
    │7.:     ADH       ADH     2/9@161.218.54.118           │
    │        printer 2 standar                              │
    │        9         d                                    │
Choose item: ▐▌ and select action:

  ┌─────────┐ ┌─────────┐              ┌─────────┐
  │    ^    │ │    V    │              │ DETAILS │
  └─────────┘ └─────────┘              └─────────┘
```

Printers (Configure Menu), Continued

"Details" Screen

Below is the screen that is displayed when the "DETAILS" softkey is selected from the "Printers" screen.

```
Anlz: 218 CoopTCD-2                                    Fault
App: App 3                                              HOLD
Strm: Strm22                                  55 >  112 sec
16-01-1996 17:35:32                        ████████░░░░░░

          ┌──────────────────┬──────────────────────────┐
          │ Name             │ Value                    │
          │ ID               │ 2                        │
          │ Name             │ ADH printer 7 12         │
          │ Loop             │ 7                        │
          │ Unit             │ 12                       │
          │ Address          │ 161.218.54.116           │
          │ Type             │ 1 ADH standard           │
          │ Print Alarms?    │ No                       │
          │ Print Results?   │ No                       │
          │ Print Calibration? │ No                     │
          └──────────────────┴──────────────────────────┘


Choose item: ▮▮, ENTER; or:
Press number of item on keypad
┌────────┐┌────────┐            ┌────────┐┌────────┐
│   ^    ││   V    │            │        ││ MODIFY │
└────────┘└────────┘            └────────┘└────────┘
```

Interpreting the Display

The content area of the main "Printers" screen contains a list of all installed printers. Information displayed for each printer includes the printer ID number, the printer name, the type of printer, and the IP address.

The available printer types include the following.
> ADH standard (result log)
> ADH export (comma delimited result list)
> Network or Serial
> Email printing

The values "Loop" and "Unit" refer to the Advance Data Hiway (ADH) loop number and unit number. These fields are required when the printer is connected on the ADH.

Printers (Configure Menu), Continued

Softkey Descriptions

The following softkeys are available from the "Printers" screen and from the associated "Details" screens.

Softkey	Use
"DETAILS"	This softkey displays a detailed information screen for the selected printer. Details which have their values shown against a black background may be modified using the "MODIFY" softkey.
"MODIFY"	This softkey, when displayed, allows the user to change certain details relating to the selected printer. Some changes toggle the selected value, and other changes cause a modification screen or modification window to display.
"GO TO ORIG"	When modifying details and a list of multiple preset values is available for selection, this softkey appears. It allows the user to return to the original value that was set when the "MODIFY" softkey was pressed.
"NEXT ITEM"	This softkey produces unpredictable results. DO NOT USE.
"DONE"	This softkey is used to confirm the input of a parameter change and return to the previous menu. It is similar to an "ACCEPT CHANGES" softkey.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.

Note:

The "NEXT ITEM" softkey is known to produce unpredictable results. Do not use this softkey when modifying details.

Hosts (Selection 4 on Configure Menu)

Description　　　　The Maxum II system provides serial interfacing to other programmable devices such as control systems or host computers. The "Hosts" screen displays information regarding the available host interfaces. This screen is read only. No information can be changed from the "Hosts" screen.

Menu Path　　　　The "Hosts" function can be accessed from the Configure Menu. If not already displayed, the Configure Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Hosts" Screen　　　Below is the screen that is displayed when the "Hosts" menu item is selected from the Configure Menu.

```
Anlz: 218 CoopTCD-2
App: App 3                                            HOLD
Strm: Strm22                                  55 > 112 sec
16-01-1996 17:41:58
Hosts




               ID        Name     Type      Address
               1.       LT_NAU1   6 Modbus  5 @161.218.54.241
               3.       ADH host  0         7/30 @161.218.54.248
                        7 30




Choose item: ▌▌ and select action:
┌──────────┐ ┌──────────┐
│    ^     │ │    V     │
└──────────┘ └──────────┘
```

Softkeys　　　　There are no special softkeys available from the "Hosts" screen.

Hosts (Configure Menu), Continued

Interpreting the Display

The content area of the main "Hosts" screen contains a list of all configured hosts. Information displayed for each host includes the ID number, the name, the IP address, and the host type.

The available host types include the following.
- HCI-C01
- HCI-C04
- HCI-H
- HCI-A
- Results only format for HCI cards
- Modbus
- Modbus Freeform (for TCP printers to provide standard report)
- HCI-A (with cycle length as last result)
- External Results

Only basic host information is displayed from the "Hosts" screen. The full set of host parameters can be viewed and modified via the "Hosts" system table that is accessible in System Manager.

BASIC Events (Selection 5 on Configure Menu)

Description

MaxBasic is a programming language for the Maxum II. MaxBasic can only be used if it has been purchased and installed. It is separately licensed from the Maxum II Workstation software.

The "BASIC Events" function allows users to view and modify available events and the schedule parameters for each event.

"Events" are application dependent functions that the analyzer performs in real time. Events may run on cycle time or may be scheduled on a time-of-day basis. Events are created using the MaxBasic program editor.

Menu Path

The "BASIC Events" function can be accessed from the Configure Menu. If not already displayed, the Configure Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"BASIC Events" Screen

Below is the screen that is displayed when the "BASIC Events" menu item is selected from the Configure Menu.

```
Anlz: 218 CoopTCD-2                                      Fault
App: App 3                                                HOLD
Strm: Strm22                                    55 >  112 sec
16-01-1996 17:44:00
BASIC Events




        #    Stream Event         Stat
                    Name
        1.    -1    *Autocal + 1    OK    Su Mon Tue Wed
                                          Thu Fri Sat
                                          11:15:08
        2.    -1    TotalPeaks+EOC  OK    Unscheduled



Choose item: ▐▌ and select action:
┌────────┬────────┬────────┬────────┬────────┬────────┐
│   ^    │   V    │ ENABLE │  RUN   │  VIEW  │DETAILS │
│        │        │        │PROGRAM │ SCHED  │        │
└────────┴────────┴────────┴────────┴────────┴────────┘
```

BASIC Events (Configure Menu), Continued

"VIEW SCHED" Screen

Below is the screen that is displayed when the "VIEW SCHED" softkey is selected from the "BASIC Events" main screen. This screen allows the user to modify the scheduled execution program for an event.

```
Anlz: 218 CoopTCD-2
App: App 3                                        HOLD
Strm: Strm22                              55 >  112 sec
16-01-1996 17:46:06                       ███████
BASIC Pgm Schedule
Autocal




            Schedule                Next Runtime
            Su Mon Tue Wed Thu Fri Sat    21-01-2008
            11:00:00                      12:00:00




Choose item: ▌▌ and select action:
   ^          V       CHANGE    CHANGE    CHANGE    CHANGE
                      TIME      DAY       UNIT      FREQ
```

"Details" Screen

Below is the screen that is displayed when the "DETAILS" softkey is selected from the "BASIC Events" main screen.

```
Anlz: 218 CoopTCD-2
App: App 3                                        HOLD
Strm: Strm22                              55 >  112 sec
16-01-1996 17:46:53                       ███████


        Name                Value
        ID                  1
        App                 3
        Instance            1
        Streams             -1
        Event Name          *Autocal
        Status              0
        iargs
        rargs
        Run Strm            0
        Max Exec Time       120
        Pgm Function        1 AutoCAL
        Debug_Option        0
        Overrun_Option      0
        Enable              No


Choose item: ▌▌ and select action:
   ^          V                               MODIFY
```

BASIC Events (Configure Menu), Continued

Interpreting the Display

The content area of the "BASIC Events" screen includes the ID number, the event name, the streams that are associated with the event, the current status of the event, and a summary of the schedule. A stream value of "-1" refers to all streams. Applicable statuses are "OK" and "ERROR".

The content area of the "VIEW SCHED" screen shows the execution schedule for a scheduled event and the next planned run time as determined by the schedule. The "VIEW SCHED" screen is blank for unscheduled events.

Programs are set to run either by day and time, or by frequency (not both). The "CHANGE TIME" and "CHANGE DAY" softkeys on the "VIEW SCHED" screen are used to set a program to run on specify days and times. The "CHANGE UNIT" and "CHANGE FREQ" softkeys are used to set a program to run on a certain frequency (interval). For more information refer to the descriptions of the softkeys

BASIC Events (Configure Menu), Continued

Softkey Descriptions

The following softkeys are available from the "BASIC Events" screen and from the associated sub-screens.

Softkey	Use
"ENABLE" and "DISABLE"	This softkey enables or disables the selected event. When an event is disabled, an asterisk will be displayed next to the event name. Disabled events will not run when commanded from a program schedule or a cycle event. However, disabled events WILL run when commanded from an external command such as a Modbus command.
"RUN PROGRAM" and "CANCEL"	The "RUN PROGRAM" softkey runs the program manually. While the program is running, the "CANCEL" softkey is displayed.
"VIEW SCHED"	This softkey displays the schedule screen for the selected event.
"CHANGE TIME"	This softkey is used to set the time of day at which an event is scheduled to execute.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"ACCEPT CHANGE"	This softkey is used to confirm the values entered in the data fields. When it is pressed the data entry fields disappear and the data is stored.
"CANCEL CHANGE"	This softkey is used to cancel a change. When it is pressed the data entry fields disappear and any modified entries remain at their original value.
"SHOW DAY"	The "SHOW DAY" softkey is used with the "CHANGE DAY" softkey. It is used to verify which days are selected.

BASIC Events (Configure Menu), Continued

Softkey Descriptions (continued)

Softkey	Use
"CHANGE DAY"	This softkey is used to set the days that an event is scheduled to run. The days of the week are set using a binary mask (i.e. the number 15 represents the binary digits 0000 0111). The numbers 201-231 are used to run a program on a specific day of the month (e.g. 205 equals the 5th day of each month). The numbers 0-127 are used to schedule the event to run on specific days of the week. The last 7 digits represent the days of the week. This means that the numbers 0-127 can be used to represent any combination of days. A bit value of 1 indicates that the event is scheduled to run on the applicable day. Bit 0 (far right) is for Saturday Bit 1 (second from right) is for Friday Bit 2 (third from right) is for Thursday ... Bit 7 is for Sunday A value of 127 represents "111 1111" which means that the event will run on every day of the week. Use the "SHOW DAY" softkey to have the system calculate and show the schedule that corresponds to a particular number.
"CHANGE UNIT"	Sets the time units when executing an event based on frequency. The following units are available 1 = Hours 2 = Minutes 3 = Days 4 = Seconds 5 = Milliseconds 6 = Months 7 = Years
"CHANGE FREQ"	This softkey is used with the "CHANGE UNIT" softkey. It determines the frequency that an event should be executed (e.g. 10 days).

BASIC Events (Configure Menu), Continued

Softkey Descriptions (continued)

Softkey	Use
"DETAILS"	This softkey displays a detailed information screen for the selected printer. Details which have their values shown against a black background may be modified using the "MODIFY" softkey.
"MODIFY"	This softkey, when displayed, allows the user to change certain details relating to the selected printer. Some changes toggle the selected value, and other changes cause a modification screen to appear.
"NEXT ITEM"	This softkey produces unpredictable results. DO NOT USE.
"DONE"	This softkey is used to confirm the input of a parameter change and return to the previous menu. It is similar to an "ACCEPT CHANGES" softkey.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"VIEW ARGS"	Displays a separate screen showing details regarding arguments for the event. This is related to the parameters "iargs" and "rargs". Arguments are integer (iargs) and real (rargs) numbers that are passed to a program event and used to identify a parameter. The information displayed by this function is also available from the "Parameters" screen which is described in the following section of this chapter.

Note: The "NEXT ITEM" softkey is known to produce unpredictable results. Do not use this softkey when modifying details.

Parameters (Selection 6 on Configure Menu)

Description

The "Parameters" function is used to view and modify input and output information for events created in the MaxBasic program editor.

Menu Path

The "Parameters" function can be accessed from the Configure Menu. If not already displayed, the Configure Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Parameters" Screen

Below is the screen that is displayed when the "Parameters" menu item is selected from the Configure Menu.

```
Anlz: 218 CoopTCD-2                                    Fault
App: App 3                                             HOLD
Strm: Strm22                                   55 >  112 sec
16-01-1996 17:48:24                        ████████
Parameters




     Strm  ID    Name           Value    Query    Query
                                          type     id
     -1    5010                 1002      None     0
     -1    1000                 9000      None     0




Choose item: ▐▌ and select action:
   ┌─────────┐ ┌─────────┐                      ┌─────────┐
   │    ^    │ │    V    │                      │ MODIFY  │
   └─────────┘ └─────────┘                      └─────────┘
```

Parameters (Configure Menu), Continued

Interpreting the Display

The content area of the "Parameters" screen includes the stream,, the parameter number, the parameter name, the current value, the type (see below), and the ID.

The following query types are available.

0	none(value is used as a constant for the program)
1	AI
2	DI
3	Result buffered_value
4	Result saved_value
5	Extresult saved_value
6	stream current error
7	stream current warning
8	application current error
9	application current warning
10	flowing stream
11	application mode
12	active sequence id
13	next sequence id
14	DO

Softkey Descriptions

The following softkeys are available from the "Parameters" screen.

Softkey	Use
"MODIFY"	This softkey allows the user to change certain values related to the parameter.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"ACCEPT CHANGE"	This softkey is used to confirm the values entered in the data fields. When it is pressed the data entry fields disappear and the data is stored.
"CANCEL CHANGE"	This softkey is used to cancel a change. When it is pressed the data entry fields disappear and any modified entries remain at their original value.
"NEXT FIELD"	This softkey allows the user to toggle between the available data fields.

System I/O (Selection 7 on Configure Menu)

Description

The "System I/O" function provides a menu of functions related to system wide input and output configurations. All inputs and outputs configured in the system are listed in the various sub-screens. The following functions are listed on the menu.

>Analog Input
>
>Analog Output
>
>Digital Input
>
>Digital Output
>
>SNE Controllers
>
>SNE Hardware
>
>CAN Modules

The various screens are primarily for viewing the I/O information. Some limited changes can be made to certain types of information.

Note:

Each of the selections on the "System I/O" menu opens a different sub-screen. For the purposes of this manual, descriptions for each of the sub-screens are contained in separate sections within this chapter.

Menu Path

The "System I/O" menu can be accessed from the Maintenance Menu. If not already displayed, the Maintenance Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

System I/O (Configure Menu), Continued

"System I/O" Menu Screen

Below is the menu screen that is displayed when "System I/O" is selected from the Configure Menu. The different selections on the menu are described in later sections of this chapter.

```
Anlz: 218 CoopTCD-2                                      Fault
App: App 3                                                HOLD
Strm: Strm22                                      55 > 112 sec
17-01-1996 00:11:46                        ████████
System I/O




                      ┌─────────────────────┐
                      │1. Analog Input      │
                      │2. Analog Output     │
                      │3. Digital Input     │
                      │4. Digital Output    │
                      │5. SNE Controllers   │
                      │6. SNE Hardware      │
                      │7. CAN Modules       │
                      └─────────────────────┘




Choose item: ▐▐ and select action:
┌──────────┬──────────┬─────────────────────┬──────────┐
│    ^     │    ∇     │                     │  SELECT  │
└──────────┴──────────┴─────────────────────┴──────────┘
```
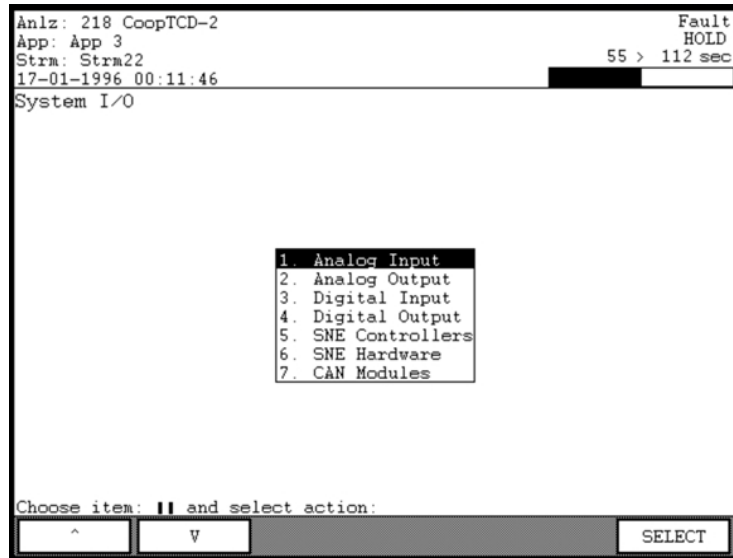
Interpreting the Display

The functions listed on the "System I/O" menu are used to display and perform limited modifications on system inputs, outputs, SNE Controllers and Hardware, and CAN Modules. These settings are not specific to any particular method or application. For input and output information related to applications refer to the Maintenance Menu selection "App I/O, Temperature & Pressure".

Softkey Description

The only extra softkey available from the "System I/O" screen is the "SELECT" softkey. This softkey, when used with the arrow keys, will select and activate a menu item. It is also possible to use the numeric keypad to directly select menu items.

Analog Input (on System I/O Menu)

Description

"Analog Input", which is selection 1 on the "System I/O" menu, is designed to allow users to view information related to all analog inputs that are configured within the analyzer.

An analog input is an I/O signal which is brought into an analyzer from other equipment. The equipment can be internal to the analyzer such as detectors. The equipment may also be external to the analyzer such as devices connected through a CAN Extension Unit.

The I/O screens are used for troubleshooting, to verify that data is being sent or received, and to manually control a particular I/O.

Menu Path

The "Analog Input" screen may be accessed from the "System I/O" menu. The "System I/O" menu is accessed from the Configure Menu. If not already displayed, the Configure Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Analog Input" Screen (Numerical View)

Below is the screen that is displayed when the "Analog Input" menu item is selected from the "System I/O" menu. On this screen, the Hardware ID information is shown in a numerical format.

Analog Input, Continued

Interpreting the Display

The central section of the content area contains the list of all analog inputs configured within the analyzer. Information displayed includes the unique hardware ID, the status, the raw hexadecimal value from the hardware, and the weighted value.

For analog inputs, the "Value" column calculates the current value weighted based on the full scale value. For example, a "Value" of 0.2000 indicates that the current value is 20% of full scale.
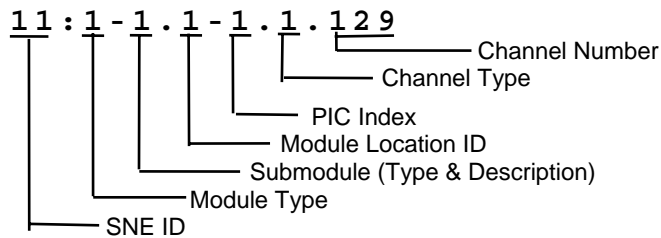
The following status values are available for the "Stat" column.
> OK – Working correctly
> INIT – Initializing
> ERR – A hardware or software error exists
> COM ERR – A communication error exists
> * (located before the status) – The analog input is disabled

The "SHOW DECODE" and "SHOW NUM" softkeys toggle the way that the hardware ID is displayed. The numerical format of the hardware ID is described as follows

```
1 1 : 1 - 1 . 1 - 1 . 1 . 1 2 9
```
───── Channel Number
─── Channel Type
─── PIC Index
─── Module Location ID
─── Submodule (Type & Description)
─── Module Type
─── SNE ID
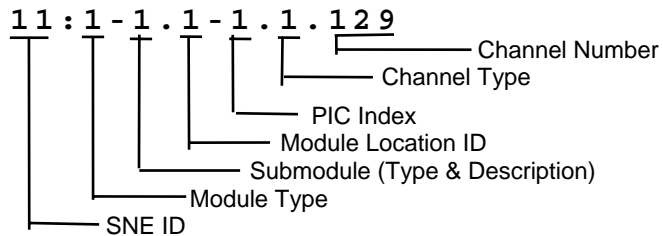
Analog Input, Continued

"Analog Input" Screen ("SHOW DECODE" View)

Below is the screen that is displayed when the "SHOW DECODE" softkey is selected from the "Analog Input" screen. On this screen the hardware ID information has been decoded by the analyzer to provide an indication of the hardware involved.

```
Anlz: 218 CoopTCD-2                                    Fault
App: App 3                                              HOLD
Strm: Strm22                                  55 >  112 sec
17-01-1996 00:46:49                          ▮▮▮▮▮▮
System Analog Input




  Hrdwr ID                      Stat   Raw Value   Value
  CAN-3 AI-1                    *ERR   00000000    0.0000   ▪
  CAN-3 AI-2                    *ERR   ffffffff   -0.0500
  CAN-3 AI-3                    *ERR   00000002    0.2000
  CAN-3 AI-4                    *ERR   fffffffd   -0.1500
  20:SVCM-1 SVC-1 BD           *OK    00000000    0.0000
  TEMP(129)
  20:SVCM-2 SVC-1 BD           *OK    00000000    0.0000
  TEMP(129)
  20:EPC-2 PC-1 MEAS-1(1)       OK    199eb600    0.1001
  20:EPC-2 PC-1 BD TEMP(129)   *OK    00000000    0.0000



Choose item: ▮▮ and select action:
┌──────────┐┌──────────┐┌──────────┐
│    ^     ││    V     ││   SHOW   │
│          ││          ││   NUM    │
└──────────┘└──────────┘└──────────┘
```

Softkey Descriptions

The following softkeys are available from the "Analog Input" screen.

Softkey	Use
"SHOW DECODE"	This softkey converts the numerical hardware ID information into text.
"SHOW NUM"	When the hardware ID information is displayed as text, this softkey converts it back into the raw numerical ID.

Analog Output (on System I/O Menu)

Description

"Analog Output", which is selection 2 on the "System I/O" menu, is designed to allow users to view information related to all analog outputs that are configured within the analyzer. In addition, the output values may be changed.

An analog output is an I/O signal sent from an analyzer to other equipment. The equipment can be internal to the analyzer such as an oven heater. The equipment may also be external to the analyzer such as devices connected through a CAN Extension Unit.

The I/O screens are used for troubleshooting, to verify that data is being sent or received, and to manually control a particular I/O.

Menu Path

The "Analog Output" screen may be accessed from the "System I/O" menu. The "System I/O" menu is accessed from the Configure Menu. If not already displayed, the Configure Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Analog Output" Screen

Below is the screen that is displayed when the "Analog Output" menu item is selected from the "System I/O" menu. On this screen, the Hardware ID information is shown in a numerical format. The "SHOW DECODE" softkey will force the Hardware ID information to display in a textual format (refer to the previous "Analog Input (on System I/O Menu)" section of this manual for an example of the "SHOW DECODE" display).

Analog Output, Continued

Interpreting the Display

The central section of the content area contains the list of all analog outputs configured within the analyzer. Information displayed includes the unique hardware ID, the status, the raw hexadecimal value from the hardware, and the weighted value.

For analog outputs, the "Value" column calculates the current value weighted based on the full scale value. For example, a "Value" of 0.2000 indicates that the current value is 20% of full scale.

The following status values are available for the "Stat" column.
> OK – Working correctly
> INIT – Initializing
> ERR – A hardware or software error exists
> COM ERR – A communication error exists
> * (located before the status) – The analog output is disabled

The "SHOW DECODE" and "SHOW NUM" softkeys toggle the way that the hardware ID is displayed. The numerical format of the hardware ID is described as follows

```
11:1-1.1-1.1.129
```
                              Channel Number
                         Channel Type
                     PIC Index
                 Module Location ID
             Submodule (Type & Description)
         Module Type
      SNE ID

Analog Output, Continued

Softkey Descriptions   The following softkeys are available from the "Analog Output" screen.

Softkey	Use
"SHOW DECODE"	This softkey converts the numerical hardware ID information into text.
"SHOW NUM"	When the hardware ID information is displayed as text, this softkey converts it back into the raw numerical ID.
"MODIFY"	This softkey allows the user to change the current value for the selected analog output.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"ACCEPT CHANGE"	This softkey, when available, is used to confirm the values entered in the data fields. When it is pressed the data entry fields disappear and the data is stored.
"CANCEL CHANGE"	This softkey, when available, is used to cancel a change. When it is pressed the data entry fields disappear and any modified entries remain at their original value.

Digital Input (on System I/O Menu)

Description

"Digital Input" which is selection 3 on the "System I/O" menu is designed to allow users to users to view information related to all digital inputs that are configured within the analyzer.

A digital input is an I/O signal with a value of either "ON" or "OFF". It may indicate information such as an alarm status (alarm or no alarm) or operating information (such as flame out on a detector).

The I/O screens are used for troubleshooting, to verify that data is being sent or received, and to manually control a particular I/O.

Menu Path

The "Digital Input" screen may be accessed from the "System I/O" menu. The "System I/O" menu is accessed from the Configure Menu. If not already displayed, the Configure Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Digital Input" Screen

Below is the screen that is displayed when the "Digital Input" menu item is selected from the "System I/O" menu. On this screen, the Hardware ID information is shown in a numerical format. The "SHOW DECODE" softkey will force the Hardware ID information to display in a textual format (refer to the previous "Analog Input (on System I/O Menu)" section of this manual for an example of the "SHOW DECODE" display).

```
Anlz: 218 CoopTCD-2
App: App 3                                              HOLD
Strm: Strm22                                    55 >  112 sec
17-01-1996 00:48:01
System Digital Input


        Hrdwr ID                        Stat    Value
        0:0.0.3.1                       *OK     0
        0:0.0.3.2                       *OK     0
        0:0.0.3.3                       *OK     0
        0:0.0.3.4                       *OK     0
        0:0.0.3.5                       *OK     1
        0:0.3.3.1                       *ERR    0
        0:0.3.3.2                       *ERR    0
        20:1-1.1-1.3.129                *OK     0
        20:1-1.1-1.3.130                *OK     0
        20:1-1.1-1.3.131                *OK     0


Choose item: ‖ and select action:
    ^          V          SHOW
                          DECODE
```

Digital Input, Continued

Interpreting the Display

The central section of the content area contains the list of all digital inputs configured within the analyzer. Information displayed includes the unique hardware ID, the status, and the digital value (either 0 or 1).

The following status values are available for the "Stat" column.

      OK – Working correctly
      INIT – Initializing
      ERR – A hardware or software error exists
      COM ERR – A communication error exists
      * (located before the status) – The digital input is disabled

The "SHOW DECODE" and "SHOW NUM" softkeys toggle the way that the hardware ID is displayed. The numerical format of the hardware ID is described as follows

```
11:1-1.1-1.1.129
```
                       Channel Number
                  Channel Type
             PIC Index
          Module Location ID
        Submodule (Type & Description)
      Module Type
    SNE ID
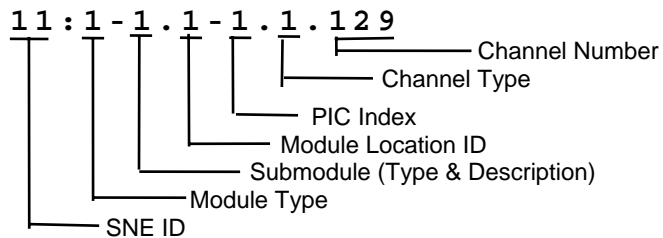
Softkey Descriptions

The following softkeys are available from the "Digital Input" screen.

Softkey	Use
"SHOW DECODE"	This softkey converts the numerical hardware ID information into text.
"SHOW NUM"	When the hardware ID information is displayed as text, this softkey converts it back into the raw numerical ID.

Digital Output (on System I/O Menu)

Description

"Digital Output" which is selection 4 on the "System I/O" menu is designed to allow users to view information related to all digital outputs that are configured within the analyzer. In addition, the output value may be changed (toggled between 0 and 1)

A digital output is an I/O signal with a value of either "ON" or "OFF". It is typically used to perform actions such as changing the status of a valve, injecting a sample, or igniting a detector flame.

The I/O screens are used for troubleshooting, to verify that data is being sent or received, and to manually control a particular I/O.

Menu Path

The "Digital Output" screen may be accessed from the "System I/O" menu. The "System I/O" menu is accessed from the Configure Menu. If not already displayed, the Configure Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Digital Output" Screen

Below is the screen that is displayed when the "Digital Output" menu item is selected from the "System I/O" menu. On this screen, the Hardware ID information is shown in a numerical format. The "SHOW DECODE" softkey will force the Hardware ID information to display in a textual format (refer to the previous "Analog Input (on System I/O Menu)" section of this manual for an example of the "SHOW DECODE" display).

```
Anlz: 218 CoopTCD-2                              Fault
App: App 3                                        HOLD
Strm: Strm22                          55 >  112 sec
17-01-1996 00:48:40
System Digital Output



   Hrdwr ID                      Stat   Value
   21-7.21.7.1                   ERR    1
   0:0.0.4.2                     OK     1
   0:0.0.4.3                     OK     1
   0:0.0.4.4                     OK     1
   0:0.3.4.1                     ERR    0
   0:0.3.4.2                     ERR    0
   20:1-1.1-1.4.1                OK     0
   20:1-1.1-1.4.129              OK     0
   20:1-1.1-1.4.130              OK     0
   20:1-1.1-1.4.2                OK     0



Choose item: ‖ and select action:
  ┌─────┬─────┬───────┬────────┬─────┬──────┐
  │  ^  │  V  │ SHOW  │        │     │ OFF  │
  │     │     │DECODE │        │     │      │
  └─────┴─────┴───────┴────────┴─────┴──────┘
```

Digital Output, Continued

Interpreting the Display

The central section of the content area contains the list of all digital outputs configured within the analyzer. Information displayed includes the unique hardware ID, the status, and the digital value (either 0 or 1).

The following status values are available for the "Stat" column.
> OK – Working correctly
> INIT – Initializing
> ERR – A hardware or software error exists
> COM ERR – A communication error exists
> * (located before the status) – The digital output is disabled

The "SHOW DECODE" and "SHOW NUM" softkeys toggle the way that the hardware ID is displayed. The numerical format of the hardware ID is described as follows

```
1 1 : 1 - 1 . 1 - 1 . 1 . 1 2 9
```
                                                   Channel Number
                                         Channel Type
                                    PIC Index
                               Module Number
                          Submodule (Type & Description)
                     Module Type
                SNE ID
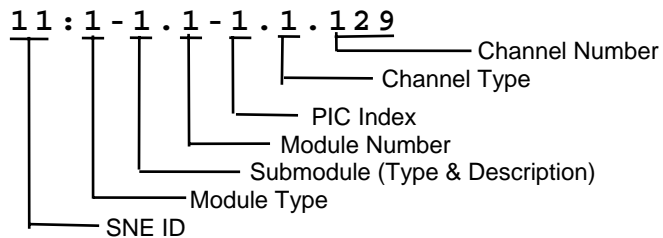
Softkey Descriptions

The following softkeys are available from the "Digital Output" screen.

Softkey	Use
"SHOW DECODE"	This softkey converts the numerical hardware ID information into text.
"SHOW NUM"	When the hardware ID information is displayed as text, this softkey converts it back into the raw numerical ID.
"OFF" and "ON"	These softkeys allow the user to toggle the current value for the selected digital output. "1" equals ON and "0" equals OFF.

SNE Controllers (on System I/O Menu)

Description

"SNE Controllers", which is selection 5 on the "System I/O" menu, is designed to allow users to view information related to the Sensor Near Electronics Controllers (SNECONs) that are configured in the analyzer.

The Sensor Near Electronics (SNE) is the hardware that contains the electronics which interfaces the detectors and other oven components into the System Controller of the Maxum II. The SNECON is the control module for the SNE hardware.

Menu Path

The "SNE Controllers" screen may be accessed from the "System I/O" menu. The "System I/O" menu is accessed from the Configure Menu. If not already displayed, the Configure Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"SNE Controllers" Screen

Below is the screen that is displayed when the "SNE Controllers" menu item is selected from the "System I/O" menu.

```
Anlz: 218 CoopTCD-2                                    Fault
App: App 3                                              HOLD
Strm: Strm22                                   55 >  112 sec
17-01-1996 00:49:29
SNE Controllers

  ADR  S/N         APP Ver  OS Ver  T  Stat   Config
  21M  EC10376     4.c16    4.m15   1  OK      x31101902
                                                Rev 3.1
                                                RAM 16MB
                                                CPU 25Mhz
                                                DBG
                                                SIM=x0
  23S  EC10373     4.c16    4.m15   1  OK      x31101902
                                                Rev 3.1
                                                RAM 16MB
                                                CPU 25Mhz
                                                DBG
                                                SIM=x0
  22S  EC10374     4.c16    4.m15   1  OK      x31101902
                                                Rev 3.1
                                                RAM 16MB
                                                CPU 25Mhz
                                                DBG
                                                SIM=x0
  20S                               0  INIT    x0
                                                SIM=x0
Choose item: ▐▐ and select action:
  ┌────────┐ ┌────────┐                         ┌────────┐
  │   ^    │ │   V    │                         │DETAILS │
  └────────┘ └────────┘                         └────────┘
```

Interpreting the Display

The central section of the content area contains the list of all SNECONs configured within the analyzer. Information displayed includes the following.

ADR – The address which identifies the location of the SNECON in the electronics enclosure
S/N – Serial Number of the SNECON
APP Ver – Application version release number
OS Ver – Operating system version release number
T – Refers to the SNE type (Maxum II SNE is type 1).
Stat – Status
Config – Configuration and build information (SNECON memory, etc.)

The "DETAILS" screen shows the above information plus additional data such as last boot date and the number of times the SNECON has been booted.

All data on the main "SNE Controllers" screen and the "DETAILS" screen is read-only. No changes are possible from these screens.

"DETAILS" Screen

Below is the screen that is displayed when the "DETAILS" softkey is pressed from the "SNE Controllers" screen.

```
Anlz: 218 CoopTCD-2                                    Fault
App: App 3                                              HOLD
Strm: Strm22                                  55 >  112 sec
17-01-1996 00:50:09
       Name                    Value
       ADR                     21
       I2C Bus Master          M
       S/N                     EC10376
       APP Ver                 4.c16
       OS Ver                  4.m15
       Type                    1
       Status                  OK(0)
       Config                  x31101902
                               Rev 3.1
                               RAM 16MB
                               CPU 25Mhz
                               DBG
       Boot Count              61
       Boot Date               02-01-1996 14:36:24
       Down Date               21-07-1 12:15:05
       Name                    21
       Load cmd                0
       Load status             0
       Sim method              OFF

                                            RESET
                                             SNE
```

SNE Controllers, Continued

Softkey Descriptions   The following softkeys are available from the "SNE Controllers" screen.

Softkey	Use
"DETAILS"	This softkey displays a detailed information screen for the selected Sensor Near Electronics Controller (SNECON). No details can be modified from this "DETAILS" screen.
"RESET SNE"	This softkey, available on the "DETAILS" screen performs a reset of the selected SNECON.

SNE Hardware (on System I/O Menu)

Description

 "SNE Hardware", which is selection 6 on the "System I/O" menu, is designed to allow users to view information related to the Sensor Near Electronics (SNE) hardware that is configured in the analyzer.

The Sensor Near Electronics (SNE) is the hardware that contains the electronics which interfaces the detectors and other oven components into the System Controller of the Maxum II.

Menu Path

The "SNE Hardware" screen may be accessed from the "System I/O" menu. The "System I/O" menu is accessed from the Configure Menu. If not already displayed, the Configure Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"SNE Hardware" Screen (Numerical View)

Below is the screen that is displayed when the "SNE Hardware" menu item is selected from the "System I/O" menu. On this screen, the Address information is shown in a numerical format. The "SHOW DECODE" softkey will force the address information to display in a textual format (refer to the previous "Analog Input (on System I/O Menu)" section of this manual for an example of the "SHOW DECODE" display).

```
Anlz: 218 CoopTCD-2                                    Fault
App: App 3                                              HOLD
Strm: Strm22                                  55 >  112 sec
17-01-1996 00:50:40                        ▐███████     ▌
SNE Hardware




        Name      Address          Stat  Serial   Revision
        SNE       23:5-7.23-1      OK    EC10373  V1.000
        SNE-TCD   23:4-6.3-4       OK    EE63     F1.011
        SNE-TCD   23:4-6.3-3       OK    EE63     F1.011
        SNE-TCD   23:4-6.3-2       OK    EE63     F1.011
        SNE-TCD   23:4-4.3-1       OK    EE63     F2.005
        SNE       22:5-7.22-1      OK    EC10374  V1.003
        TCD       22:4-6.2-4       OK    EF22123  F3.004
        TCD       22:4-6.2-3       OK    EF22123  F3.004
        TCD       22:4-6.2-2       OK    EF22123  F3.004
        TCTRL     22:4-4.2-1       OK    EF22123  F2.101a



Choose item: ▐▌ and select action:
┌────────┬────────┬────────┬──────────────────────┐
│   ^    │   V    │ SHOW   │                      │
│        │        │ DECODE │                      │
└────────┴────────┴────────┴──────────────────────┘
```

SNE Hardware, Continued

Interpreting the Display

The central section of the content area contains a list of modules configured within the analyzer (detector modules, pressure controllers, temperature controllers, etc.). Information displayed includes the name, address, the status, the serial number and the revision.

The following status values are available for the "Stat" column.

        OK – Working correctly
        INIT – Initializing
        ERR – A hardware or software error exists
        COMM – A communication error exists

The "SHOW DECODE" and "SHOW NUM" softkeys toggle the way that the address is displayed. The numerical format of the address is described as follows

```
1 1 : 1 - 1 . 1 - 1 . 1 . 1 2 9
                          └──── Channel Number
                      └──── Channel Type
                  └──── PIC Index
              └──── Module Location ID
          └──── Submodule (Type & Description)
      └──── Module Type
  └──── SNE ID
```

Softkey Descriptions

The following softkeys are available from the "SNE Hardware" screen.

Softkey	Use
"SHOW DECODE"	This softkey converts the numerical hardware ID information into text.
"SHOW NUM"	When the hardware ID information is displayed as text, this softkey converts it back into the raw numerical ID.

CAN Modules (on System I/O Menu)

Description

This screen is used by maintenance personnel after a CAN module has been newly installed or replaced. After the addition or replacement, the analyzer must be configured to recognize the new hardware.

Menu Path

The "CAN Modules" screen may be accessed from the "System I/O" menu. The "System I/O" menu is accessed from the Configure Menu. If not already displayed, the Configure Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"CAN Modules" Screen (Numerical View)

Below is the screen that is displayed when the "CAN Modules" menu item is selected from the "System I/O" menu.

```
Anlz: 218 CoopTCD-2
App: App 3                                            HOLD
Strm: Strm22                                    55 >  112 sec
17-01-1996 00:51:06                         ███████
CAN Modules




          ┌──────────────────────────────────────────┐
          │Node      Serial Number            Status  │
          │0         0                        OK(1)    │
          │2         00700000002101           OK(1)    │
          │3         00200000065101           ERR(-1)  │
          └──────────────────────────────────────────┘




Choose item: ▐▐ and select action:
   ┌─────────┐┌─────────┐        ┌─────────┐┌─────────┐
   │    ^    ││    V    │        │   ADD   ││ DELETE  │
   └─────────┘└─────────┘        └─────────┘└─────────┘
```

CAN Modules, Continued

Adding and Deleting CAN Modules

When a CAN Module is replaced (or added), the analyzer configuration must be updated to reflect the serial number of the new module. The "ADD" and "DELETE" keys on the "CAN Modules" screen are used for this purpose.

If a module is replaced, delete the old value first. Make a note of the node number and then, for the appropriate CAN Module, press the "DELETE" softkey. Press the "DELETE" softkey again to confirm the deletion

To add the new module perform the following steps.

1. Obtain the 14-digit serial number from the label on the CAN module.
2. Press the "ADD" softkey from the "CAN Modules" screen.
3. Enter the 14-digit serial number. Hint: The serial number field has all of the "0" characters filled out and shows question marks ("?") for the remaining numbers. Use the arrow softkeys to move the cursor to left of the question marks. Then type over the question mark with the correct number from the serial number.
4. Verify that the node number is correct (should match the node number of the deleted module).
5. Press the "DONE" softkey to confirm the entry.

Note: When replacing a CAN Module, the old module information must be deleted first. This is necessary so that the node number can be reused.

CAN Modules, Continued

Softkey Descriptions The following softkeys are available from the "CAN Modules" screen.

Softkey	Use
"ADD"	This softkey is used to update the analyzer configuration to reflect the serial number of a new or replaced CAN Module.
"DELETE"	This softkey is used to delete a CAN Module from the analyzer configuration.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"NEXT FIELD"	This softkey toggles between data entry fields.
"DONE"	This softkey confirms changes that have been entered and returns the user to the previous screen. It is similar to an "ACCEPT CHANGES" softkey.

Users/Passwords (Selection 8 on Configure Menu)

Description

The "Users/Passwords" function is used to modify user passwords and set the default user for the analyzer.

Menu Path

The "Users/Passwords" function can be accessed from the Configure Menu. If not already displayed, the Configure Menu is obtained by pressing the "Home" softkey and then pressing the "SELECT MENU" softkey.

"Users/Passwords" Screen

Below is the screen that is displayed when the "Users/Passwords" menu item is selected from the Configure Menu.

```
Anlz: 218 CoopTCD-2                                          Fault
App: App 3                                                    HOLD
Strm: Strm22                                        55 >  112 sec
17-01-1996 22:26:44                          ████████████████


         User                  Password            Level
         PUBLIC                                     0
         operate               111                 1
         calibrate             222                 2
         maintain              333                 3
         configure             444                 4
        >super                 555                 99



Choose item: ||, ENTER; or:
Press number of item on keypad
   ┌─────────┐ ┌─────────┐               ┌─────────┐┌─────────┐
   │    ^    │ │    V    │               │   SET   ││ MODIFY  │
   └─────────┘ └─────────┘               │ DEFAULT │└─────────┘
                                         └─────────┘
```

Users/Passwords (Configure Menu), Continued

Interpreting the Display

The default user for the system is the user that is automatically logged on after timeout or when the system is rebooted. The default user is identified in the user list by an arrow (>) next to the user name.

By default, six users are defined. These are "public", "operate", "calibrate", "maintain", "configure", and "super". The default access level for each of these users matches their names. Other users (created using System Manager) may exist as well.

These users must have unique names and they can be created with either "operate", "calibrate", "maintain", or "configure" access levels. Creation and deletion of users must be performed in System Manager (refer the the System Manager section of this manual for the steps to create or delete users).

Access levels are defined as follows.

1   Operate – Includes most functions on Monitor Menu
2   Calibrate – All "Operate" level functions plus calibration
3   Maintain – All "Calibrate" functions plus Maintenance Menu
            functions
4   Configure – All functions except password functions.
99   Super User – All screens and functions

Softkey Descriptions   The following softkeys are available from the "Users/Passwords" screen.

Softkey	Use
"SET DEFAULT"	This softkey sets the currently selected user to be the default user (user that gets logged on by default when the system times out or reboots).
"MODIFY"	This softkey is used to change the password or access level for a user.
"BACK SPACE"	This softkey allows the user to back space while entering data in a field.
"NEXT FIELD"	This softkey allows the user to toggle between the available data fields.
"NEXT ITEM"	This softkey produces unpredictable results. DO NOT USE.
"DONE"	This softkey confirms changes that have been entered and returns the user to the previous screen. It is similar to an "ACCEPT CHANGES" softkey.

Note: The "NEXT ITEM" softkey is known to produce unpredictable results. Do not use this softkey when modifying passwords.

HMI Displayed Alarms

Description

This section provides the user with a list of commonly occurring HMI alarms.

Included on the list are descriptions and suggested actions for most of the alarms. This list is not all inclusive, but it contains most of the more common alarm messages. If an alarm is received that is not on this list, Siemens customer support can provide assistance in defining and troubleshooting the alarm.

Safety First

Many of the suggested actions in this section involve maintenance procedures that are intended ONLY for qualified and authorized maintenance personnel. Care must be exercised and precautions must be taken to prevent physical injury or unnecessary damage to the equipment.

Interpreting Alarm Code Text

The first character of the alarm message indicates the severity of the alarm.

! Indicates a fault alarm

? Indicates a warning alarm

+ Indicates a note (informational)

Alarm messages usually include additional text that provides specific information regarding the occurrence of the alarm. This text is noted in the table below by text such as "%3".

Alarm #	Message	Description	Suggested Actions
301	? External Message: send failure	One of the following: A message was received from itself; or source of message can't be identified; or Gateway is too busy; or communication was disrupted.	Reset Gateway or SYSCON
303	+ External Message:invalid communication from unit %3	Message was received from ADH unit that had previously broadcast with no slots or slot is out of range.	Reset ADH unit.
304	+ External Message: Orphan message received from %3	A external PANDSP was received with no matching PANKEY, or an ATTACH was received with no matching RATCH, or an internal timeout was generated for non-existent message.	Ignore or reset Syscon

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
305	? External Message: Invalid Message Length for %3	Results, print, HAE, or Service Panel messages received from database that have no length.	Check database set up for these messages.
306	+ External Message: Send invalid communication to unit %3	Message from database is directed to an ADH unit that has no slots, an invalid range of slots, or no UID has ever been received.	Check ADH unit.
307	! External Message: Duplicate anlz_id %3 detected ; setting to zero	A ZIP message was received from another ADH unit, or another Maxum has broadcast with the same analyzer #.	Check other units on network
308	! External Message: Duplicate UNIT %3 detected; setting loop/unit to zero	A SLEP message has been received. Another ADH unit has broadcast with the same loop/unit	Check other units on ADH
309	? External Message: RUD:Unit does not respond; loop/unit %3	Occurs when loop/unit does not respond to a RUD message - originates from I/O, Host, or Printer table in database	Remove extraneous references to non-existent units. Check ADH connection.
310	? External Message: Unit not known for %3	Message was received from database to send to an unknown unit.	Unit has not broadcast its presence on the ADH.
311	? External Message: Error for Activation of EVT on %	Bad HAE message was sent by database	check procedure
312	? External Message: Send error for %3	Send failure for UDP outgoing message sequences	This is a general failure that would indicate trouble on the network.
313	? External Message: Invalid TOR sequence on %3	A SEND message was received from external unit when there are no results to send	Check result transmit, # of results.
315	? External Message: Anlz id exceeds allowable limit for ADH	FUNCT 88 Alarm message received from HCI-H - or database attempted a broadcast with an analyzer_id > 255	Check analyzer ID

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
316	? External Message: Host: Anlz 1 to 50 conflict	FUNCT 89 Alarm message received from HCI-H	check # results and # streams
317	? External Message: Host: anlz 51-254 - >1 stream or >9 components	FUNCT 90 Alarm message received from HCI-H	check # results and # streams
318	? External Message: Host: invalid data received from anlz	no results are marked for transmission	check trtval in result table
320	? External Message: %3 Timeout for %4	message timeout for ADREQ, REXD, results, HAE, Print, FUNCT	reset syscon
321	+ External Message connection opened on: %3	Normal message from reset	no action required
322	? no ADH connection detected %3 failed	no message handler	reset Syscon check boot options
323	? External Message: Invalid LOOP %3 detected ; setting loop/unit to zero	A WRLP message has been received from ADH.	Check Loop
331	! Run Method: No SNE found or bad status on module: %3	The connection between the database and the SNE is invalid.	Check cable between the SNE and Syscon. Check the LEDs on the SNE to see if it is operating.
332	! Run Method: No module found for detr: %3	The SNE has not reported the detector/pressure/temperature	Check hardware connections to SNE
333	! Run Method: No Detr found or bad status for method.channel: %3	realtime chrom attempt on invalid detector, or bad status on detector	check hrdwr_id, module for app_detector
334	! Run Method: No Channel found for method: %3	No channels are present or can't find detector for channel	check app_detector, EZChrom method

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
336	! SNE connection closed on %3 error: %4	sne connection closed due to timeout or error	IF IP address specified is not a 192.168.144.# network address, check for appropriate grounding of system. Otherwise check SNE for appropriate connections and Software versions.
338	? SNE %3 Method %4 Can not Store Chrom	results received from SNE for unknown stream	check stream table
339	? SNE %3 Method %4 Application %1 not found	can't find application or method to match SNE results	Should never happen, unless the messages between the SNE and Syscon have been invalidated. Reset SNE to sychronize messages.
340	! SNE %3 Method %4 Load - Invalid Method	SNE has sent a status message that the method is invalid. No other information is available	redownload method from EZChrom
341	! SNE %3 Method %4 Inactive	SNE sent message that method is inactive. No other information is available.	restart application
342	! SNE %3 Method %4 Load - Max Method exceeded	SNE sent message that maximum methods has been exceeded	reduce number of methods, reset Syscon
343	! SNE %3 Method %4 Load - Invalid Mode	Invalid run/hold sent to SNE	reset Syscon or try again
344	! SNE %3 Method %4 status - unknown error %5	unknown error from SNE methodstatus	reset SNE/Syscon
345	! Stream Valve does not exist	can't find appdo or sys_do for DO set in cycle_events	DO on cycle_event may not be valid. Check DO on application I/O tables to see if it exists for this application and has a normal status
347	! SNE %3 Read IO %4 does not exist	IO read was sent to SNE that doesn't exist	reset SNE/Syscon

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
348	! SNE %3 RT chrom %4 does not exist	realtime chrom request to non-existent SNE	reset SNE/Syscon
350	! SNE Module I/O error 0x %3 on %4	An operation attempted on an attached SNE module failed	Report the error number %3 and the module %4 to Customer Support
351	! SNE pSOS error 0x %3 on %4	System Software Failure	Report System error %3 and module %4 to Customer Support
352	! SNE pSOS Driver error 0x %3 on %4	Driver Software Failure	Report Driver Error %3 and module %4 to Customer Support
353	! SNE AAi Driver error 0x %3 on %4	AAI custom driver failure	Report Driver Error %3 and module %4 to Customer Support
354	? SNE TFTP load Error on %3 : %4	tftpload failure	Check to see that TFTP server is running and that the correct information for IP address and file location is correct. Then try again
355	? SNE FLASH Driver Error on %3 : %4	Flash Memory Failure	If persistent, replace SNE
356	! SNE %3 Stream/Method %4/%5 does not exist	results received from SNE- can't locate stream/method	check sequence
360	! %3 %4	General SNE Fault	Should not occur, report to Customer Support
361	? %3 %4	General SNE Warning	Should not occur, report to Customer Support
362	+ %3 %4	General SNE Note	Should not occur, report to Customer Support
363	! invalid function request %3 from SYSCON	SYSCON sending corrupt messages or SNE/SYSCON messages are out of sync	Reset System

Alarm #	Message	Description	Suggested actions
364	? No realtime buffer exists for detector on DPM %4	Detector data being collected for a detector that wasn't properly enabled.	If received during a load sequence, it is an artifact of the shutdown sequence. Otherwise, record occurrence and %4 and report to Customer Support
365	! Incomplete Analysis on channel %3	EZChrom analysis was not completed on channel	Try modifying integration events in method. Send offending method to Customer Support
366	! Data Corruption Error	Major Data corruption on SNE.	Reset SNE, report error
367	! System Error %3 in File %4 line %5	System Software Failure	Record sequence leading to occurrence and report error with values of %3, %4 and %5 to Customer Support
368	! Unable to find %3 number %4	Hardware specified in Method is not in analyzer	Check method
369	! Unsupported channel type %3	Hardware channel operation requested for an invalid channel type	Inspect for current version of SNE software. May require a reload or rebuild of corrupted SysCon database
370	? No channel %3 on DPM %4 for realtime display	Realtime display requested for a detector channel that doesn't exist	This should not be possible except from a corrupted database.
371	! Invalid channel acquisition overlap on %3	Two channels referencing the same hardware detector are scheduled to acquire at the same time.	If multiple application detector channels are assigned to the same hardware detector, make the times not overlap
372	! Scheduling error %3 scanning %4 # %5 channel %6	Unable to schedule all event and polling routines.	May either be a memory or hardware failure problem. If method schedules an inordinate number of events as well as all 18 detectors, try removing some of the events or deleting some of the detectors and resetting the SNE.
373	! Module I/O error %3 on %4 # %5 channel %6	Module %4 number 5 had an error in an operation dealing with channel 6	This error should not occur in up to date analyzers. They are now interpreted by SysCon.

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
374	! Internal communication error %3	Software modules inside SNE are failing to communicate. Usually happens with out of memory condition resulting from SysCon timeout	Take actions to insure SysCon is not bogged down with excessive processing requirements
375	! End of cycle missed; stopping cycle	The message that coordinates the end of a method around the SNE Tasks was lost	SNE operation is compromised and needs to be reset. Attempt to reduce the complexity of the SNE setup or replace SNE
377	! Error %3 scheduling cycle clock master adjustment	Resource for scheduling adjustment of event clock cannot be found	SNE may be overloaded. Try reducing complexity of tasks for SNE. SNE will need to be reset before event clock overflow.
378	+ %3 samples adjusted on chrom from channel %4	An inordinate number of samples had to be adjusted on Chrom	This should only occur in conjunction with some DPM alarms. Replace affected DPM.
379	! Error %3 preparing analysis for channel %4	EZChrom processing error	Check integration events, try to modify any potentially problem events.
380	! Error %3 finding chrom peaks for channel %4	EZChrom processing error	Check integration events and peak table and modify any potential problem areas
381	! Error %3 generating results for channel %4	EZChrom processing error	Check method for any problems that could affect results. For example, a common problem has been setting the threshold value too low such that many peaks are detected in the noise of the chromatogram.
382	! EZchrom server failed	Resource problem on SNE	Attempt to reduce SNE workload or replace SNE
383	? Software Watchdog Timeout	SNE is running out of processing throughput	See if SNE workload can be reduced

Alarm #	Message	Description	Suggested actions
384	! Method Modification Failed	An attempt to modify a running method failed	Most probably was fed invalid data. Please check that modification was valid.
385	? Event Occurred before modification request	Before a modification of a running method was completed, the event occurred	
386	! Invalid Cycle Length %3	A cycle length larger than the maximum size was specified in a method	Most likely a corrupt method, since the maximum cycle length is approximately 2 days.
387	! Invalid Sample Rate %3 on channel %4	Invalid sample rate value chosen for channel in method	
388	! Acquisition time greater than cycle length on channel %3	Start and stop acquisition times for a detector exceeded the method cycle length	Decrease acquisition time or increase cycle method time
389	! Invalid Event Type %3 for event %4	Invalid event downloaded with method	Check for proper SNE version or rebuild method
390	! Invalid Start Time %3 for event %4	Event time specified that is not within the cycle start and stop times	
391	? %3 messages not sent to Syscon from SNE	Some messages that the SNE attempted to send to SysCon were lost. Results may be unpredictable	
392	? %3 Detector underflows detected on channel %4 of module %5	Detector is reading a raw value of 0. It is potentially clipping the signal at the low value	
393	? %3 Detector opens detected on channel %4 of module %5	Detector channel is not connected	
394	? %3 Unexpected Calibration points on channel %4 of module %5	Detector channel went unexpectedly into calibration mode	Replace DPM if persistent

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
395	? %3 Detector overflows on channel %4 of module %5	Detector is reading above its maximum value and the signal is being clipped	
396	! SNE out of memory at %3 line %4		Try to alleviate SNE workload. Please report %3 and %4 values to Customer Support
398	! Invalid Number of Temperature Program Segments	The number of temperature program setpoints was different from the number sent	Try to rebuild temperature program for method
400	! Sync Bus Failure %3	Sync Bus Test failed	Replace SNE
402	+ SNE reset requested	SysCon requested a reset from the SNE.	Usually means that the communications between the SNE and SysCon timed out. This is can happen when SysCon is overloaded
403	! Configured Detector %3 Balance Failure	Balance Failure from an Advance+ detector	Check detector elements
404	? All Methods must be in Hold before Configuring Detectors	All methods must be in hold while describing any configured detectors	
420	! Heartbeat timeout	MicroSAM:	Check with MicroSam support personnel for assistance
421	! Heartbeat lost	MicroSAM:	Check with MicroSam support personnel for assistance
422	! Cannot connect to RSP	MicroSAM:	Check with MicroSam support personnel for assistance
423	! Method %3 has more than 8 simultaneous events	MicroSAM:	Check with MicroSam support personnel for assistance
424	! Method %3 has more than 255 events	MicroSAM:	Check with MicroSam support personnel for assistance

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
511	! Program Failed event # %3 %4	error running MaxBasic program called from an external source	check message and program
512	? Program execution cancelled: event # %3	cancellation requested from HMI	informational
513	! Program Failed: Run requested on running event # %3	occurs when overrun_option is set to 2 and event is run while events is still running from a previous request	check event timing
514	! Program Invalid frequency; disabling event # %3	invalid program frequency	check freq_unit
515	? Program overrun for event %3	occurs when overrun_option is set to 1 and warns that a program is running when a previous run of the same program has not finished	check cycle event timing or frequency of program
671	! Database: Failure: %3	1. can't find method; 2.can't find MaxBasic program 3. Invalid stream for program 4. Bad status on external result	1. check methods, sequences 2. Check program table 3. Check program streamcontext 4. Verify extresult table entries
673	! Database:value > limit: %3	limit exceeded	defined in limit and alarmhandler tables
674	! Database value < limit: %3	limit exceeded	defined in limit and alarmhandler tables
675	! Database: No Stream at cycle start on application %1	can't locate stream to start	check sequence; make sure that the entries are enabled
676	! Database: delay limit exceeded on stream %3	temperature or pressure wait has been exceeded	check temp or press controller
677	! Next Stream Error	can't locate next stream in sequence	check sequence
679	! Application is out of service	attempt was made to move results for an out of service application	put application in service

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
680	? print job failed: %3 for Printer: %4	print failure	check printer
681	! Application is disabled	attempt was made to set disabled application to run	enable application
682	! Database: i/o failure: %3	bad status on AO, DO write	check I/O channels
683	! Database: no normal sequence for application: %3	no active sequence	check sequences
684	! Database: no enabled entries in sequence	can't find enabled entry in sequence	check sequence
685	? Printer: TCP connection or queue failed	Printer connection failed	check address in printer table
686	? Printer: TCP Print failed	communication failure with TCP printer	try again
687	! Results for cycle %3 lost due to SNE reset	This alarm marks results as uncertain until a cycle has been completed after resetting unit	automatically repaired - no action necessary
688	! method is corrupt: %3 reload from EZChrom	method is corrupt	download method from EZChrom
689	! Database: Fault on Slave Application %3	A fault is being transferred from the slave to the master to invalidate the master's results	check fault in slave application
690	! Database: Slave Application not Complete %3	master application is trying to run when slave is not in hold	check cycle length of slave application; should be shorter than master. Also could occur if autocal sequence for master is shorter that slave's
692	! Database: Divide by zero in %3	peak measured value is zero during calibration for an autocal, so margin checking cannot occur	check method

Alarm #	Message	Description	Suggested actions
694	? Database:value > limit: %3	limit exceeded	limit values are set in the limit table
695	? Database value < limit: %3	limit exceeded	limit values are set in the limit table
698	? MODBUS: NAU %3 not available to receive results	1. No analyzer reference in host table for Maxum Modbus 2. Can't open connection to remote analyzer for Maxum Modbus	1. Check host table anlzref 2. Check network cables
699	? MODBUS: result is not in address map %3	can't find address in map for result or analyzerstatus that came from an analyzer	check modbus_addmap
700	? MODBUS: Analyzer %3 not available to receive host commands	analyzer can't be opened from NAU to receive message from the DCS	check network, reset Syscon
703	? MODBUS: host command for undefined address: %3	DCS message received that is for an unknown address	check modbus_addmap
704	? MODBUS: host can't write to this address: %3	The address is not defined with a value_type that the host can send messages to	check value_type of address in modbus_addmap
705	? MODBUS: host command can't be processed: %3	1. Invalid DCS command was sent to an optichrom 2. EUHI, calibrate, stream select, skip stream, run/hold, doset set from host that can't be located in analyzer table	1. Can't clear alarms on optichrom 2. Check analyzer table to see if entry occurs or wait until analyzer broadcasts
706	? MODBUS: can't locate euhi %3	can't find euhi for result	check euhi address in modbus_addmap_result table
707	? Calibration rejected: margin exceeded for %3	peak margins exceeded on auto calibration	check peak margins in EZChrom
708	? MODBUS: Data type failure for address: %3	data_type mismatch with value_type	check modbus_addmap. This is usually self-correcting, but changes should be checked.

Alarm #	Message	Description	Suggested actions
709	! AI Averaging	averaging is occurring on an AI that no result has been designated to receive the average	check configuration of AI averaging
710	? AI Averaging	averaging is occurring on an AI that no result has been designated to receive the average	check configuration of AI averaging
712	! System Startup Ver: %3 - %4 on %5	Syscon has been reset	normal
716	! DB: Invalid Sourcekey or SourceAttribute for StatMon table: id %3	occurs when statmon table is not configured properly	consult documentation
717	? DB: Calibration : margin check/reports are invalid for curve type	occurs when a margin is set in ezchrom for a curve type that does not support margin checking	remove margin or change curve type
718	? Validation failed for %3	validation has failed	check report or HMI
719	+ Database: SNE reset requested	SNE is indicating that it has been reset from a database request	possibly indicates a communication overload
720	? Database: Reprocess during Run not allowed	reprocess button pressed while application in run	only push reprocess button when application is in hold
721	+ Database: Application in service	occurs when an application is placed inservice after being out of service	no action required
722	? Reference Component not found; Component %3 , Reference %4	Quantra	
723	! Database: Method id %3 not found	method id is in sequence, but not in method table	check method table
724	? Calibration or Validation failed; application in hold	calibration or validation was requested while one was already running	check timing of calibration or validation events

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
725	? DB: Method %3 halted	application was halted	no action required
726	! DB: Slave application stream is invalid %3	stream id in slave does not line up with master application stream id(new requirement for version 4.0)	check master and slave sequences
727	? DB: Master app autocalibration completed before Slave app %3	master autocal sequence is finishing before slave's	check length of sequences. Master autocal sequence must finish after slave's
728	? DB: application cannot autocalibrate	autocal was requested on application that is not defined for autocal	check autocal attribute in application table
730	! DB: Unnamed peak processing exceeded(2000) for channel %3	processing for unnamed peaks must not exceed 2000 peaks for a channel. Excess has been discarded	
806	? Memory Corruption Error from Task %3	An attempt to free a block of memory was unsuccessful because the header had been overwritten. This is a warning that the block of memory was not returned to the free pool.	Contact Customer Support for debug procedure.
810	? Invalid db.dat file	The db.dat file, containing the "cold" database on a Compact-flash system, is missing or invalid. This may happen if the system was reset or powered down during a user-initiated save to flash (initiated from the HMI or the workstation)	Perform a manual save to flash as soon as possible in order to have a valid db.dat file
814	? Invalid CMOS time, check the battery		check battery
900-996	custom alarms from alarmhandler table	text is in alarmhandler table	

Alarm #	Message	Description	Suggested actions
997	3%	general alarm - may originate from MaxBasic	nothing
998	? %3	general alarm - may originate from MaxBasic or be a general DB runtime error	runtime errors should be reported immediately to Siemens customer support - please make careful note of the alarm message.
999	! %3	general fault alarm - may originate from MaxBasic, or may be software problem	runtime errors should be reported immediately to Siemens customer support - please make careful note of the alarm message.
1002	Id Key Not Connected on %4	All PICs: The module location id connector is disconnected or set to 0. This is an abnormal condition and the module is not guaranteed to be operational	Verify that the location id connector is in good condition and connected properly.
1003	Id Key Change on %4	All PICs: The module location id value was changed while the module was operating. This is a transient error. When it happens, the module automatically resets and can then be addressed at the new location id. The module is operational at the new address.	Verify that the location id connector is in good condition and tightly connected. Check for intermittent connection.
1004	EEPROM Bad Checksum on %4	All PICs: A checksum error was detected in the module EEPROM. The firmware will still use all the information that it can read from the EEPROM, however the module may not operate normally.	Cycle power and if it happens again replace the module

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
1005	Temp Diag Error on %4	All PICs: The on-board temperature sensor (LM-75) diagnostic failed. The alarm generation in case of a module overheat (alarm #1044) may not happen. This alarm is in no way related to and should not be confused with the Overtemp Shutdown on a temperature controller. This alarm is known to happen occasionally, on fully functional board, following a board reset.	Nothing should be done unless it happens systematically. If it does, replace the module
1007	Firmware Fault on %4	All PICs: A "run-time" error was detected in the PIC firmware. For example, a timer is turned off at a point where the firmware expects it to be on. The firmware will attempt to recover. Usually an additional specific flag will be set to provide more information about the cause of the fault	Report to Siemens customer support for further investigation
1008	EEPROM Bad Value on %4	All PICs: A value read from EEPROM is out-of-range or invalid. This may happen if a board's EEPROM was incorrectly initialized during manufacturing. It may also happen if the EEPROM was not at all initialized and is then set together with the EEPROM_BAD_CHECKSUM flag	Cycle power and if it happens again replace the module
1009	Local I2C error on %4	All PICs: A fatal error was detected while accessing the internal, on-board I2C bus (not to be confused with the private bus between a SNE and a DPM). The communication with the on-board EEPROM or the LM75 (on board temperature sensor) is not working normally.	Cycle power and if it happens again replace the module

Alarm #	Message	Description	Suggested actions
1010	Fatal error on %4	All PICs: An error or an invalid operational condition was detected by the PIC firmware. The board is shutdown to a failsafe mode.	Report to Siemens customer support for further investigation
1041	AO Out Of Range on %4	All PICs: An AO was set to a value outside of the allowed range. The value was clipped to the allowed range. For example an EPC has a 0 to 100 psi nominal range for the pressure setpoint. An attempt to set the setpoint to 150 psi results in an "AO out of range" and the setpoint is clipped to remain within the allowed range (100 psi).	Locate the problematic AO and change the AO value to a value within the proper range.
1042	Invalid Group Channel on %4	All PICs: The hardware I/O channel(s) requested does not exist on the module.	Check the "Sys Hardware" table for invalid entries. Check that only detector channels are specified in the detector I/O table. Check that only EPC are defined in the pressure controller table. Check that only temperature controllers are defined in the temperature controller table.
1043	Invalid EEPROM Address on %4	All PICs: The on-board EEPROM addresses requested do not exist or cannot be accessed within a single command. Should happen only during board manufacturing.	Report to Siemens customer support for further investigation

Alarm #	Message	Description	Suggested actions
1044	Board over-heating on %4	All PICs: The module temperature is greater than the defined maximum operating temperature (default 65 DegC) and there is now a possibility that the module life expectancy will be reduced because of overheating. This alarm is not related to Overtemp Shutdown on a temperature controller. An over-heating condition can cause permanent damages to the analyzer electronics and should be dealt with as soon as possible. Note: This alarm may display together with alarm 1005 (Temp Diag Error). In this case the board may not be really overheating.	If the overheating condition is real, determine and fix the cause of high operating temperature. Look for: · Ambient temperature higher than specification · Inoperative fan in the EC (restricted air flow inside the EC
1045	Output Locked on %4	All PICs: The state of the DO or the value of the AO are locked and cannot be changed. The AO or DO command was ignored. Some DO and AO are locked during a board self-test.	When performing a board self-test, all other operation affecting the board should be suspended.
1081	Data Not Ready on %4	All PICs: The data requested is not available. Should happen only during board manufacturing.	Report to Siemens customer support for further investigation
1082	Reset Detect on %4 %5	All PICs: A reset was detected. Normal indication that the PIC was reset	Ignore
1083	Power Up on %4 %5	All PICs: A power-up cycle was detected. Normal indication that the PIC was just powered-up	Ignore
1084	I2C Timeout on %4	All PICs: An I2C communication timeout timer has expired. The timer is reset after each successful character processed. Only an addressed module may get a timeout. The timeout is checked on character going in as well as character going out	I2C communication error, refer to "I2C Communications Troubleshooting.doc"

Alarm #	Message	Description	Suggested actions
1085	I2C Read Past End on %4	All PICs: The I2C communication master did not stop reading after the complete response had been sent.	I2C communication error, refer to "I2C Communications Troubleshooting.doc"
1086	I2C Buffer Overflow on %4	All PICs: The combination of the transmit and receive I2C message was too big causing a buffer overflow. (With kernel rev 1: SSP_READ_UNEXPECTED_STOP, a stop condition occurred before the end of the response)	I2C communication error, refer to "I2C Communications Troubleshooting.doc"
1087	I2C Write Past End on %4	All PICs: In an I2C message, more than the number of bytes specified by the length was written. The extra bytes are ignored.	I2C communication error, refer to "I2C Communications Troubleshooting.doc"
1088	I2C Resync Error on %4	All PICs: Severe I2C error, causing the current message to be dropped. It will re-synchronize after the next START or STOP condition. Most of the time this is associated with an alarm 1092.	I2C communication error, refer to "I2C Communications Troubleshooting.doc"
1089	I2C Write Unexpected Stop on %4	All PICs: A new I2C message was received in the middle of a write. The old message was discarded and the new message is served (this message may be out of sequence and therefore cause other flags to be set). (With kernel rev 1: SSP_WRITE_UNEXPECTED_STOP, During a slave write, a stop condition occurred before the message was completed. The message is ignored)	I2C communication error, refer to "I2C Communications Troubleshooting.doc"

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
1090	I2C Write Unexpected Strt on %4	All PICs: A new I2C message was received in the middle of a read. The old message was discarded and the new message is served (this message may be out of sequence and therefore cause other flags to be set). (With kernel rev 1: SSP_WRITE_UNEXPECTED_START, During a slave write a Start or Repeat Start (RS) condition was detected before the entire message was received (according to the length field). The message is ignored and processing resumes following the Start or Repeat Start)	I2C communication error, refer to "I2C Communications Troubleshooting.doc"
1091	I2C Write Before Read on %4	All PICs: An attempt was made to write an I2C message before reading the response from a previous message. This means that an attempt was made to do a Slave Write - RepeatStart - Slave Write combination	I2C communication error, refer to "I2C Communications Troubleshooting.doc"
1092	I2C Read Unexpected on %4	All PICs: An I2C read from the peripheral was attempted before a slave write loaded a command	I2C communication error, refer to "I2C Communications Troubleshooting.doc"
1093	I2C Invalid Checksum on %4	All PICs: An I2C message with an invalid checksum was received. The message was ignored	I2C communication error, refer to "I2C Communications Troubleshooting.doc"
1094	Data not available on %4	All PICs: Some data was lost and is no longer available. For a detector channel it means that a "Detector Read" command was received with an invalid index. This can happen when a request to retransmit detector data came too late when the data was already gone from the buffer. This situation may also happen while accessing the I/O related to the LM75 (BOARD_TEMPERATURE and OVERTEMP_SETPOINT). It indicates that the local I2C bus was not available to perform the desired action.	Cycle power and if it happens again replace the module or the SNECON

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
1095	Invalid Message on %4	All PICs: An I2C message with a valid checksum was not recognized or had an invalid op-code	Cycle power and if it happens again replace the module and/or the SNECON
1121	Firmware Math error on %4	All PICs: An unexpected math operation error was detected by the PIC. It can be an un-handled overflow, underflow, etc… This flag is always associated with a FIRMWARE_FAULT flag.	Cycle power and if it happens again replace the module
1122	Firmware Mem error on %4	All PICs: A jump or a call was made to an invalid PIC memory location causing the PIC to be reset. This flag is always associated with a FIRMWARE_FAULT flag.	Cycle power and if it happens again replace the module
1123	Firmware Table error on %4	All PICs: An error was detected when addressing an internal PIC firmware table. The index in the table is likely to be invalid. This flag is always associated with a FIRMWARE_FAULT flag.	Cycle power and if it happens again replace the module
1124	Firmware Watchdog on %4	All PICs: The PIC watch dog timer has expired causing a module reset. This flag is always associated with a FIRMWARE_FAULT flag. It can be an indication that the I2C clock or data line was held low for more than the timeout duration (nominally 30 ms). It can also indicate that the PIC oscillator is not working normally	Cycle power and if it happens again replace the module
1125	Firmware System Monitor on %4	All PICs: The background system monitoring task has discovered a problem causing the PIC to be reset. It can be that the interrupt or timer were disabled when they should have been enabled, and the like. This flag is always associated with a FIRMWARE_FAULT flag.	Cycle power and if it happens again replace the module

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
1126	Firmware Application on %4	All PICs: A general PIC firmware error was encountered causing a board reset.	Cycle power and if it happens again replace the module
1317	Valve Switch Error on %4	SVCM PIC: The SVCM firmware has detected an invalid condition in the circuit driving the solenoid valves. One or more valve is likely to be malfunctioning	Replace the module
1318	J10 Disconnected on %4	SVCM PIC: The SVCM J10 connector is not properly connected and the corresponding bank of solenoid may not work	Check the corresponding connection
1319	J11 Disconnected on %4	SVCM PIC: The SVCM J11 connector is not properly connected and the corresponding bank of solenoid may not work	Check the corresponding connection
1617	LWH1 Output Fault on %4	PECM PIC: On-board diagnostic indicating that LWH1 is not working correctly. This diagnostic is active only when a SSR output is configured for PECM self control, when the loop-back connector is present. The diagnostic is not active when the control is from a temperature controller. If this happens when the output is controlled by a temperature controller, it indicates a defective harness between the DPM and the PECM. (The PLUG_DETECT pin (#5) is not grounded and the output is turned on)	If associated with an "Invalid configuration alarm" (1659), then check the corresponding connection on J3 on PECM. Otherwise, replace the PECM or the cable between the DPM and PECM
1618	Lwh2 Output Fault on %4	PECM PIC: On-board diagnostic indicating that LWH2 is not working correctly. See 1617 for more details	Check J4 on PECM … See 1617
1619	Lwh3 Output Fault on %4	PECM PIC: On-board diagnostic indicating that LWH3 is not working correctly. See 1617 for more details	Check J5 on PECM … See 1617
1620	Lwh4 Output Fault on %4	PECM PIC: On-board diagnostic indicating that LWH4 is not working correctly. See 1617 for more details	Check J6 on PECM … See 1617

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
1622	Lwh5b Output Fault on %4	PECM PIC: On-board diagnostic indicating that LWH5B is not working correctly. See 1617 for more details	Check J7 on PECM … See 1617
1624	Lwh6b Output Fault on %4	PECM PIC: On-board diagnostic indicating that LWH6B is not working correctly. See 1617 for more details	Check J8 on PECM … See 1617
1625	ABH1 Output Fault on %4	PECM PIC: On-board diagnostic indicating that ABH1 is not working correctly. See 1617 for more details	Check J91 on PECM … See 1617
1626	ABH2 Output Fault on %4	PECM PIC: On-board diagnostic indicating that ABH2 is not working correctly. See 1617 for more details	Check J92 on PECM … See 1617
1627	ABH Ctrl Plug Missing on %4	PECM PIC: The air bath heater control cable is missing in J9 and at least one of the air-bath heaters is non-disabled. If the cable is missing, the NO_AIR_ABH_x flag will also be set on the non-disabled air-bath heater channels	If the air bath heater is not used, then disconnect J91 and J92 on PECM in order to eliminate the alarm. Otherwise check J9.
1628	ABH Air Plug Missing on %4	PECM PIC: The air-bath heater air-sensor connector is missing and at least one of the air bath heaters is non-disabled.	Check J10 on PECM.
1629	Purge Indicator not available on %4	PECM PIC: Neither the SYSCON nor the HMI level 1 LED panel is connected. It indicates that there is no purge indicator connected, the PECM has nowhere to report the purge information.	Check J1302 and J101 on PECM. Verify the cable connected into J1302.
1630	! The low wattage relay board is missing	PECM PIC: The low wattage relay board is not connected properly to the PECM electronics	Confirm that the relay board is connected properly. Replace the relay board and/or the PECM electronics

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
1633	! Output error on solenoid valve, left location, left group	PECM PIC: The solenoid output status readback value is incorrect for at least one valve in the group. This can happen when a solenoid cable is disconnected, even momentarily. Note that the readback check can only be accomplished when the state of the output to a solenoid is OFF (no verification can be done on an output when it is ON).	Verify the cable connections. Replace the solenoid group cable. Replace the solenoid group. Replace the PECM board
1634	! Output error on solenoid valve, left location, right group	PECM PIC: The solenoid output status readback value is incorrect for at least one valve in the group. This can happen when a solenoid cable is disconnected, even momentarily. Note that the readback check can only be accomplished when the state of the output to a solenoid is OFF (no verification can be done on an output when it is ON).	Verify the cable connections. Replace the solenoid group cable. Replace the solenoid group. Replace the PECM board
1635	! Output error on solenoid valve, right location, left group	PECM PIC: The solenoid output status readback value is incorrect for at least one valve in the group. This can happen when a solenoid cable is disconnected, even momentarily. Note that the readback check can only be accomplished when the state of the output to a solenoid is OFF (no verification can be done on an output when it is ON).	Verify the cable connections. Replace the solenoid group cable. Replace the solenoid group. Replace the PECM board
1636	! Output error on solenoid valve, right location, right group	PECM PIC: The solenoid output status readback value is incorrect for at least one valve in the group. This can happen when a solenoid cable is disconnected, even momentarily. Note that the readback check can only be accomplished when the state of the output to a solenoid is OFF (no verification can be done on an output when it is ON).	Verify the cable connections. Replace the solenoid group cable. Replace the solenoid group. Replace the PECM board

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
1637	! Output error on solenoid valve, upper location, left group	PECM PIC: The solenoid output status readback value is incorrect for at least one valve in the group. This can happen when a solenoid cable is disconnected, even momentarily. Note that the readback check can only be accomplished when the state of the output to a solenoid is OFF (no verification can be done on an output when it is ON).	Verify the cable connections. Replace the solenoid group cable. Replace the solenoid group. Replace the PECM board
1638	! Output error on solenoid valve, upper location, right group	PECM PIC: The solenoid output status readback value is incorrect for at least one valve in the group. This can happen when a solenoid cable is disconnected, even momentarily. Note that the readback check can only be accomplished when the state of the output to a solenoid is OFF (no verification can be done on an output when it is ON).	Verify the cable connections. Replace the solenoid group cable. Replace the solenoid group. Replace the PECM board
1657	ABH1 No Air on %4	PECM PIC: The air bath heater #1 is turned off, as the air pressure is too low for a safe operation of the heater. This flag is set only if the corresponding air bath heater is in-use. The PECM considers the air bath heater in-use if a loop-back connector or a cable from a temperature controller is connected.	· If the channel is not in-use, disconnect the loop-back connector or temperature controller cable. · Check the air pressure on the air bath heater. Make sure that it is 10 psi or above. · Electrically disconnect the pressure switch and verify that it operates normally by measuring the contact resistance with a multimeter at 0 and 10 psi. · Verify that that there is no continuity to ground. Verify the harness with the multimeter. · Replace the PECM

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
1658	ABH2 No Air on %4	PECM PIC: The air bath heater #2 is turned off, as the air pressure is too low for a safe operation of the heater. This flag is set only if the corresponding air bath heater is in-use. The PECM considers the air bath heater in-use if a loop-back connector or a cable from a temperature controller is connected.	· If the channel is not in-use, disconnect the loop-back connector or temperature controller cable. · Check the air pressure on the corresponding air bath heater. Make sure that it is 10 psi or above. · Electrically disconnect the pressure switch and verify that it operates normally by measuring the contact resistance with a multimeter at 0 and 10 psi. Verify that with the multimeter that there is no continuity to ground. Verify the harness with the multimeter. · Replace the PECM
1659	Invalid Configuration on %4	PECM PIC: An attempt is made to control a heater output with a DO command and the corresponding loop-back cable is not installed	Install or verify the corresponding PECM loopback plug
1697	Purge Loss on %4	PECM PIC: Purge failure in the EC enclosure. The pressure differential between the interior and exterior of the EC is not high enough.	Depending of the environment classification where the analyzer is used, this may be an alarm that requires immediate action to correct the situation or an alarm that can be totally ignored. Refer to the analyzer custom documentation and the Maxum II Explosion Protection Safety Standards Manual (Siemens part number A5E02220442001) for more information.
1919	A/D Failure TCD L %5 on %4	TCD DPM Detector PIC: Set when the corresponding Analog to Digital Converter hardware does not work properly. The flag will be set if the A/D internal calibration cycle is not completed within a pre-determined period of time or the A/D does not report any valid data within a pre-defined timeout period. Note: A firmware problem affecting the version 1.000 of the TCD detector PIC may cause an A/D failure flag to show-up occasionally following a PIC reset. This is not a sign of a defective A/D converter.	Cycle power and if it happens again consistently then replace the module

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
1920	A/D Failure TCD U %5 on %4	TCD DPM Detector PIC: Set when the corresponding Analog to Digital Converter hardware does not work properly. The flag will be set if the A/D internal calibration cycle is not completed within a pre-determined period of time or the A/D does not report any valid data within a pre-defined timeout period. Note: A firmware problem affecting the version 1.000 of the TCD detector PIC may cause an A/D failure flag to show-up occasionally following a PIC reset. This is not a sign of a defective A/D converter.	Cycle power and if it happens again consistently then replace the module
1922	Incompatible Hardware on %4	TCD DPM Detector PIC: The PIC firmware is not compatible with the DPM board	Replace the module
1925	Glow Plug Bad on %4	See alarm 2225	See alarm 2225
1926	Invalid PIC index on %4	DPM Detector PIC: The PIC index is not valid, the DPM board is not working normally	Replace the module
1927	Mezzanine disconnected on %4	See alarm 2227	See alarm 2227
1928	Mezzanine ID changed on %4	See alarm 2228	See alarm 2228
1929	Mezzanine ID invalid on %4	See alarm 2229	See alarm 2229
1930	Mezzanine ID reserved	See alarm 2230	See alarm 2230

Alarm #	Message	Description	Suggested actions
1957	Balance Failure TCD L %5 on %4	TCD DPM Detector PIC: *Rev 1 TCD DPM*: A detector balance sequence failed because of a hardware failure or because of an improper configuration or sequence of events. Some possible causes are: The detector beads are too unbalanced to be "balance-able". The detector signal is not stable enough and proper balance could not be obtained before the maximum number of iterations was reached. The A/D or D/A do not work properly The detector is not configured for acquisition or turned off. SIMULATE_TCD_x is set to '1', the balance cannot be done in detector simulation mode. The balance is disabled (DISABLE_BALANCE_TCD_x is set to '1'). The sampling period was changed during the balance sequence.	Refer to a separate procedure
1958	Balance Failure TCD U %5 on %4	TCD DPM Detector PIC: Same as alarm 1957 for upper channel	Refer to "Detector Balance Troubleshooting.doc"
1959	Balance Out Of Limit TCD L %5 on %4	TCD DPM Detector PIC: **Rev 1 TCD DPM:** A detector balance value is above the normal limits. The balance may still work as this is an early warning. **Rev 2 TCD DPM or FID DPM:** Not implemented	If associated with a balance failure (alarm 1957), then the source of the balance failure must be corrected. If not associated with a balance failure and the balance limits are normal (>9 Volts or 90%) then maintenance should be scheduled to replace the detector beads.
1960	Balance Out Of Limit TCD U %5 on %4	TCD DPM Detector PIC: **Rev 1 TCD DPM:** A detector balance value is above the normal limits. The balance may still work as this is an early warning. **Rev 2 TCD DPM or FID DPM:** Not implemented	If associated with a balance failure (alarm 1958), then the source of the balance failure must be corrected. If not associated with a balance failure and the balance limits are normal (>9 Volts or 90%) then maintenance should be scheduled to replace the detector beads.

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
1965	Flame Ignition failure on %4	See alarm 2265	See alarm 2265
1966	Gain Override on %4	See alarm 2266	See alarm 2266
1967	Gain Select not supported on %4	See alarm 2267	See alarm 2267
1968	Igniter type changed on %4	See alarm 2268	See alarm 2268
1997	Buffer Overflow TCD L %5 on %4	DPM Detector PIC: The PIC detector data buffer filled-up before an I2C command was received to retrieve the data. Some data was lost. The SNECON was not fast enough to come to retrieve the points, or the SNECON stopped polling without turning off the corresponding detector channel. This may happen with a combination of a very high speed detector with a large burst of I/O commands	· Staggering the balance events and valve switching events by maybe 10-20 ms will distribute the load on the I2c bus and may fix the problem. · Disconnect the SNECON debug cable (if connected) and reset. · Reload SNE-OS and APP software.D155
1998	Buffer Overflow TCD U %5 on %4	DPM Detector PIC: Same as alarm 1997 but for the upper channel	Same as alarm 1997 but for the upper channel
1999	Detector Disabled on %4	DPM Detector PIC: An attempt was made to read detector information from a disabled detector.	Cycle power and if it happens again replace the module
2005	Flame Out on %4	See alarm 2305	See alarm 2305
2006	Bias Off on %4	See alarm 2306	See alarm 2306
2219	A/D Failure FID %5 on %4	FID DPM Detector PIC: Set when the corresponding Analog to Digital Converter hardware does not work properly. The flag will be set if the A/D internal calibration cycle is not completed within a pre-determined period of time or the A/D does not report any valid data within a pre-defined timeout period.	Cycle power and if it happens again consistently then replace the module

Alarm #	Message	Description	Suggested actions
2220	A/D Failure TCD %5 on %4	FID DPM Detector PIC: Set when the corresponding Analog to Digital Converter hardware does not work properly. The flag will be set if the A/D internal calibration cycle is not completed within a pre-determined period of time or the A/D does not report any valid data within a pre-defined timeout period.	Cycle power and if it happens again consistently then replace the module
2222	Incompatible Hardware on %4	The firmware has detected an invalid condition indicating that the hardware is not compatible with the firmware	Replace the module
2225	Glow Plug Bad on %4	FID DPM Detector PIC: The glow plug is not working correctly. The diagnostic is performed when the board is reset or when an attempt is made to light the flame. The hardware diagnostic verifies that a minimum current and voltage is present, checking for a short and open glow plug. This may also indicate that a spark igniter that is not connected properly.	Confirm that the glow plug or spark igniter cable is securely inserted in the corresponding connector. Replace the glow plug. Replace the DPM
2226	Invalid PIC index on %4	FID DPM Detector PIC: The PIC index is not valid, the DPM board is not working normally	Replace the module
2227	Mezzanine disconnected on %4	FID DPM Detector PIC: The mezzanine id value is 0 or 15 indicating the no mezzanine is present or a malfunction	Verify that the mezzanine is properly connected. Replace the mezzanine. Replace the DPM
2228	Mezzanine ID changed on %4	FID DPM Detector PIC: The mezzanine id value is not stable and has changed since the last time the board was reset. There might be a bad contact or a bad component	Same as alarm 2227
2229	Mezzanine ID invalid on %4	FID DPM Detector PIC: The mezzanine ID value is not supported by this DPM board. More specifically, the mezzanine value is pointing to a non-initialized EEPROM region on the DPM. This may indicate an invalid mezzanine board or an older rev of the DPM that was manufactured before the mezzanine board was defined.	Verify the DPM rev level and replace as needed. Replace the mezzanine.

Alarm #	Message	Description	Suggested actions
2230	Mezzanine ID reserved	FID DPM Detector PIC: The mezzanine ID value is set to a value reserved for future expansion	Same as alarm 2229
2257	Balance Failure FID on %4	FID DPM Detector PIC: A detector balance sequence failed because of a hardware failure or because of an improper configuration or sequence of events. Some possible causes are: 1) The detector signal is not stable enough and proper balance could not be obtained before the maximum number of iterations was reached. 2) The A/D or D/A do not work properly. 3) The detector is not configured for acquisition or turned off. 4) SIMULATE_FID is set to '1', the balance cannot be done in detector simulation mode. 5) The balance is disabled (DISABLE_BALANCE_FID is set to '1'). 6) The sampling period was changed during the balance sequence.	Refer to "Detector Balance Troubleshooting.doc"
2258	Balance Failure TCD on %4	FID DPM Detector PIC: A detector balance sequence failed because of a hardware failure or because of an improper configuration or sequence of events. Some possible causes are: 1) The detector beads are too unbalanced to be balanced corrected. 2) The detector signal is not stable enough and proper balance could not be obtained before the maximum number of iterations was reached. 3) The A/D or D/A do not work properly. 4) The detector is not configured for acquisition or turned off. 5) SIMULATE_TCD is set to '1', the balance cannot be done in detector simulation mode. 6) The balance is disabled (DISABLE_BALANCE_TCD is set to '1'). 7) The sampling period was changed during the balance sequence.	Refer to "Detector Balance Troubleshooting.doc".

Alarm #	Message	Description	Suggested actions
2259	Balance Out Of Limit FID on %4	FID DPM Detector PIC: A detector balance value is above the normal limits. The balance may still work as this is an early warning	If associated with a balance failure (alarm 2257), then the source of the balance failure must be corrected. If not associated with a balance failure and the balance limits are normal (>9 Volts or 90%) then maintenance should be scheduled to clean or replace the FID detector.
2260	Balance Out Of Limit TCD on %4	FID DPM Detector PIC: A detector balance value is above the normal limits. The balance may still work as this is an early warning	If associated with a balance failure (alarm 2258), then the source of the balance failure must be corrected. If not associated with a balance failure and the balance limits are normal (>9 Volts or 90%) then maintenance should be scheduled to replace the detector beads.
2265	Flame Ignition Failure on %4	FID DPM Detector PIC: The FID flame could not be lit within the predefined delay (25 or 60 sec). No other attempt will be made to automatically light the flame until the MANUAL IGNITION DO is activated.	· If associated with an alarm 2225 (Glow plug failure), then diagnose and fix this other alarm first. · If a BASIC program is used to control the electronic pressure controller (EPC) to adjust the gas mixture for proper ignition, confirm that the poll rate of the "IGNITE" DI is set to 2 sec. · Check that the gas supply pressure is adequate. · Verify the proper operation of the EPC.
2266	Gain Override on %4	FID DPM Detector PIC: An external signal is applied to the DPM, overriding the DPM gain control. This is a normal situation if a signal is connected to the external gain select connector.	If no signal is connected, replace the DPM
2267	Gain Select not supported on %4	FID DPM Detector PIC: An attempt was made to change the gain on a particular configuration that does not support the dual gain feature. The request was ignored.	Remove any access to the GAIN_ALT_SELECT DO

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
2268	Igniter type changed on %4	FID DPM Detector PIC: The spark igniter was connected or disconnected during an ignition sequence, causing the ignition sequence to be aborted.	Verify that the igniter is properly connected. Replace the igniter. Replace the DPM
2297	Buffer Overflow FID on %4	FID DPM Detector PIC: The PIC detector data buffer filled-up before an I2C command was received to retrieve the data. Some data was lost. The SNECON was not fast enough to come to retrieve the points or that the SNECON stopped polling without turning off the corresponding detector channel. This may happen with a combination of a very high speed detector with a large burst of I/O commands	· Staggering the balance events and valve switching events by maybe 10-20 ms will distribute the load on the I2c bus and may fix the problem. · Disconnect the SNECON debug cable (if connected) and reset. · Reload SNE-OS and APP software.
2298	Buffer Overflow TCD on %4	FID DPM Detector PIC: Same as 1997 but for the TCD channel	Same as 1997 but for the TCD channel
2299	Detector Disabled on %4	FID DPM Detector PIC: An attempt was made to read detector information from a disabled detector.	Cycle power and if it happens again replace the module
2305	Flame Out on %4	FID DPM Detector PIC: The flame is out, the data generated on FID channel is probably not valid.	Check that the flame gas supply is adequate. Verify the operation of any associated EPC.
2306	FID Bias Off on %4	FID DPM Detector PIC: The detector is used while the 300 Volts bias is disabled. The data validity is unknown.	Set the "disable bias" DO to '0'
2500	I2C Premature Stop on %4	SNECON I2C driver: A stop condition was detected in the middle of a transfer (SNECON hardware rev 2.x)	I2C communication error, refer to "I2C Communications Troubleshooting.doc"
2501	I2C No Acknowledge (Module Disconnected?) on %4	SNECON I2C driver: No module responding to the I2C address. A module was disconnected or is no longer responding. This can also happen if the PIC-index is erroneously set to 0 as this is a way to bypass the I2C address resolution table and directly address the I2C bus	Reset the analyzer
2502	I2C NS486 Timeout Overflow on %4	SNECON I2C driver: An I2C communication timeout condition was detected (SNECON hardware rev 2.x)	I2C communication error, refer to "I2C Communications Troubleshooting.doc"

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
2503	I2C Address is Odd on %4	SNECON I2C driver: Illegal I2C address	Reset the analyzer. Reload SNE OS
2505	I2C Driver Not Initialized	SNECON I2C driver: An attempt was made to communicate to the I2C driver before it's initialized	Reset the analyzer. Reload SNE OS and APP
2508	I2C Improper Acknowledge on %4	SNECON I2C driver: No module responding to the I2C address. A module was disconnected or is no longer responding (SNECON hardware rev 2.x)	I2C communication error, refer to "I2C Communications Troubleshooting.doc"
2509	I2C Invalid Message Checksum Received on %4	SNECON I2C driver: A message was received with an invalid checksum	(SNECON hardware rev 2.x): I2C communication error, refer to "I2C Communications Troubleshooting.doc". Verify that the application does not use a hardware address that does not exist.
2510	I2C Module Not Found: %4	SNECON I2C driver: No module of this "module type" and "location id" is listed in the address table	Reset the analyzer. Verify that the application does not use a hardware address that does not exist.
2511	I2C Invalid Opcode Received from %4	SNECON I2C driver: The message received corresponds to an unrecognized opcode	Reset the analyzer. Reload SNE OS and APP. Replace the SNECON
2512	I2C Error Reading ISR Queue	SNECON I2C driver: An error was detected reading a communication queue (SNECON hardware rev 2.x)	Reset the analyzer.
2513	I2C Message Too Big on %4	SNECON I2C driver: The I2C message received is too big and is not valid	I2C communication error, refer to "I2C Communications Troubleshooting.doc"
2515	I2C Address Table Full	SNECON I2C driver: No free addresses on the I2C bus. There is a limit of 120 addresses per bus, each PIC is taking up one address	Reset the analyzer.
2516	I2C Invalid Bus on %4	SNECON I2C driver: Invalid I2C bus identification number	Reset the analyzer.

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
2518	I2C Unknown Address Received on %4	SNECON I2C driver: SNECON firmware internal error	Reset the analyzer.
2519	I2C Invalid Data Type on %4	SNECON I2C driver: SNECON firmware internal error	Reset the analyzer.
2520	I2C Invalid Number of I/O Channels on %4	SNECON I2C driver: SNECON firmware internal error	Reset the analyzer.
2521	I2C Bus Conflict; Lost Arbitration on %4	SNECON I2C driver: An I2C communication error was detected (SNECON hardware rev 2.x)	Confirm that only 1 SNECON is present on the bus as a rev 2 SNECON cannot share the I2C bus. Refer to the I2C communication troubleshooting.
2522	I2C Using a Free Message Buffer on %4	SNECON I2C driver: SNECON firmware internal error	Reset the analyzer.
2523	I2C NS486SXF-C0 Patch Timeout on %4	SNECON I2C driver: SNECON firmware internal error	Reset the analyzer. Replace the SNECON
2525	I2C Invalid Driver Control Command on %4	SNECON I2C driver: SNECON firmware internal error	Reset the analyzer. Reload the OS and APP. Replace the SNECON
2526	I2C Capability Information Too Big on %4	SNECON I2C driver: SNECON firmware internal error	Reset the analyzer.
2527	I2C Message Lost in a Controller Reset: %4	SNECON I2C driver: A pending I2C message could not be sent and was lost as a result of a reset of the I2C interface. The cause of the reset is usually a re-occurring communication error	I2C communication error, refer to "I2C Communications Troubleshooting.doc"
2529	I2C Invalid Capability Version; Incompatible Firmware on %4	SNECON I2C driver: An I2C module has provided an invalid device capability information message. The associated "Sys_Hardware" table may be invalid	Replace the module. Reload a newer SNE OS and APP

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
2531	I2C Internal Error; Invalid Info on %4	SNECON I2C driver: SNECON firmware internal error	Reset the analyzer.
2532	I2C Invalid Device ID Version; Incompatible Firmware on %4	SNECON I2C driver: An I2C module has provided an invalid device id information message. The module type and location id information may be invalid	Replace the module. Reload a newer SNE OS and APP
2537	I2C Address Table not initialized on %4	SNECON I2C driver: SNECON firmware internal error	Reset the analyzer.
2538	I2C ISR Lockup	SNECON I2C driver: The SNECON message receive indicator is stuck (SNECON rev 3.0 hardware only)	Reset the analyzer. Replace the SNECON
2539	I2C Invalid Message Status Size on %4	SNECON I2C driver: SNECON firmware internal error	Reset the analyzer. Replace the SNECON
2540	I2C Message Too Short on %4	SNECON I2C driver: An I2C message received by the SNECON in too short to be valid	I2C communication error, refer to "I2C Communications Troubleshooting.doc"
2541	I2C FPGA Queue Full on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Replace the SNECON
2542	I2C FPGA Write Before End on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Replace the SNECON
2543	I2C FPGA Write After End on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Replace the SNECON
2544	I2C FPGA Message Too Short on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Replace the SNECON
2545	I2C FPGA Invalid Checksum on %4	SNECON I2C driver: SNECON on-board communication error. Is known to happen very infrequently with SNECON I2C FPGA rev 23 or lower (SNECON rev 3.0 hardware only)	Ignore the alarm. If happening too frequently, replace the SNECON

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
2546	I2C FPGA Invalid Size on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software. Replace the SNECON
2547	I2C Heartbeat Timeout Expired; Resetting Controller	SNECON I2C driver: A SNECON PIC was not responding and was reset (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software. Replace the SNECON
2549	I2C Heartbeat Counter Mismatch on %4	SNECON I2C driver: One or more messages were lost on the on-board communication (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software. Replace the SNECON
2550	I2C Invalid Message Status on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software. Replace the SNECON
2551	I2C Internal Error; Invalid Block Structure ID on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software
2552	I2C Internal Error; Invalid Block Offset on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software
2553	I2C Internal Error; Invalid Block ID on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software
2554	I2C Internal Error; New Block Offset Non-Zero on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software
2555	I2C Internal Error; Block Table full	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software
2556	I2C Not Enough Memory	SNECON I2C driver: SNECON firmware internal error	Reset the analyzer. Reload the SNECON OS software
2557	I2C Internal Error; Block Too Big on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
2558	I2C Internal Error; Block Not Found on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software
2559	I2C Internal Error; Invalid Block Size on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software
2560	I2C Driver OS and Application version mismatch	SNECON I2C driver: The version number of the SNECON OS is incompatible with the SNECON APP version	Reload the OS and APP
2562	I2C Internal Error; Bad state on %4	SNECON I2C driver: SNECON firmware internal error	Reset the analyzer. Reload the SNECON OS software
2563	I2C FPGA bad version	SNECON I2C driver: The SNECON I2C FPGA is incompatible or broken	Reload the OS with the newest version. Replace the SNECON
2564	I2C Temperature Block Version Invalid	SNECON I2C driver: The temperature controller PID parameter data block supplied by the SYSCON is incompatible	Reload the SNECON OS and APP to the corresponding SYSCON version
2565	I2C Opcode not expected in current state on %4	SNECON I2C driver: Unexpected I2C message opcode received by the SNECON from a module	I2C communication error, refer to "I2C Communications Troubleshooting.doc"
2566	I2C Modules were reset following multiple errors	SNECON I2C driver: A fatal error or multiple consecutive retries have forced the I2C controller to reset	Usually indicates a severe I2C communication error, refer to "I2C Communications Troubleshooting.doc"
2568	I2C Internal Error; Invalid Block Index on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software
2569	I2C FPGA Queue Full on %4	SNECON I2C driver: The SNECON I2C FPGA queue is full, the PIC is no longer processing I2C message	Reset the analyzer. Replace the SNECON
2570	I2C FPGA Packet Too Big on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software. Replace the SNECON

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
2571	I2C FPGA Recovery Failed on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software. Replace the SNECON
2572	I2C FPGA Read in progress not set after header on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software. Replace the SNECON
2573	I2C Not enough memory in ISR on %4	SNECON I2C driver: SNECON firmware internal error (SNECON rev 3.0 hardware only)	Reset the analyzer. Reload the SNECON OS software. Replace the SNECON
2574	I2C Pic Reset Detected on %4	SNECON I2C driver: A problem was detected by a SNECON PIC and it went through a reset	If happening frequently, replace the SNECON. Can also be caused by an I2C communication error.
2575	I2C General AO error	SNECON I2C driver: A channel specific error was detected while an AO command was processed (Example AO out of range) . A more specific alarm will be reported by the module on the next poll.	Provides the channel information for an alarm reported on the same module.
2576	I2C General DO error	SNECON I2C driver: A channel specific error was detected while a DO command was processed (Example DO locked). A more specific alarm will be reported by the module on the next poll.	Provides the channel information for an alarm reported on the same module.
2817	12V Error on %4	Temperature controller PIC: The 12 volts supply is not working normally.	Disconnect the RTDs and feedthrough connector. If the error does not go away then replace the DPM. If the error goes away, confirm that there is no continuity between any RTD lead and ground
2818	Setpoint Board Missing on %4	Temperature controller PIC: The OTS and temperature limit configuration board (t-rating configurator) is not detected on J10. The temperature controller is non-functional	Install or replace the TLIM-OTS T-rating configuration board

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
2819	RTD Failure 1 on %4	Temperature controller PIC: An attempt was made use a temperature channel that has an invalid RTD signal. The RTD is shorted or open circuit. The temperature controller cannot function.	Verify the 4-wires temperature sense RTD on channel #1. The RTD resistance must be between 81 and 269 ohms. Confirm that none of the lead has any continuity with ground.
2820	Rtd Failure 2 on %4	Temperature controller PIC: Same as alarm 2819 but on channel #2	Same as alarm 2819 but on channel #2
2825	A/D Failure on %4	Temperature controller PIC: An Analog to Digital Converter chip does not work properly. The flag will be set if the A/D internal calibration cycle is not completed within a pre-determined period of time or the A/D does not report any valid data within a pre-defined timeout period. Note: A firmware problem affecting the version 1.002 of the Temperature controller PIC may cause an A/D failure flag to show-up occasionally following a PIC reset. This is not a sign of a defective A/D converter.	Cycle power and if it happens consistently then replace the module
2865	AC Synchronization issue	The temperature controller supports a mode where the heater pulses are synchronized to the AC signal. We do not recommend using this mode and it is not supported. This mode in ON by default and it must be turned off as indicated	Define and set to '1' the following app_do to turn off the AC synchronization: Channel 147 and 163
2899	Over Temp Shutdown 1 on %4	Temperature controller PIC: The Over-Temp Shutdown function is active on channel #1, the heater cannot be turned-on.	The overtemp shutdown condition indicates that the temperature reached the absolute limit. The cause can be: · A disconnected TLIM-OTS configuration board. · A temperature setpoint too high for the allowed T-rating. · A defective OTS or T-limit temperature probe. · A defective DPM · A defective (shorted) SSR.

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
2900	Over Temp Shutdown 2 on %4	Temperature controller PIC: The Over-Temp Shutdown function is active on channel #2, the heater cannot be turned-on.	See alarm 2899
2901	Deviation 1 Exceeded on %4	Temperature controller PIC: The measured temperature deviation (TEMP_DEVIATION) has exceeded the corresponding MAX_DEVIATION value. The PID control was not successful to control the heater with the desired precision on channel #1.	A large deviation is normal on power-up and immediately following a change in the temperature setpoint. The cause for temperature instability can be: · Improper controller type "temptype" selected in the "App_tempctl" table in Advance System Manager. The PID parameters are not optimal. · Fast variation in the ambient temperature, airflow or line voltage. · Insufficient air flow. For an air bath heater with 1/8" spargers, 3 cfm is adequate for up to 100 DegC and then 4 cfm should be used. · A temperature setpoint too high for the allowed T-rating. · An Air pressure switch that works intermittently. · A defective DPM. · A defective PECM. · A defective Solid State relay.
2902	Deviation 2 Exceeded on %4	Temperature controller PIC: Same as alarm 2901 on channel #2	Same as alarm 2901 on channel #2
2903	Ramp has no origin 1 on %4	Temperature controller PIC: A ramp rate was set without a prior temperature setpoint on channel #1. A ramp must have an initial temperature defined by the previous setpoint value	Set the power-up default ramp value to 0.
2904	Ramp has no origin 2 on %4	Temperature controller PIC: A ramp rate was set without a prior temperature setpoint on channel #2. A ramp must have an initial temperature defined by the previous setpoint value	Set the power-up default ramp value to 0.

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
3117	Pressure 1 Out-Of-Control on %4	EPC (Electronic Pressure Controller) PIC: The measured pressure, on channel #1, has exceeded the absolute maximum allowed pressure and the corresponding channel was shutdown. The pressure controller is no longer working.	· Confirm that the flow is greater than the minimum specification. · Replace the EPC.
3118	Pressure 2 Out-Of-Control on %4	EPC (Electronic Pressure Controller) PIC: Same as 3117 for channel #2	· Confirm that the flow is greater than the minimum specification. · Replace the EPC.
3119	A/D 1 Failure on %4	EPC (Electronic Pressure Controller) PIC: The Analog to Digital Converter chip does not work properly. The flag will be set if the A/D internal calibration cycle is not completed within a pre-determined period of time or the A/D does not report any valid data within a pre-defined timeout period. Note: A firmware problem affecting the version 0.250 of the EPC PIC may cause an A/D failure flag to show-up occasionally following a PIC reset. This is not a sign of a defective A/D converter.	Cycle power and if it happens consistently then replace the module
3120	A/D 2 Failure on %4	EPC (Electronic Pressure Controller) PIC: The Analog to Digital Converter chip does not work properly. The flag will be set if the A/D internal calibration cycle is not completed within a pre-determined period of time or the A/D does not report any valid data within a pre-defined timeout period. Note: A firmware problem affecting the version 0.250 of the EPC PIC may cause an A/D failure flag to show-up occasionally following a PIC reset. This is not a sign of a defective A/D converter.	Cycle power and if it happens consistently then replace the module
3157	Low Supply Pressure 1 on %4	EPC (Electronic Pressure Controller) PIC: Set when the contact on the optional supply pressure sensor on J5 is closed indicating that the supply pressure is getting low and that the bottle will have to be changed soon.	Replace the corresponding bottle

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
3158	Low Supply Pressure 2 on %4	EPC (Electronic Pressure Controller) PIC: Set when the contact on the optional supply pressure sensor on J6 is closed indicating that the supply pressure is getting low and that the bottle will have to be changed soon.	Replace the corresponding bottle
3159	Deviation 1 Exceeded on %4	EPC (Electronic Pressure Controller) PIC: The measured pressure deviation has exceeded the corresponding MAX_DEVIATION value. The PID control was not successful to control the pressure with the desired precision on channel #1.	· MAX_DEVIATION_x that is too small. · An improper setting of TIME_LIMIT_DEVIATION_UP_x or TIME_LIMIT_DEVIATION_DN_x. · Insufficient supply pressure. · Flow too small or too large. · Defective EPC.
3160	Deviation 2 Exceeded on %4	EPC (Electronic Pressure Controller) PIC: Same as alarm 3159 on channel #2	Same as alarm 3159 on channel #2
3161	Setpoint1 changed following a change in Max Pressure	EPC (Electronic Pressure Controller) PIC: The SETPOINT_1 AO value was modified internally as a result of the SETPOINT_MAX_1 AO value set to a value lower than the SETPOINT_1 value.	Make sure to set the SETPOINT_MAX_1 value first and then set the setpoint
3162	Setpoint2 changed following a change in Max Pressure	EPC (Electronic Pressure Controller) PIC: Same as alarm 3161 on channel #2	Same as alarm 3161 on channel #2
3401	TFTP Protocol Error	Protocol error detected, such as receipt of a non-DATA packet or lack of an expected message acknowledgment	Most likely the gateway settings on the SNE are wrong. It will be necessary to power up the SNE connected to a serial terminal and change the settings in the startup dialog.
3402	TFTP Timeout	The TFTP client didn't receive any response from the server.	Either the TFTP server is not running on the host computer or the host computer is not connected to the SNE through the network.

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
3403	TFTP Server out of Sync	The data packets requested by the TFTP client to not match those sent by the TFTP server.	Either the TFTP client or TFTP server is malfunctioning. First try resetting the SNE, if that does not help, try restarting the TFTP server on the host computer.
3404	TFTP Server out of Sockets	TFTP server can't create a portal from which to communicate	SNE or host computer is low on resources.
3405	TFTP Max Channels is exceeded	Too many TFTP load requests have been commanded.	Only request one TFTP load at a time.
3406	TFTP Driver not initialized	TFTP driver was not successfully initialized.	Usually a problem of resource. Ensure that the SNE has 16Mb of memory or isn't otherwise deficient. Try a reset.
3500	TFTP Client out of memory	Client ran out of memory loading file.	Ensure SNE has 16Mb SIMM. Try reset.
3501	TFTP Client Checksum Error	File loaded had invalid checksum	Check to ensure load file is correct and uncorrupted.
3502	TFTP Client Missing End of File	Attempt to load truncated file	Load file may be corrupt.
3503	TFTP Client Invalid OS File	Attempt to load OS with invalid address range.	Load file may be Application file or corrupt
3504	TFTP Client Invalid App File	Attempt to load App with invalid address range	Load file may be OS file or corrupt
3501	Advance Adapter Initialization Failure	Adapter Detected, but responding improperly	Repair or replace adapter
3502	Invalid Channel for Advance Adapter %4	Reference to invalid channel on Advance Adapter	Fix improper database.
3503	Advance Adapter Backplane Timeout on %4	I/O %4 on backplane board did not respond	Try to reseat or replace board corresponding to hardware ID.

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
3504	Advance Adapter Backplane Error on %4	I/O %4 on backplane responded improperly	Try to reseat or replace board corresponding to hardware ID.
3505	Resource for %4 not available on Advance Adapter	Memory or operating system object not available for hardware access	Ensure SNE has 16Mb SIMM. Try reset.
3517	Advance Adapter Driver Out of Memory	Driver initialization failure due to lack of memory	Ensure SNE has 16Mb SIMM. Try reset.
3518	Invalid Advance Adapter Driver Command	application requested invalid command from Adapter Driver	Most likely a mismatch between the SNE OS and application. Reload SNE software.
3718	FPGA Error Full on %4	SNECON PICs: The FPGA queue to the NS486 was full and a packet could not be sent. A best attempt is made to continue but one or more packets were lost	Reset the SNECON -or- Replace the SNECON.
3719	FPGA error reset_W on %4	SNECON PICs: A FPGA reset was detected during a packet write from the PIC. The packet and any packet still in the FPGA queues were lost.	Reset the SNECON -or- Replace the SNECON.
3720	FPGA error reset_R on %4	SNECON PICs: A FPGA reset was detected during a packet read by the PIC. The packet and any packet still in the FPGA queues were lost.	Reset the SNECON -or- Replace the SNECON.
3721	FPGA error_W on %4	SNECON PICs: An error was detected while writing the packet header or data to the FPGA. A best attempt is made to continue but one or more packets may be lost.	Reset the SNECON -or- Replace the SNECON.
3722	FPGA error_R on %4	SNECON PICs: An error was detected when reading the packet header or data from the FPGA. A best attempt is made to continue but one or more packets may be lost.	Reset the SNECON -or- Replace the SNECON.

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
3725	Error SCL on %4	SNECON PICs: An abnormal situation was detected on the I2C "Serial Clock" line.	This is an indication that the WDB is broken, a cable harness is broken or one board connected to the I2C bus is malfunctioning, pulling the I2C clock signal to a logical low. Refer to the I2C communication troubleshooting guide
3726	Error SDA on %4	SNECON PICs: An abnormal situation was detected on the I2C "Serial Data" line.	This is an indication that the WDB is broken, a cable harness is broken or one board connected to the I2C bus is malfunctioning, pulling the I2C data signal to a logical low Refer to the I2C communication troubleshooting guide
3727	I2C won't align on %4	SNECON PICs: I2C communication error	Refer to the I2C communication troubleshooting guide
3728	I2C msg not allowed on %4	SNECON PICs: A packet containing an I2C message was received by the PIC (from the NS486 through the FPGA) at a time when it is not allowed but after a valid configuration message was received. The message was discarded.	Reset the SNECON -or- Reload the OS -or- Replace the SNECON.
3757	NACK address on %4	SNECON PICs: An I2C message transaction failed after the required number of retries. A cause of this failure was a non-acknowledged destination address byte (first byte in the message). This may happen if a module was disconnected from the bus after its address has been re-assigned	Reset the analyzer
3758	NACK Byte on %4	SNECON PICs: An I2C message transaction failed after the required number of retries. A cause of this failure was a non-acknowledged byte that is not the first byte in the message (any byte other than the destination address was not acknowledged). This may happen if a module is seriously confused or the I2C signal integrity is a problem (noise, etc…)	I2C communication error, refer to "I2C Communications Troubleshooting.doc".

Alarm #	Message	Description	Suggested actions
3759	NACK Message on %4	SNECON PICs: An I2C message transaction failed after the required number of retries. A cause of this failure was a NACK message with a non-zero flag. This may happen if the firmware of the peripheral module is not responding properly.	Reset the analyzer -or- Replace the module being addressed.
3760	Invalid Checksum on %4	SNECON PICs: An I2C message transaction failed after the required number of retries. A cause of this failure was an invalid checksum in the reply message. This may happen if the firmware of the peripheral module is not working properly or the electrical properties of the I2C signals are marginal.	I2C communication error, refer to "I2C Communications Troubleshooting.doc".
3761	Invalid Opcode on %4	SNECON PICs: An invalid private opcode was received from the NS486. The message was ignored. This may happen if the PIC firmware is out-of-date relative to the SNE software	Reload the OS and APP software -or- Replace the SNECON.
3762	Invalid Message on %4	SNECON PICs: An I2C message transaction failed after the required number of retries and a cause of this failure was a reply message that had a valid checksum, valid opcode but was invalid in any other way. This may happen if the firmware of the peripheral module is not working properly or the SNECON software is too old.	Reload the OS and APP software -or- Replace the module being addressed –or- Replace the SNECON.
3763	Arbitration Loss on %4	SNECON PICs: An I2C message transaction failed after the required number of retries and a cause of this failure was that the PIC could not successfully arbitrate its way to the bus. Other bus master capable devices are using all the I2C bus bandwidth	I2C communication error, refer to "I2C Communications Troubleshooting.doc".
3764	Timeout SCL on %4	SNECON PICs: An I2C message transaction failed because the I2C clock was stretched beyond the allowed timeout period specified in the configuration. A module may be malfunctioning.	I2C communication error, refer to "I2C Communications Troubleshooting.doc".

Alarm #	Message	Description	Suggested actions
3765	Timeout SDA on %4	SNECON PICs: An I2C message transaction failed because the I2C data line was held beyond the allowed timeout period specified in the configuration. A module may be malfunctioning	I2C communication error, refer to "I2C Communications Troubleshooting.doc".
3766	Bus Not Sync on %4	SNECON PICs: The master mode operation generated a start condition that was not detected by the FPGA.	Reset the SNECON -or- Replace the SNECON.
3767	Timeout Buffer on %4	SNECON PICs: A master mode message has not been processed within a timeout period. This is a catch-all alarm, the PIC will discard the message and attempt to recover	I2C communication error, refer to "I2C Communications Troubleshooting.doc".
3768	Invalid Handle on %4	SNECON PICs: The header handle received was not sequential, one or more I2C message was lost.	Reset the SNECON -or- Replace the SNECON.
3797	Invalid Checksum Slave on %4	SNECON PICs: An unsolicited I2C message was received with a bad checksum. The message was discarded and it is expected that the master will retry the message. This is a communication error that can be ignored if not too frequent	Reset the SNECON -or- Replace the SNECON.
3798	Invalid Message Slave on %4	SNECON PICs: An unsolicited I2C message was received with an invalid message size, invalid opcode or invalid data. The message was discarded. There may be a firmware version conflict	Reload the OS and APP software to all SNECONs
3799	Invalid Status Summary on %4	SNECON PICs: A packet was received by the PIC from the NS486 and the packet had an undefined bit set in the Status_summary field of the packet. The packet was processed normally.	Reload the OS and APP software -or- Replace the SNECON.
3800	Module Not Ready on %4	SNECON PICs: An I2C message transaction failed after the required number of retries and the cause of the failure was a series of consecutive message NACK all with a 0 flag. This may happen if the firmware of the peripheral module is not responding properly.	Reload the OS and APP software -or- Replace the module being addressed –or- Replace the SNECON.

Alarm #	Message	Description	Suggested actions
3801	Invalid Status Data on %4	SNECON PICs: The content of the status buffer "Status_data" was invalid and not recognized by the PIC. This may happen if the PIC firmware is out of date relative to the NS486 software	Reload the OS and APP software -or- Replace the SNECON.
3802	Invalid Status Type on %4	SNECON PICs: The value of the status_type was invalid and not recognized by the PIC. This may happen if the PIC firmware is out of date relative to the NS486 software	Reload the OS and APP software -or- Replace the SNECON.
3803	Invalid Msg Size on %4	SNECON PICs: A packet was received with an invalid I2C message size or no I2C message at all. The packet was discarded	Reload the OS and APP software to all SNECONs
3804	Arbitration Loss Slave on %4	SNECON PICs: The PIC lost a slave read arbitration. It indicates that at least another module responded to the same message request	No action to be taken. If happening too frequently, reset the analyzer.
4001	TFTP cannot load with active method %3	Method currently running when software load was commanded	put method on hold and wait for it to complete before loading SNE software.
4022	I/O Channel not found on %4	Hardware resource requested not present	reload and or repair SysCon database
4024	Slope Check failure on Channel %4	Slope check commanded with invalid parameters	Check method for slope check events and review data.
4025	Detector channel underflow occurred on %4	A/D converter for detector reading lowest possible value. This error may also be a secondary error caused by an overflow on a FIDDPM	Check A/D inputs, potentially replace referenced DPM
4026	Detector channel open occurred on %4	Open connection detected on A/D detector input. This error may also be a secondary error caused by an overflow on a FIDDPM	Most detectors can't detect this, probably represents some sort of DPM problem.
4027	Detector channel overflow occurred on %4	A/D converter for detector reading maximum value possible	Check A/D inputs, potentially replace referenced DPM

Alarm #	Message	Description	Suggested actions
4028	Detector channel unknown error occurred on %4	Undeterminable error occurred on detector channel circuit. This error may also be a secondary error caused by an overflow on a FIDDPM	reset, if repeatable replace DPM.
4029	Zero Correction failure on lower channel of %4"	Should happen only with a rev 2 TCD DPM or rev 3 baseboard (PIC firmware rev 2.006 and up) or a : The zero correction value exceeded the max allowed value for that particular board. This is a balance failure situation	Eliminate the cause of the balance failure: a) On TCD detector, replace the detector bead or filament b) On FID detector, clean or replace the FID
4030	Zero Correction failure on upper channel of %4"	Same as 4029	Same as 4029
4031	Flame out on %4	Flame out detected on an Advance+ FID or FPD Board	Light flame on unit. If flame is lit, board may be defective.
4525	AD Failure on %4	Advance Adapter Temperature controller PIC: The Advance adapter temperature A/D converter is not generating data point within the prescribed time interval.	Reset the analyzer. Replace the advance adapter
4526	Overtemp Shutdown supply failure	Advance Adapter Temperature controller PIC: The power supply used for overtemp shutdown is not working properly	Replace the advance adapter
4557	Setpoint changed internally	Advance Adapter Temperature controller PIC: The SETPOINT AO value was modified internally as a result of the SETPOINT_MAX AO value set to a value lower than the SETPOINT value.	Make sure to set the SETPOINT_MAX value first and then set the setpoint value
4599	Over Temp Shutdown	Advance Adapter Temperature controller PIC: The Over-Temp Shutdown function is active, the heater cannot be turned-on.	The overtemp shutdown condition indicates that the temperature reached the absolute limit. The cause can be: · A temperature setpoint too high for the allowed T-rating. · A defective temperature probe. · A defective Advance adapter. · A defective (shorted) SSR.

HMI Displayed Alarms, Continued

Alarm #	Message	Description	Suggested actions
4601	Temperature Deviation Exceeded	Advance Adapter Temperature controller PIC: The measured temperature deviation (TEMP_DEVIATION) has exceeded the corresponding MAX_DEVIATION value. The PID control was not successful to control the heater with the desired precision.	A large deviation is normal on power-up and immediately following a change in the temperature setpoint. The cause for temperature instability can be: · Fast variation in the ambient temperature, airflow or line voltage. · Insufficient air flow. · A temperature setpoint too high for the allowed T-rating. · A defective DPM. · A defective Solid State relay.

Chapter 4

Maintenance

Overview

Description

Procedures in this Chapter are for use by maintenance personnel.

Safety First

When performing maintenance procedures in this chapter observe all warnings, cautions and notes to prevent physical injury to yourself or unnecessary damage to the equipment.

WARNING

⚠️

Observe all plant safety requirements before performing any repair or maintenance on the Maxum II.

Chapter Highlights

The following maintenance information is provided:

Topic	Page
Overview	4-1
General Maintenance	4-6
Maintenance Panel	4-9
SYSCON	4-11
Sensor Near Electronics (SNE)	4-18
Power Entry Control Module (PECM)	4-28
Power Entry Control Module Version 2 (PECM-2)	4-30
Power Supply (PS)	4-34
Solenoid Valve Control Module (SVCM)	4-37
Solid State Relay Module	4-44
Electronic Pressure Control Module (EPCM)	4-51
Purge Control Module (PCM)	4-55
Wiring Distribution Board (WDB)	4-59
Air Circulating Fan (ACF)	4-61
Model 50 Valve	4-63
Model 20 Valve	4-70
Model 20 High Temperature Valve (HTV)	4-83

Overview, Continued

Topic	Page
Model 11 and Model 11 Low Dead Volume (LDV) Valves	4-99
Liquid Injection Valve	4-115
Live Tee Switch	4-127
Live Tee Switch Example Application	4-129
Flame Photometric Detector (FPD)	4-140
Flame Ionization Detector (FID)	4-145
Thermal Conductivity Detector (TCD)	4-152
Miscellaneous Maxum II Procedures	4-157

Help

If technical assistance is required during performance of maintenance functions, or if parts are being returned, the customer should contact Siemens at the following address and/or phone number:

Siemens Energy & Automation, Inc.
408 US Highway 60
Bartlesville, Oklahoma 74003

Tel: (800) 448-8224 (USA)
Tel: 001 918-662-7030 (International)

How to Use This Chapter

Before performing a procedure first read it through. It is recommended that a regular scheduled daily, weekly or monthly maintenance program be established. By doing so, the Maxum II's downtime will be reduced and the system will operate at optimum analytical efficiency. Siemens recommendations for routine maintenance are listed in table 4-1 on the following page. These recommendations are intended as a guideline. Actual maintenance may change depending on application and the environment in which the Maxum II operates.

Overview, Continued

Note: The tasks described below are provided as a suggested guidleine for routine maintenance. Requirements for a particular analyzer will depend on environment, location of the analyzer, available resources, and the specific characteristics of the application.

Task	Frequency
Backup of database	Weekly as well as before performing any maintenance that requires the analyzer to be powered down.
Status Check – Includes checking alarms, utility bottle pressures, flow rates, and oven temperature.	Daily.
Visual Inspection (walk by)	Daily or weekly (may vary depending on location, application and. environment)
Interior Electronic Enclosure Visual Inspection (open cabinet and check for moisture and/or contamination)	Monthly (may vary depending on location, application and environment)
Valve Inspection	Gas Samples – Model 11 – 6 months Model 20 – 6 months Model 50 – Yearly Liquid Injection Samples - All valve types 6 weeks Routine maintenance schedule for valves will vary greatly depending on sample properties, application (including temperature and pressure) and environment. In addition, for liquid injection applications, valve seals may need to be replaced on a regular basis. The interval could range from 4 weeks to a few months depending on the sample properties.

Table 4-1: Recommended Routine Maintenance

Overview, Continued

Note: The tasks described below are provided as a suggested guidleine for routine maintenance. Requirements for a particular analyzer will depend on environment, location of the analyzer, available resources, and the specific characteristics of the application.

Task	Frequency
Verification of Calibration	Monthly (may vary greatly depending on application). When validation is included automatically as part of the method, the results should be checked daily if possible.
Sample Transport Filters	Replace as necessary. Note that wet/dirty samples require more frequent attention than dry/clean samples.
Lithium Battery on SYSCON	Replace every 5 years

Table 4-1 (Continued): Recommended Routine Maintenance
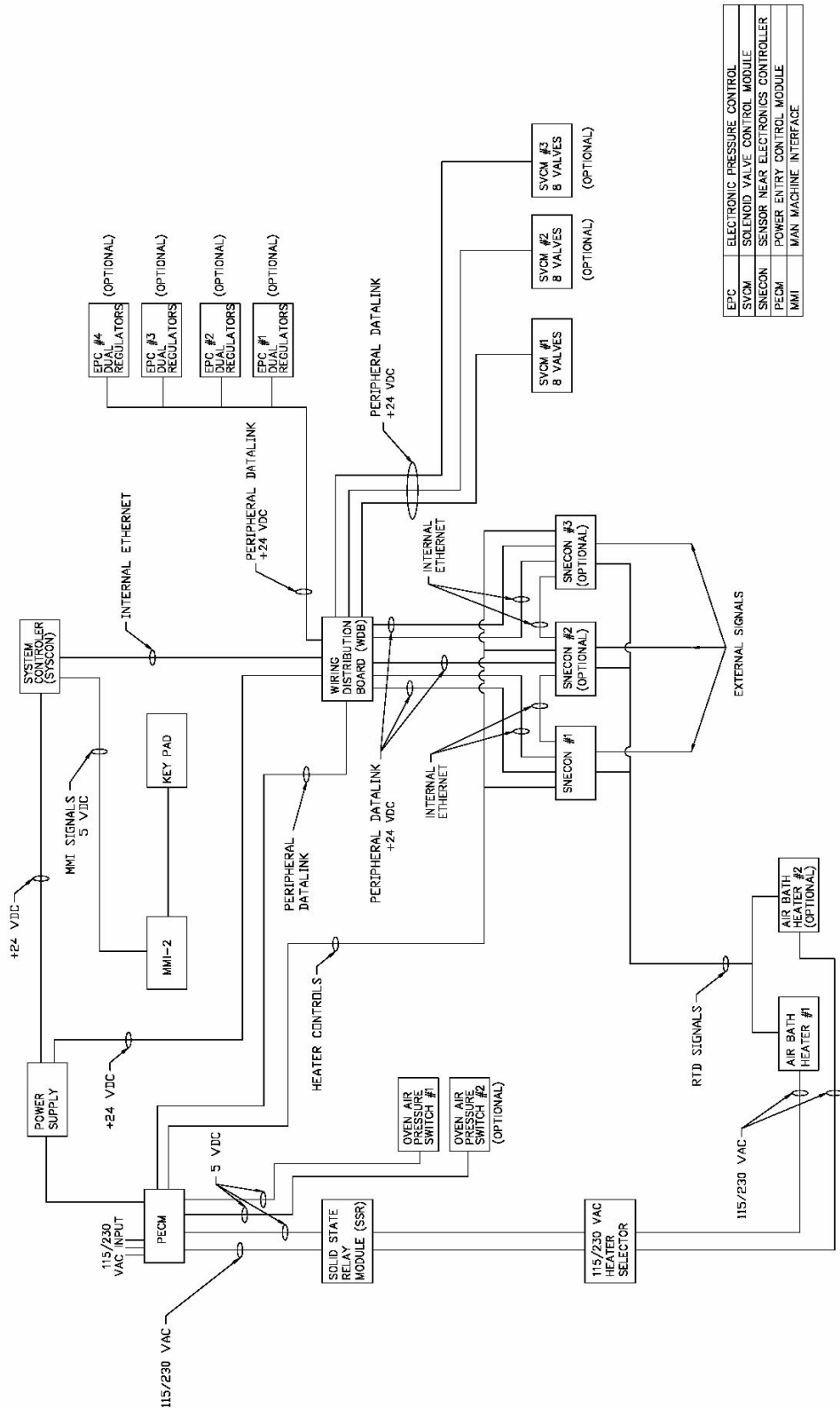
Overview, Continued

Figure 4-1: Electronics Enclosure Wiring Harness Diagram

General Maintenance

Scheduled Maintenance

It is important that a preventative maintenance schedule be established to examine the Maxum II for internal and external cleanliness, damage, and proper operation. Refer to Table 4-1 for suggestions regarding maintenance intervals. However, maintenance schedules for a particular analyzer will depend on the application, operating environment, maintenance resources, and geographical location of the analyzer.

Even though the Maxum II is tightly sealed against moisture and foreign contamination, it is recommended that the electronic enclosure door be opened periodically and internal components examined for moisture and/or contamination. If contamination is found, the system should be shutdown and corrective procedures performed. If such contamination is not removed, it could render the Maxum II inoperable.

Component Interface Cabling and Connectors

Modular components within the Maxum II are interfaced together via miniature ribbon cables, miniature wiring and connectors. It is therefore important that maintenance personnel follow the information presented in the following sections to prevent their damage.

Ribbon Cable

Therefore, when opening and closing electronic enclosure door for maintenance and/or inspection, care must be exercised so as not to place a sharp bend or crimp in the cable when the door is closed.

Removing Connectors

Internal components and modules are interfaced together using miniature wiring and associated connectors. It is therefore important that when a module and/or component is to be removed and replaced, that the connector be grasped and gently rocked, back and forth. **DO NOT REMOVE A CONNECTOR BY PULLING ON ASSOCIATED CONNECTOR WIRING.**

Nut and Bolt Mounting Hardware

With very few exceptions, nut and bolt hardware used to secure modules and/or components in their mounting locations are in metric.

WARNING

⚠

Observe all plant safety requirements before performing any repair or maintenance on the Maxum II.

General Maintenance, Continued

Opening Doors

To gain access to the modules, the electronic enclosure door must be opened. It will be necessary to use a #4mm Allen wrench to open the door if the Allen screw on the latch has been tightened.

APU Maintenance Switch

When an analyzer is equipped with an Automatic Purge Unit (APU), the APU is designed to cut power to the analyzer when the Electronics Enclousure Door is opened (disrupting purge). Maxum II analyzers with APU are equipped with a key operated Maintenance Switch that allows a user to perform maintenance on the analyzer while powered.

WARNING

⚠️

The Maintenance Switch on a Maxum II analyzer that is equipped with Automatic Purge Unit (APU) should ONLY be used when it has been verified that the analyzer location is safe. "Hot Work" permits may be required depending on the location. All work must be with the approval of local safety personnel.

Inspection After Maintenance

After performing any maintenance function(s), check to be certain there is no loose hardware left within the electronic enclosure. Such items can create electrical shorts causing damage to internal components. This increases system downtime for performing of corrective maintenance.

Field Tool Kit

Recommended tools for performing maintenance are as follows:

Maxum II Tool Kit

or

Set of metric Allen wrenches

Set of metric wrenches or nut drivers

Note: Special tools required for specific procedures within this section are noted within the procedure (example: torque wrenches required for valve assembly).

General Maintenance, Continued

Use of Solvents and Detergents

It is important for proper procedures to be used when cleaning valve and detector parts. All foreign contamination adhering to the part should be removed using an appropriate cleaning solvent, such as hexane, acetone, or methanol and a dust/lint free cloth. Use of an ultrasonic cleaner is often helpful. After cleaning, it is necessary remove excess cleaning fluid from the components by blowing with clean air or shaking. Components must be air dry before reassembling.

It is also possible and often better to use an appropriate detergent, such as Alconox® for cleaning instead of solvent. However, after cleaning with a detergent, it is necessary to rinse the part thoroughly with deionized water (distilled water is also acceptable) in order to remove detergent residue. All water must then be removed by blowing with clean air or shaking. Components must be completely dry before reassembling.

Maintenance Panel

Description
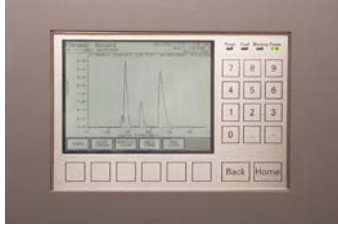
This section presents the procedures for removal and installation of Maxum II door mounted Maintenance Panel. The Maintenance Panel is designed for use in Division 1 or Zone 1 installations or Division 2 or Zone 2 installations.

WARNING

⚠

Voltage dangerous to life exists. Before performing the removal and installation procedures, it is important that primary AC power to the Maxum II be turned off from the main circuit breaker. Observe all plant safety requirements before performing any repair or maintenance on the Maxum II.

CAUTION

⚠

When the maintenance panel and switch panel are removed from their mounting location, they must be placed on a clean dirt free work surface. This is to prevent scratching of switch panel viewing surface. Interface ribbon cable must not be bent or crimped when disconnecting from maintenance panel connector.

Replacing the Maintenance Panel

The following procedures should be followed for removal or installation of a Maintenance Panel.

Step	Procedure
1.	Open electronic enclosure door (using a 4mm (5/32") Allen wrench if necessary). When door is open **DO NOT** place tension on the Maintenance Panel interface ribbon cable.

Information

The Maintenance Panel ribbon cable is secured to the panel and doorframe with fold-over clips (see figure 4-2). When instructed to bend clips back to release cable, do so with caution to prevent their breakage.

Step	Procedure
2.	Gently bend back clips that hold the ribbon cable to the back of maintenance panel. **DO NOT** bend back any clips that hold the cable to the door.
3.	Disconnect ribbon cable from connector and let ribbon cable hang loose. To release the connector, spread out the two blue locking clips. To remove the maintenance panel it is not necessary to disconnect the ribbon cable from the SYSCON Maintenance Panel connector.
4.	To remove the panel from the door, simply remove the four nuts with lock washers that secure the panel to the door.
5.	To install a new panel, repeat steps 1 to 4 in reverse order. Ensure that after connecting the ribbon cable to the panel that you push both blue hold-down clips inward to lock the connector in place.
6.	Before closing electronic enclosure door ensure that the ribbon cable is not pinched when the door is closed.
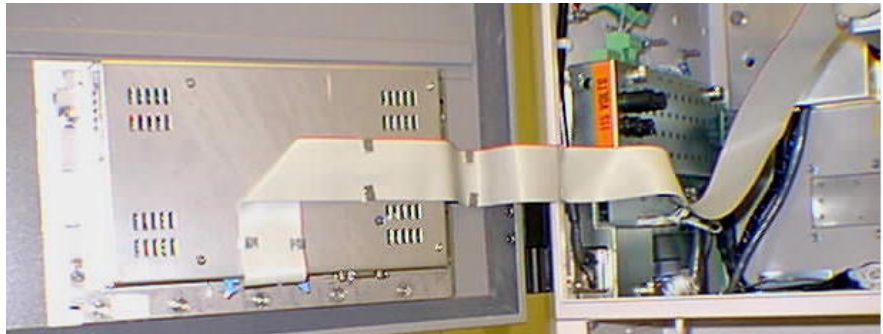
Figure 4-2: Rear View of Maintenance Panel

SYSCON

Description

This section presents the procedures for removal or installation of the SYSCON and installed motherboard. The SYSCON is mounted in the upper center section of the electronic enclosure with the motherboard being mounted within the bottom of the SYSCON cage. Three procedures are presented in this section:

Motherboard Removal and Installation
Installing of Expansion Board(s)
Battery Replacement

WARNING

Voltage dangerous to life exists. Before performing the removal and installation procedures, it is important that primary AC power to the Maxum II be turned off from the main circuit breaker. Observe all plant safety requirements before performing any repair or maintenance on the Maxum II.

CAUTION

To remove the SYSCON mounted motherboard from the SYSCON the SYSCON assembly must be completely removed from the electronic enclosure. When removing the assembly, exercise care so as not to drop the assembly. Doing so could seriously damage sensitive motherboard components. Before removal of the motherboard, service personnel should either wear a wrist type grounding strap with the other end connected to the SYSCON frame or personally ground themselves to the chassis. Static buildup on a person could discharge through motherboard components causing permanent damage to on-board components.

Procedures

The following procedures should be followed for removal and installation of SYSCON and the installed motherboard. Components to be removed to access the motherboard are shown in Figure 4-3 and 4-4.

Motherboard Removal and Installation

Step	Procedure
1.	Open electronic enclosure door (using a 4mm (5/32") Allen wrench if necessary). When door is open **DO NOT** place tension on the Maintenance Panel interface ribbon cable.
2.	If expansion boards are installed in motherboard expansion slots, disconnect their interface cables.

SYSCON, Continued

NOTE	Verify each expansion board interface cable is labeled with its mounting location.

Step	Procedure
3.	If SYSCON is connected to a network, disconnect the 10BaseT connector.
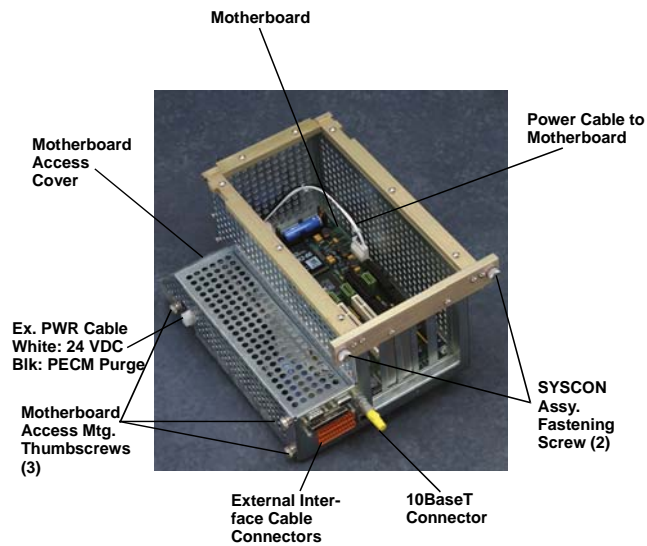
**Figure 4-3: Accessing/Removing Motherboard
(Original SYSCON is Shown)**

4.	Disconnect all cable connectors from External Interface Cable Connector panel. Remove the Maintenance Panel ribbon cable from any fold over clips that fasten it to the SYSCON Mounting Assembly. Use care bending clips to prevent breaking them.
5.	Using appropriate tools, loosen the topmost SYSCON Assembly fastening hardware that secures the assembly to electronic enclosure mounting bracket.
6.	Pull the SYSCON assembly forward and lower it so that it rests on the rubber mounting foot. Refer to Figure 4-4.

SYSCON, Continued

Step	Procedure
7.	Remove the two external PECM Power Cables from the SYSCON. These are located on the rear left side for the older style mounting assembly and on the rear left bottom for the newer style assembly. To remove cables, press in the connector locking tabs and pull connector outward. These two cables have different connectors preventing cabling errors during installation.
8.	Old SYSCON Mounting Assembly: Refer to Figure 4-5 and remove cable tray on bottom of the SYSCON. New SYSCON Mounting Assembly: Remove PECM power cables from clip that secures them to the mounting assembly.
9.	At the WDB end remove the cable that connects the WDB to the SYSCON module.
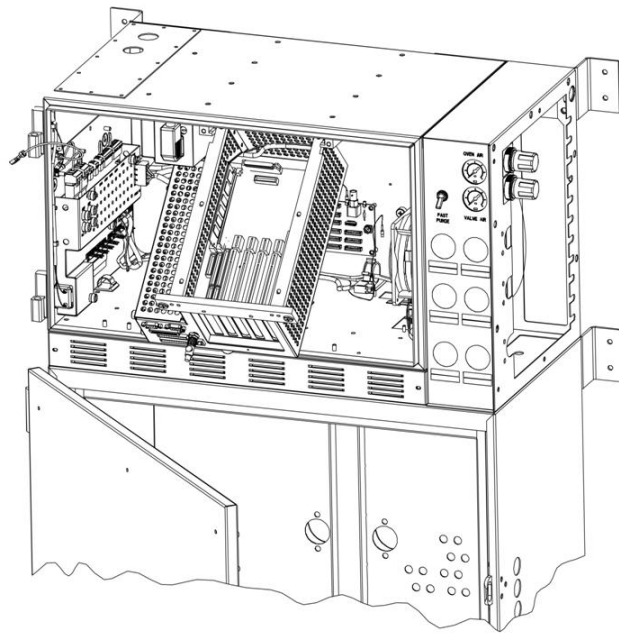
Figure 4-4: Positional Location of SYSCON in Electronic Enclosure

SYSCON, Continued
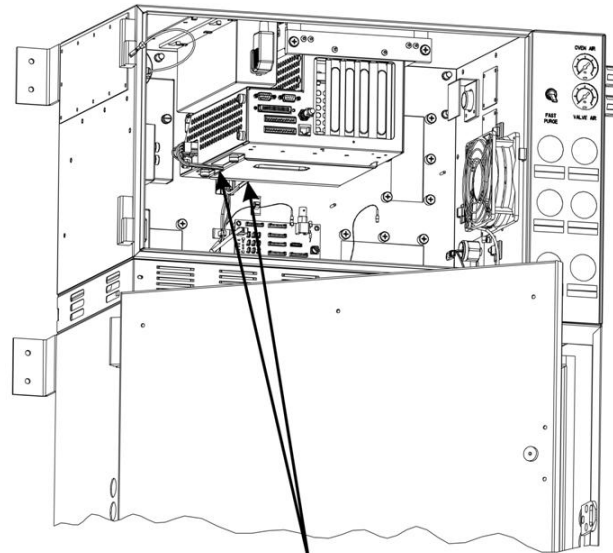
Verify routing of cables is as shown.
Ensure Cables are within cable tray
when fully installed.

Figure 4-5: SYSCON Fully Installed View (Old SYSCON Shown)

Step	Procedure
10.	To remove SYSCON, lift the assembly upwards and pull forward from its mounting rail assembly. It is recommended that the assembly be lifted by one hand and supported by the other. Place assembly on a clean dirt free work surface.
11.	(Old SYSCON Mounting Assembly Only) Remove the three motherboard access thumb mounting screws. These screws secure left side mounted perforated cover to SYSCON frame. Remove cover to expose left side of motherboard.

CAUTION

⚠️

To remove the SYSCON mounted motherboard from the SYSCON, the SYSCON assembly must be completely removed from the electronic enclosure. When removing the assembly, exercise care so as not to drop the assembly. Doing so could seriously damage sensitive motherboard components. Before removal of the motherboard, service personnel should either wear a wrist type grounding strap with the other end connected to the SYSCON frame or personally ground themselves to the chassis. Static buildup on a person could discharge through motherboard components causing permanent damage to on-board components.

SYSCON, Continued

Step	Procedure
12.	Disconnect all cable connectors connected to the motherboard. Use care when unplugging the small gold connector of the WDB cable. Carefully remove this connector by pulling firmly (use pliers if necessary).

IMPORTANT   Before removing cables from motherboard, label each one to identify its motherboard mounting location.

13.	Remove all motherboard installed expansion boards. Note slot location for each board so they can be reinstalled in same slot. Also unplug the orange connectors that extend through the front face of the mounting assembly.
14.	Remove the six Allen screws securing motherboard to its SYSCON assembly mounting standoffs. Screws are located in each corner and center of motherboard.

IMPORTANT   When removing motherboard, lift by its sides. **DO NOT** touch board mounted components. Discharge of body static electricity can damage components.

15.	(Old Mounting Assembly) Lift-up the motherboard and slide it to the right, then lift-up left side and extract from SYSCON mounting assembly. Motherboard must be lifted up over the two SYSCON frame mounted power connectors. (New Mounting Assembly) Lift up the motherboard and pull back to remove.
16.	Place motherboard in an anti-static bag for return to Siemens.
17.	To reinstall motherboard, repeat steps 1 to 15 in reverse order.
18.	Before closing door and reapplying AC power, be certain all interface cables are correctly connected. Be certain expansion boards are installed in their correct motherboard expansion slots.

SYSCON, Continued

Installing of Expansion Board(s)

If only an expansion board(s) is to be installed in a motherboard expansion slot, then perform the following procedures. To install a board(s) it is not necessary to disconnect interface cables or to remove the SYSCON from its mounting facility.

Step	Procedure
1.	Open electronic enclosure door (using a 4mm (5/32") Allen wrench if necessary). When door is open **DO NOT** place tension on the Maintenance Panel interface ribbon cable.
2.	Using appropriate tools, loosen the topmost SYSCON Assembly fastening hardware that secures the assembly to electronic enclosure mounting bracket.
3.	Pull the SYSCON assembly forward and lower so it rests on the bottom frame rubber mounting foot.
4.	Remove the blank slot cover from the slot that is to be used.
5.	Install the expansion board in the appropriate SYSCON motherboard expansion slot. Be certain the board is properly seated in its connector and screw it into the mounting chassis. Refer to Figure 4-3.
6.	Connect necessary cables.
7.	Push the SYSCON assembly back into its mounting facility and secure in place with the fastening hardware.
8.	Attach appropriate interface cable to the expansion board connector.
9.	Before closing door and reapplying AC power, be certain the interface cable is securely connected to expansion board.

SYSCON, Continued

IMPORTANT	The battery should only be replaced with an approved spare. Contact Siemens for a replacement.

Battery Replacement

Step	Procedure
1.	Open electronic enclosure door (using a 4mm (5/32") Allen wrench if necessary). When door is open **DO NOT** place tension on the Maintenance Panel interface ribbon cable.
2.	Using appropriate tools, loosen the topmost SYSCON Assembly fastening hardware that secures the assembly to electronic enclosure mounting bracket.
3.	Pull the SYSCON assembly forward and lower so it rests on the electronic enclosure bottom frame rubber mounting feet. For battery location, refer to Figure 4-6.

CAUTION

⚠️

Before removal of battery, note location of its positive end when installed in battery holder. The positive and negative terminals are marked on the battery. **Note that the physical shape of the Positive and Negative terminals on the battery are NOT STANDARD.**

4.	Remove defective battery from its mounting bracket located at the rear of the module. Refer to picture below.
5.	When installing 3.6-Volt Lithium Battery in its holder, place the positive (+) end so it installs per marking on the holder. Refer to picture below.
6.	After installation, push the SYSCON assembly back into its mounting facility and secure assembly in place with the fastening hardware.
7.	Before closing door and reapplying AC power, be certain the battery is securely installed in its holder and polarity, within holder, is correct.

Battery

Figure 4-6: SYSCON Board

Sensor Near Electronics (SNE)

Description
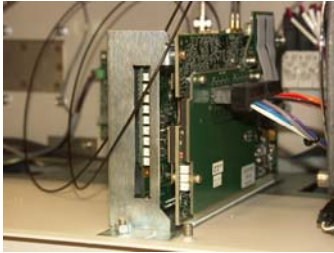
This section presents the procedures for removal or installation of the Sensor Near Electronics (SNE) module. The module is located on the lower part of the electronic enclosure directly below the SYSCON. Procedures are presented for:

> SNE Removal and Installation
> SNE Cooling Fan Removal
> Controller Board Removal and Installation
> Mezzanine Board Removal and Installation
> DPM Board Removal and Installation

Installation Note

Up to a total of three SNE modules can be installed within a single electronic enclosure. The removal and installation procedures presented in this section are applicable to each installed SNE; refer to Figures 4-7 through 4-10 for reference.

There are two significantly different configurations of SNE assembly currently in use. The procedures in this section are applicable to both configurations except where noted. For more information on the available configurations of SNE assembly and upgrading from the old configuration to the new configuration, refer to the SNE Assembly Installation Manual (Siemens part number 2000685-001).

WARNING

⚠

Voltage dangerous to life exists. Before performing the removal and installation procedures, it is important that primary AC power to the Maxum II be turned off from the main circuit breaker. Observe all plant safety requirements before performing any repair or maintenance on the Maxum II.

CAUTION

⚠

All interface wiring connections terminating on the SNE are on the back top, left and right sides of the SNE. Top and left side connected cabling is easily accessible. However, cabling on right side is obstructed by the close proximity of the feed-through assembly connector extension. This requires the top and left side connectors be disconnected first. To access right side connections, it is necessary that SNE be released and rotated from its mounting assembly.

Right side mounted cabling is fragile and must not be bent or pinched during removal and installation.

CAUTION

⚠
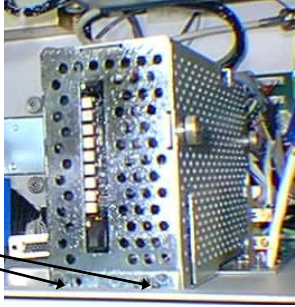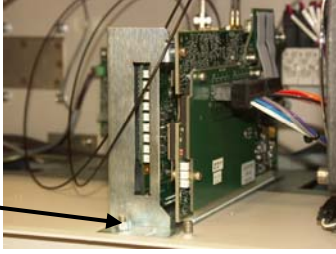
When attaching an SMC connector to a mezzanine module, do not over tighten the connector. Proper torque for the SMC connector is 0.3 to 0.6 Nm (3 to 5 inch-pounds). Tightening beyond the proper torque may break the connector.

Sensor Near Electronics (SNE), Continued

Procedures

The following procedures should be followed for removal and installation of SNE.

SNE Removal and Installation

Step	Procedure
1.	Open electronic enclosure door (using a 4mm (5/32") Allen wrench if necessary). When door is open **DO NOT** place tension on the Maintenance Panel interface ribbon cable.
2.	Remove interface cables from top and left side of the SNE. Label each cable as to its connection point. This will help avoid making a wrong connection during installation. Long interface cables attach to top mounted connectors and short cables attach to bottom connectors.
3.	Remove the one or two nuts from the front SNE mounting bracket; see Figures below. Old Assembly Mounting Nuts New Assembly Mounting Nut
4.	Pull the SNE slightly forward to release assembly from rear mounting guide.
5.	Remove SNE from electronic enclosure.

Sensor Near Electronics (SNE), Continued

| CAUTION ⚠ | In the following steps, if attaching an SMC connector to a mezzanine module, do not over tighten the connector. Proper torque for the SMC connector is 0.3 to 0.6 Nm (3 to 5 inch-pounds). Tightening beyond the proper torque may break the connector. |

Step	Procedure
6.	To reinstall the new SNE, perform steps 1 to 5 in reverse order.
7.	Before reapplying AC power, be certain the SNE assembly is securely fastened to electronic enclosure mounting facility, and all interface cables are correctly and securely fastened.

SNE Cooling Fan

For the old SNE Assembly, there is a small cooling fan located on the side of the assembly chassis. This fan does is not required on the new chassis. This fan is part of the old SNE Assembly and is not available as a spare part. If the fan becomes faulty then the SNE Assembly must be replaced with the newer version.

Sensor Near Electronics (SNE), Continued
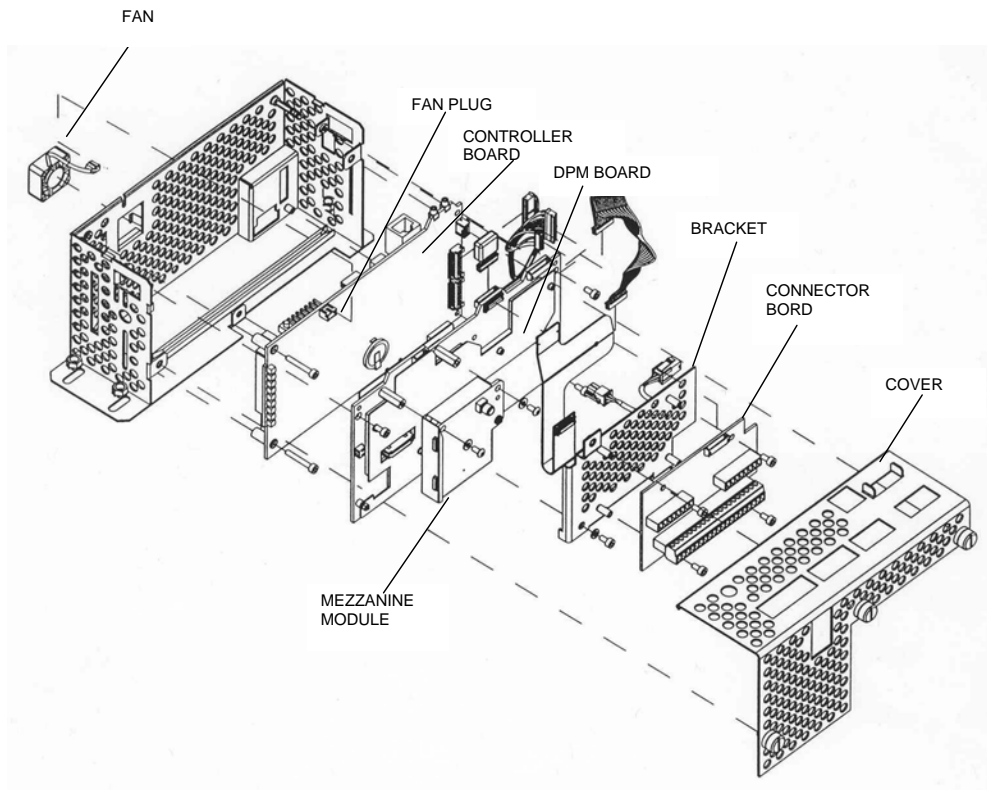
Figure 4-7: Old SNE Assembly
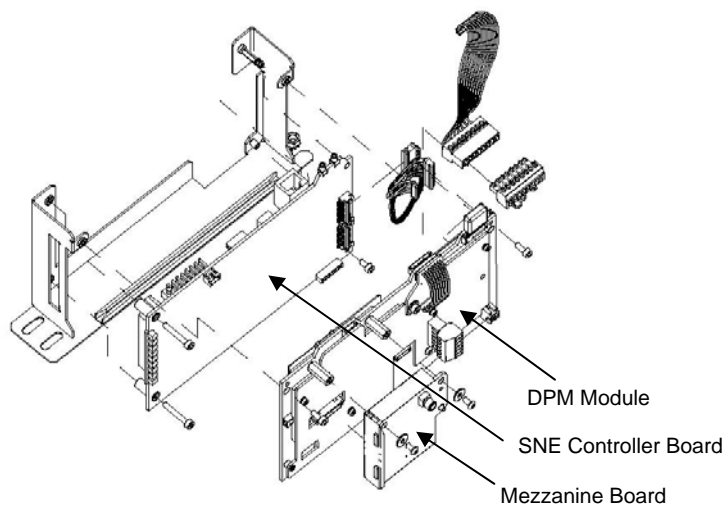
Figure 4-8: New SNE Assembly

Controller Board Removal and Installation

To replace a SNE installed board, it is necessary to remove the SNE from the EC. See Figure 4-7 (old assembly) or 4-8 (new assembly) for the following procedures.

Old Assembly:

Step	Procedure
1.	Remove the SNE from its enclosure mounting position by performing steps 1 to 5 in previous section, SNE Removal and Installation.
2.	With the SNE fully removed from enclosure remove the screen cover by unscrewing the three fastening screws. These are captive screws and will remain with the panel.
3.	See Figure 4-7 or 4-8, the controller board is located in the expansion slot against left side of the assembly. This board incorporates LED status lights. Remove all external cables to and from the Controller board. Note cable locations.
4.	Remove controller board and install replacement board.
5.	Connect all I/O wiring to the replacement board.
6.	Reinstall screen cover and reinstall SNE Assembly in the electronics enclosure.

New Assembly:

Step	Procedure
1.	Remove the SNE from its enclosure mounting position by performing steps 1 to 5 in previous section, SNE Removal and Installation.
2.	The DPM must be removed prior to removing the SNE Controller board. To remove the DPM, remove any cables and then remove the two allen screws securing the board to the assembly. Then pull the board firmly to unplug.
3.	Remove any additional cables or jumpers from the SNE Controller board. Make note of cable locations.

Sensor Near Electronics (SNE), Continued

Step	Procedure
4.	Unscrew the three fastening screws that secure the SNE Controller to the assembly and then unplug the SNE Controller board.

CAUTION

⚠️

In the following steps, if attaching an SMC connector to a mezzanine module, do not over tighten the connector. Proper torque for the SMC connector is 0.3 to 0.6 Nm (3 to 5 inch-pounds). Tightening beyond the proper torque may break the connector.

Step	Procedure
5.	Perfrom steps 1 to 4 in reverse order to install new SNE controller, reinstall DPM and reinstall assembly in the Electronics enclosure.

Installation Note

After installing the SNE in the EC, ensure that the board is securely installed in its SNE expansion slot.

Mezzanine Module Removal and Installation

A Mezzanine module can be removed without removing the DPM board.

Step	Procedure
1.	Remove the SNE from its enclosure mounting position by performing steps 1 to 5 in previous section, SNE Removal and Installation.
2.	**(Old Assembly Only)** With the SNE fully removed from enclosure, remove the screen cover by unscrewing the three fastening screws. These are captive screws and will remain with the panel.
3.	Refer to Figure 4-7 or 4-8 and remove the attaching hardware securing the mezzanine module to the controller board.

Sensor Near Electronics (SNE), Continued

CAUTION

⚠️

In the following steps, if attaching an SMC connector to a mezzanine module, do not over tighten the connector. Proper torque for the SMC connector is 0.3 to 0.6 Nm (3 to 5 inch-pounds). Tightening beyond the proper torque may break the connector.

Step	Procedure
4.	To reinstall replacement board, perform steps 1 to 3 in reverse order.
5.	Connect all I/O wiring to the module and reinstall SNE in the electronics enclosure.

Sensor Near Electronics (SNE), Continued

DPM Removal and Installation

To replace a DPM it is necessary to remove the SNE from the EC. See Figure 4-7 (old assembly) or Figure 4-8 (new assembly) for the following procedure.

Step	Procedure
1.	Remove the SNE from its enclosure mounting position by performing steps 1 to 5 in previous procedure, SNE Removal and Installation.
2.	**(Old Assembly Only)** With the SNE fully removed from enclosure remove the screen cover by unscrewing the three fastening screws. These are captive screws and will remain with the panel.
3.	**(Old Assembly)** Loosen the thumbscrew that secures the connector board assembly to the DPM and remove the assembly. **(New Assembly)** Remove the two allen screws that secure the DPM to the mounting assembly.
4.	Remove all external cables to and from the DPM board. It may be necessary to partially remove the board in order to remove the cables on the left side of the board.
5.	Remove DPM board.

CAUTION

⚠

In the following steps, if attaching an SMC connector to a mezzanine module, do not over tighten the connector. Proper torque for the SMC connector is 0.3 to 0.6 Nm (3 to 5 inch-pounds). Tightening beyond the proper torque may break the connector.

6.	To reinstall replacement board, perform steps 1 to 5 in reverse order.
7.	Connect all I/O wiring to the replacement board and reinstall the SNE into electronic enclosure.

Sensor Near Electronics (SNE), Continued
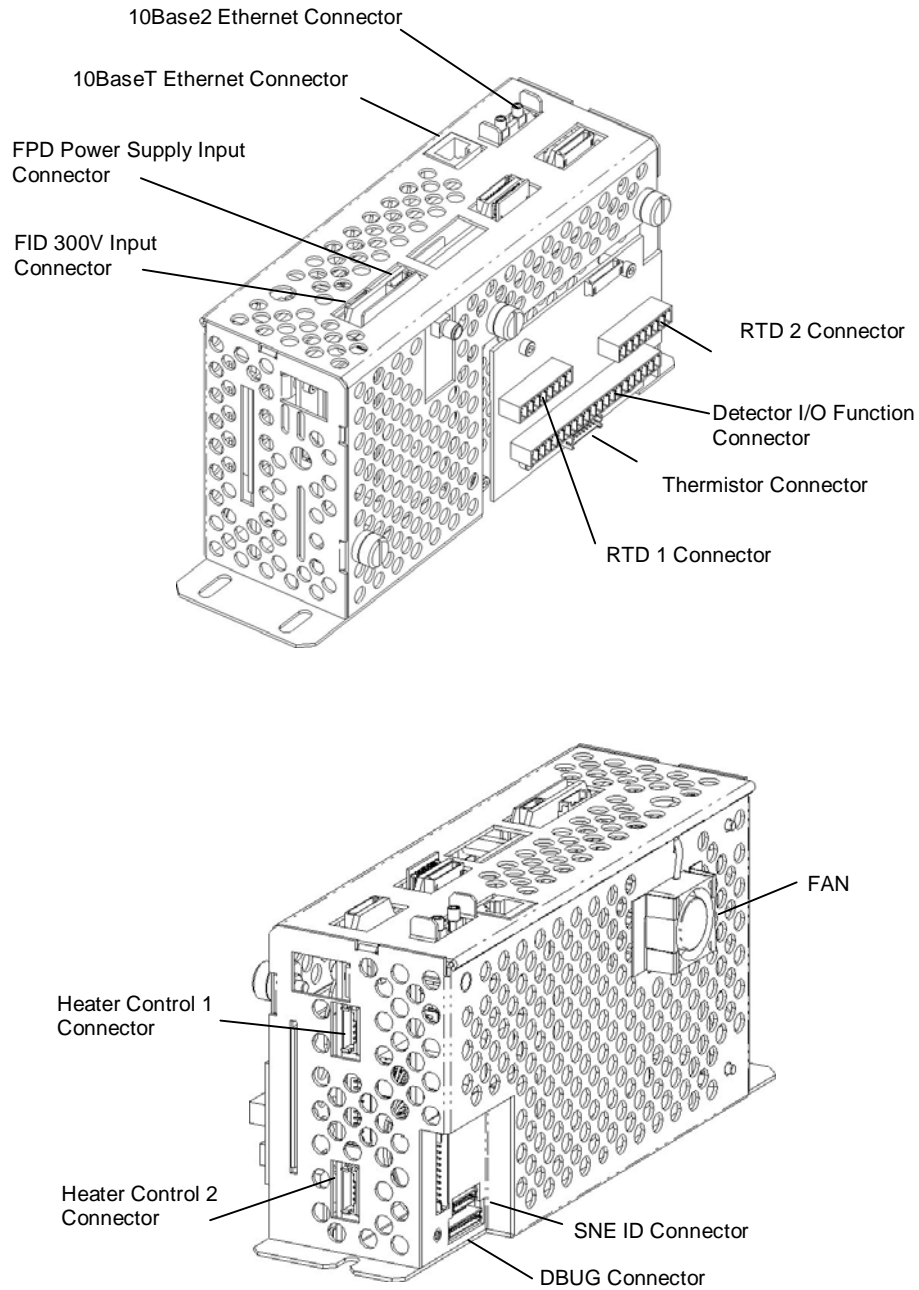
Figure 4-9: SNE I/O Connectors (Old Configuration)

Sensor Near Electronics (SNE), Continued

To PECM

To SNECON

1. Nut with Lockwasher
2. Plug — Module ID #3
3. Screws — Allen Head
4. Heater Control Cable
5. I2C Cable
6. SNECON Board
7. DPM Board
8. Mezzanine Module
9. Signal Cable Connection
10. Micro-Coax Connections to WDB
11. Heater Terminator Plug
12. Cable — Heater Sensor Near (Short)
13. I2C Bus Connection (J6)
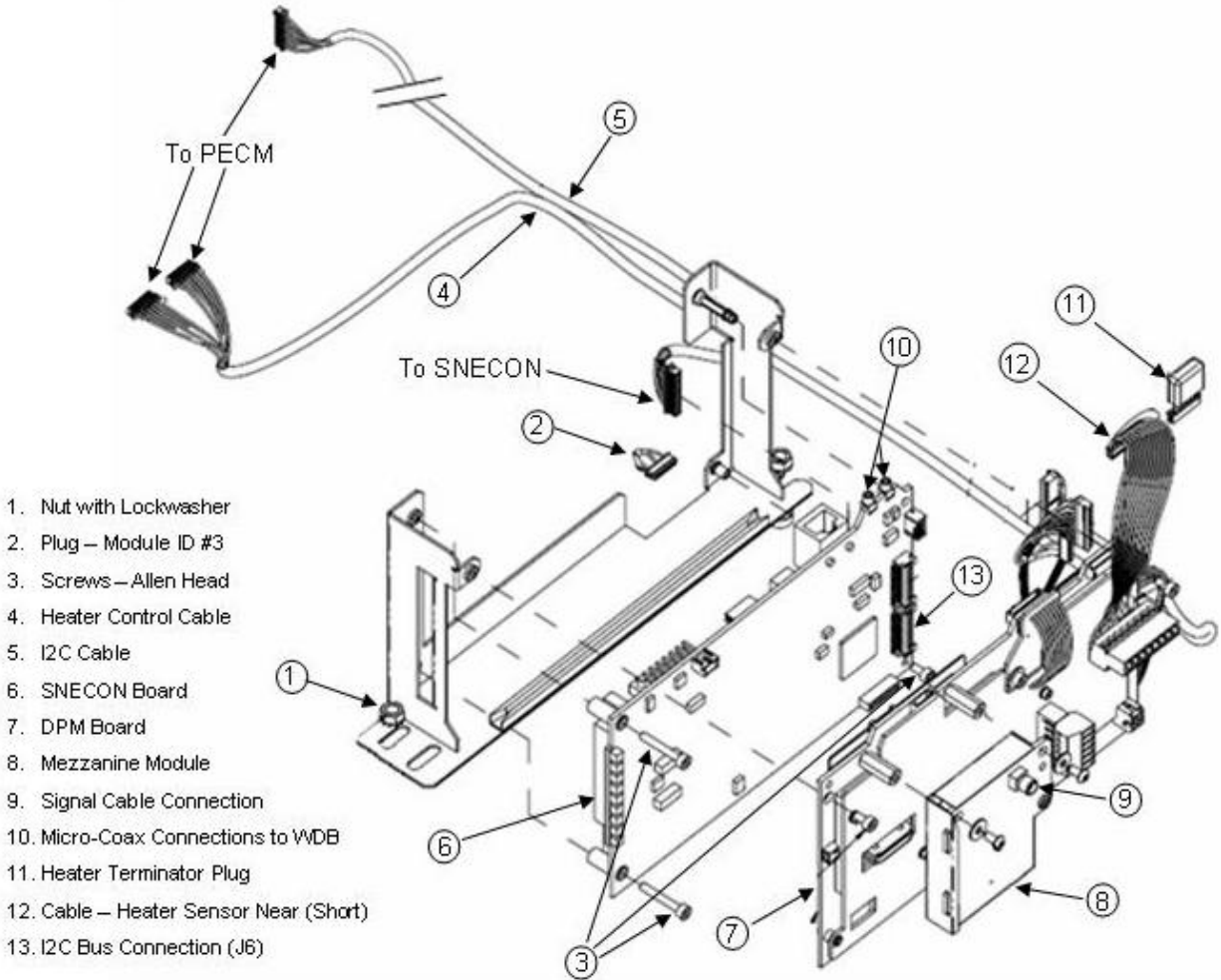
Figure 4-10: SNE (New Configuration)

Power Entry Control Module (PECM) – Original Version

Description
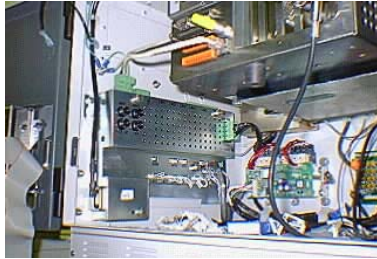
This section references procedures for the original version of the Power Entry Control Module (PECM). This part is no longer available for order from Siemens. When replacing the original version of the PECM it should be upgraded to the newest version, called PECM-2. The PECM-2 is detailed in the next section and is also covered in detail in the PECM Installation Manual (Siemens part number 2000687-001). The PECM is mounted on the left interior sidewall of the electronic enclosure.

WARNINGS

⚠

Voltage dangerous to life exists. Before performing the removal and installation procedures, it is important that primary AC power to the Maxum II be turned off from the main circuit breaker. Observe all plant safety requirements before performing any repair or maintenance on the Maxum II.

When installing the replacement PECM, it is important that the line filter AC power cable green ground wire be reconnected to the enclosure ground stud. This stud is located directly above and to the left of the PECM. For safety reasons, the wire <u>must never</u> be connected to any other enclosure ground point.

Upgrade to PECM-2

The original PECM module is no longer available for order. Upgrade to PECM-2 is required when replacing the PECM. This requires some additional cabling. The procedures for upgrading from PECM to PECM-2 are contained in the Maxum II Extended Service Manual.

To determine the version of PECM installed in an analyzer, refer to the picture at the top of this page, the figures on the following page, and the figures in the following section which refers to the new version of the Power Entry Control Module (PECM-2).

Power Entry Control Module (PECM) - Original Version, Continued
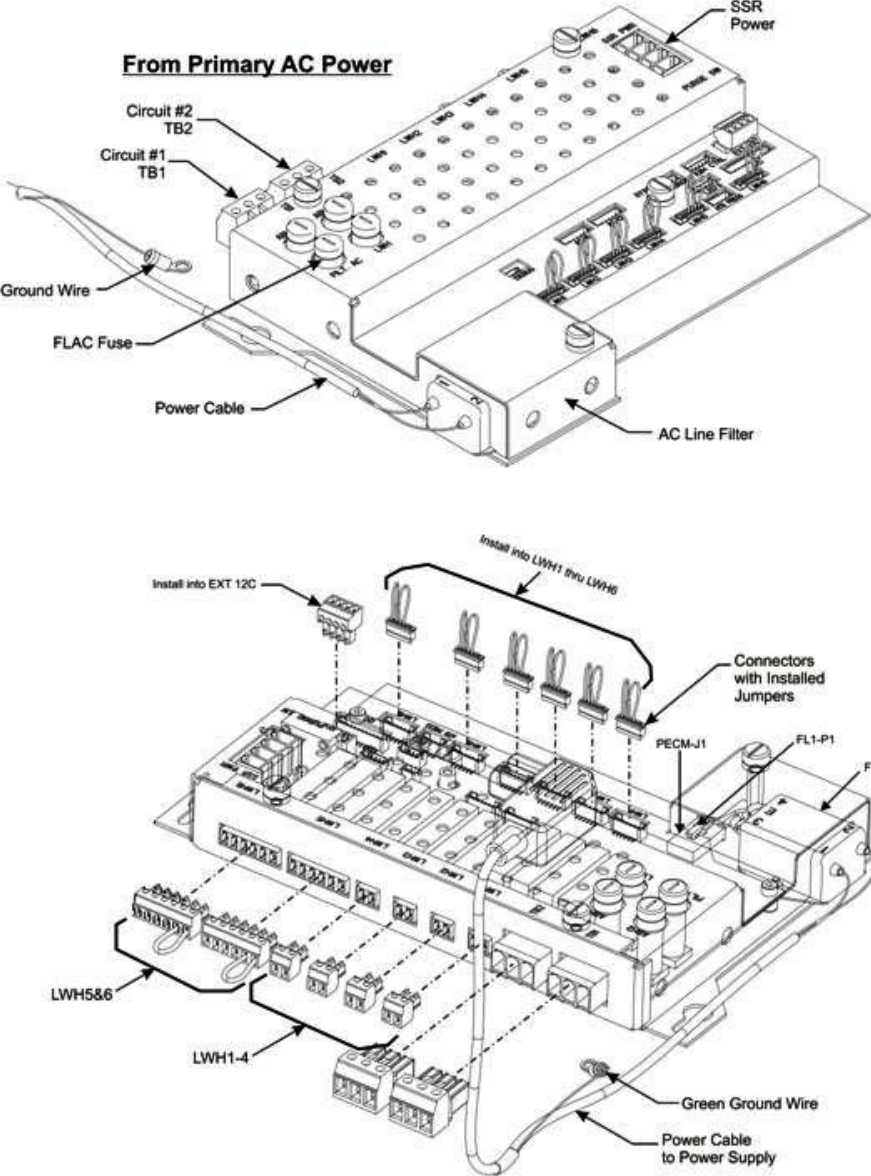
Figure 4-11: PECM Configuration

Power Entry Control Module (PECM-2) - New Version

Description
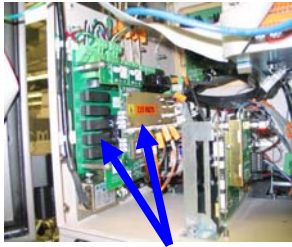
New two-part PECM

This section presents the procedures for removal or installation of the newest version of the Power Entry Control Module (PECM-2). The PECM-2 is also covered in detail in the PECM Installation Manual (Siemens part number 2000687-001).

When replacing the original version of the PECM it should be upgraded to the PECM-2. This will require additional cabling. If upgrading from original PECM to PECM-2, refer to the procedure in the Maxum II Extended Service Manual (Siemens part number A5E02220441001).

WARNING

⚠

Voltage dangerous to life exists. Before performing the removal and installation procedures, it is important that primary AC power to the Maxum II be turned off from the main circuit breaker. Observe all plant safety requirements before performing any repair or maintenance on the Maxum II.

WARNING

⚠

The cable harness connectors and the chassis plugs associated with the Heater circuits are marked with orange identifier tags. Before reconnecting any connector or plug to a Heater circuit, ensure that the orange identifier tag on the connector or plug reads identical to the orange identifier tag on its mating connector.

The PECM-2 assembly is mounted to the left wall of the Electronic Enclosure. The PECM-2 assembly consists of a base board with attached temperature controller board. The temperature control board mounts directly on the base board. This section covers replacement of both the base board and the temperature control board.

Power Entry Control Module (PECM-2), Continued

PECM-2 Removal and Installaton

The following procedure should be used for replacement of the PECM-2 in the Maxum II. If upgrading from original PECM to PECM-2, refer to the Maxum II Extended Service Manual (part number A5E02220441001).

Step	Procedure
1.	Turn off power to the Maxum II at the main circuit breaker.
2.	Open electronic enclosure door (using a 4mm (5/32") Allen wrench if necessary). When door is open **DO NOT** place tension on the Maintenance Panel interface ribbon cable.
3.	Remove power connections from PECM-2. Secure and lable these connections for reattachment later.
4.	Remove cables connected to PECM-2. Label each cable when it is removed.
5.	Unplug the atmospheric reference tube from the purge switch. (connection SW1, tubing connection on the bottom board of the PECM-2, middle right side, back). Refer to Figure 4-12.
6.	Use a 5mm nut driver or socket to loosen the two hex nuts at the top of each side of the base plate of the PECM-2. Do not remove the nuts completely.
7.	Slide the PECM-2 up and then lift it off of the mounting bolts.
8.	On the replacement PECM-2 perform the following: Verify that the Purge Disable jumper JP2 is set correctly. Ensure the TL/OT boards are moved to the replacement PECM-2 (J15 & J16) to maintain the same T-rating of the GC. Install the appropriate fuses for either 115VAC or 230VAC in Fuse locations F1 and F2 and install covers. Refer to the table on the following page for fuse assignments). Be sure to replace the fuse cover over the fuses once the fuses are installed. Move jumper cables or termination plugs to the replacement PECM-2.

Power Entry Control Module (PECM-2), Continued

Step	Procedure
9.	Making sure there are no wires behind the mounting position of the PECM-2, install the replacement PECM-2 on the mounting bolts.
10.	Reattach the atmospheric reference tube from the purge switch. (SW1, tubing connection on the bottom board on the PECM-2, middle right side, back).
11.	Starting at the back of the PECM-2, plug in all cables. Make sure that plug in locations and labels match. Refer to Figure 4-12.
12.	Reattach power connections and apply power to the analyzer.

Fuse	Function	Fuses for 115VAC	Fuses for 230VAC
F1	AC Power Circuit 1	16A (1901693-001)	10A (1901694-001)
F5	Heater Channel 6	6.3A (1901695-001)	6.3A (1901695-001)
F2	AC Power Circuit 2	16A (1901693-001)	10A (1901694-001)
F4	LWH 1-5 (low wattage heaters)	10A (1901694-001)	10A (1901694-001)
F3	Power Supply (24V out)	3.15A (1302004-033)	3.15A (1302004-033)

Table 4-2: PECM-2 Fuse Assignments

Power Entry Control Module (PECM-2), Continued
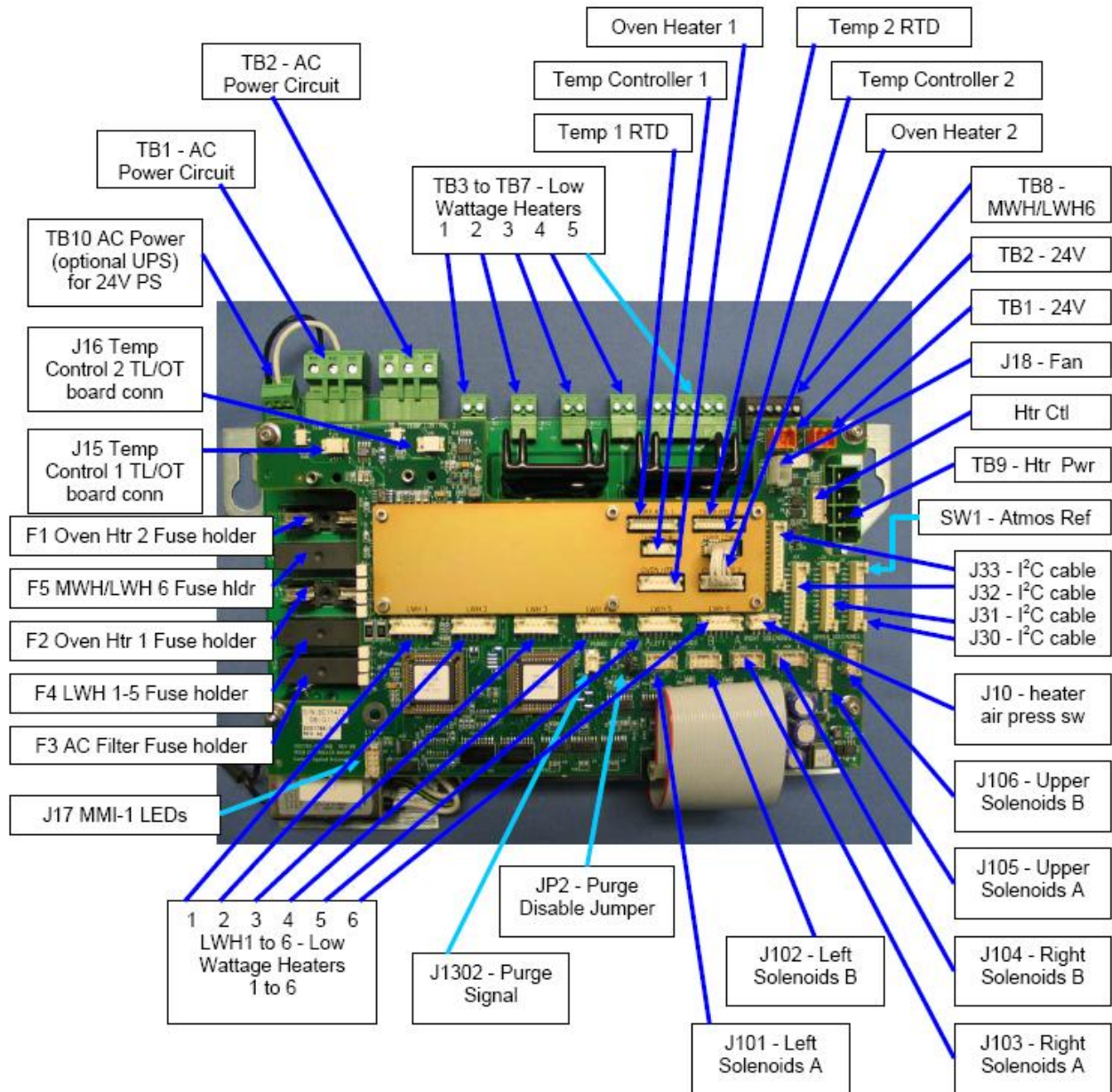
Figure 4-12: PECM-2 Assembly Layout

Power Supply

Description
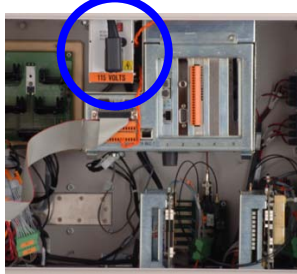
This section presents the procedures for removal or installation of the Power Supply. The Power Supply is mounted to the top of the electronic enclosure. Location is to the left side of the SYSCON Assembly.

WARNING

⚠

Voltage dangerous to life exists. Before performing the removal and installation procedures, it is important that primary AC power to the Maxum II be turned off from the main circuit breaker. Observe all plant safety requirements before performing any repair or maintenance on the Maxum II.

Procedure

The following procedures should be followed for removal and installation of power supply. Refer to Figure 4-13.

CAUTION

⚠

Before loosening, but not removing, the four mounting screws that secure power supply to inside top of enclosure, firmly grasp the power supply so it does not fall onto components mounted in bottom of enclosure.

Power Supply Removal and Installaton

Step	Procedure
1.	Open electronic enclosure door (using a 4mm (5/32") Allen wrench if necessary). When door is open **DO NOT** place tension on the Maintenance Panel interface ribbon cable.
2.	Remove the power entry control module power cable connector from front of power supply.

Power Supply, Continued

Power Connections to Syscon

115/230 VAC Selector Switch

24 VDC Connected to WDB/PECM

PECM Power Connector

GND Wire Connected to Chassis GND

Enclosure Slotted Mtg. Screw Locations (2)
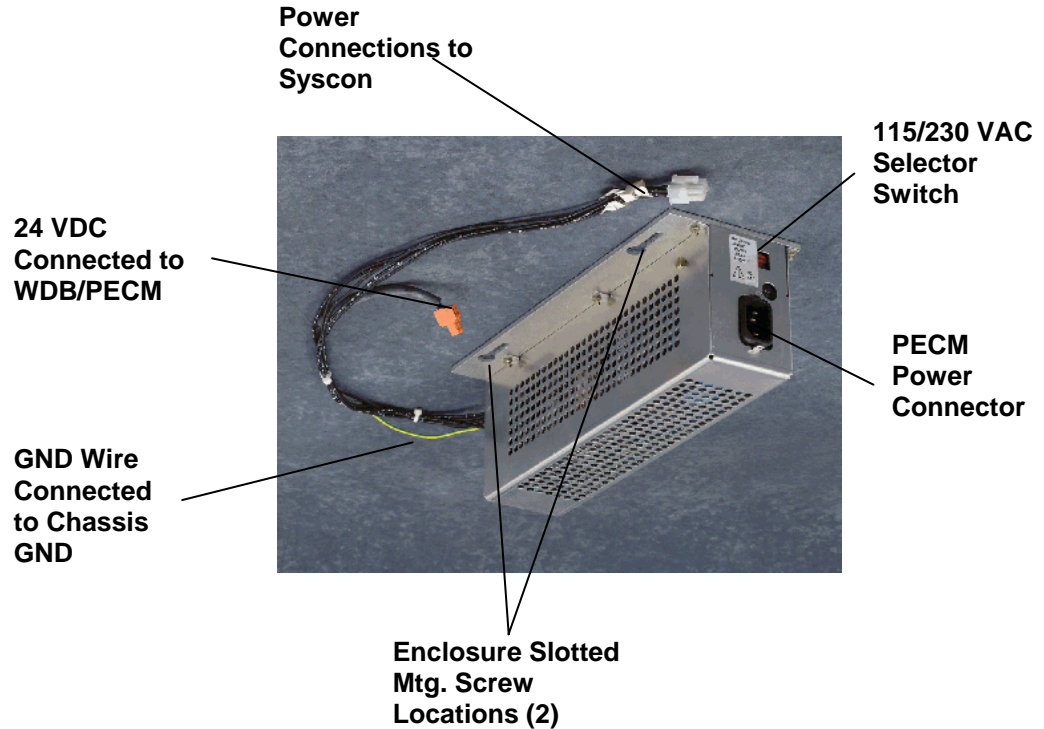
Figure 4-13: Power Supply Mounting Configuration

Step	Procedure
3.	Disconnect and label any cables that run power supply to other devices.
4.	Unplug the power supply chassis ground wire from its spade plug on the analyzer chassis. This plug is located on the back wall of the analyzer behind the power supply.
5.	Loosen but **do not** remove the two #5 mounting nuts from left side of power supply.
6.	Firmly grasp the power supply, slide it forward until it touches the front frame of electronic enclosure upper frame. This should clear mounting bolts and release the right side of supply from SYSCON mounting bracket.

Power Supply, Continued

Step	Procedure
7.	Rotate the lower left side downward to clear mounting hardware then remove the power supply by lifting it out to the left.
8.	To reinstall the power supply, perform steps 1 to 7 in reverse order.
9.	After installation of power supply, reconnect all power cables to the WDB and SYSCON. Connect green ground wire to electronic enclosure chassis.

CAUTION

⚠

Before applying primary AC power to the power supply after installation, be certain the power supply red 115/230 VAC selector switch is set to the input primary AC power source voltage.

10.	Before closing electronic enclosure door and reapplying AC power, be certain all interface cables are correctly connected from the power supply to other modules within the analyzer.

Solenoid Valve Control Module (SVCM)

Description

This section presents the procedures for removal or installation of the Solenoid Valve Control Module (SVCM). The SVCM is mounted on the back wall of the electronic enclosure; depending upon your installation you can have up to three modules. There are two configurations of SVCM. The old version, which is still supported as a spare part, is equipped with a valve driver circuit board. For the newer version of the SVCM, this valve drive circuitry has been moved to the PECM module. Also, the old version uses a Parker brand solenoid, and the new version uses an SMC brand solenoid.

IMPORTANT

If the old configuration is in use, it is necessary that the valve driver circuit board be removed in order to remove the bank of eight latching solenoids. This allows access to the module mounting hardware. The screws securing the module to the rear of the electronic enclosure wall are captive and cannot be fully removed. The screws are removed with the SVCM assembly.

WARNING

⚠️

Voltage dangerous to life exists. Before performing the removal and installation procedures, it is important that primary AC power to the Maxum II be turned off from the main circuit breaker. Observe all plant safety requirements before performing any repair or maintenance on the Maxum II.

CAUTION

⚠️

There are 15 Viton O-rings installed in each latching solenoid bank. After removal of a solenoid bank, the assembly should be inspected to be certain all O-rings have remained installed. These O-rings *must be* in place when the bank assembly is reinstalled. For their location, refer to Figure 4-17.

Old SVCM   **New SVCM**

Figure 4-14: Old and New SVCM Assemblies

Solenoid Valve Control Module (SVCM), Continued

Procedures

Procedures are presented for removal of the circuit board and then the latching solenoids. Refer to Figures 4-14 through 4-17.

IMPORTANT

Depending on the configuration of the Maxum II, it may be necessary to remove an SNE assembly in order to properly access the SVCM assembly for removal. Refer to the SNE maintenance section of this manual for instructions on removing an SNE assembly.

Removal SVCM Electronics Controller (Old SVCM Only)

Step	Procedure
1.	Open electronic enclosure door (using a 4mm (5/32") Allen wrench if necessary). When door is open **DO NOT** place tension on the Maintenance Panel interface ribbon cable.
2.	Disconnect both solenoid cables J10 and J11 connected to circuit board. Also disconnect J1, J2 and J3. Refer to Figure 4-15.
3.	Remove three 5mm Allen mounting screws securing SVCM to relay bank mounting standoffs. These are not captive screws and **MUST BE** completely removed.
4.	Remove circuit board from mounting standoffs. To remove, grasp board by its sides to prevent static discharge which could damage components.
5.	To reinstall a new circuit board, perform steps 1 to 4 in reverse order. To prevent damage to SVCM, **DO NOT** over tighten mounting screws (screws should be tightened firmly but not torqued down).

Solenoid Valve Control Module (SVCM), Continued

CAUTION

⚠

SVCM Solenoid Assembly Removal and Installation

In the following procedure, when removing the older configuration SVCM assembly, **DO NOT** remove connectors from individual relays. The connectors should remain connected to each relay.

Step	Procedure
1.	Remove the tubing from each right angled elbow fitting. These fittings are located on the left and right side of SSR mounting assembly. Refer to Figures 4-16 and 4-17. (Old SVCM) To remove hose from fitting, pushup on fitting collar then pull tubing from fitting. After tubing is removed, collar will return to its original position. (New SVCM) To remove hose from fitting, pull tubing from fitting while pushing in on orange fitting collar. Note: For ease in removing tubing from collar, the right angled fittings can be rotated for easier access to collar.
2.	**(Old SVCM) DO NOT** remove cables from installed relays. **(New SVCM)** Verify the labeling on the individual cables from the relays. Then, remove the cables from the relays. Do not disconnect the cables at the PECM end.
3.	Remove the six 5mm allen head assembly mounting screws. These are captive screws that stay with the assembly. Do NOT remove the six nuts next to the SVCM assembly. These connect the SVCM tubing manifold to the back of the Electronics Assembly
4.	Slowly pull the solenoid assembly from its mounting assembly. The mounting standoffs will be removed with the assembly.

Solenoid Valve Control Module (SVCM), Continued

Step	Procedure
5.	After the assembly has been removed, examine its electronic enclosure mounting surface to be certain all 15 O-rings are still installed. Check O-rings to be certain they are not damaged or cut. Any defective O-ring **MUST BE** replaced. **"O" RING PART REPLACEMENT:** QTY 12: #039006-1/8" QTY 3: #039008-3/16"
6.	Install right angled fittings on both the left and right sides of the replacement assembly.

CAUTION

⚠

Before installation of a SVCM, check enclosure mounting surface to be certain all 15 O-rings are installed. If any O-ring is lost or damaged, replace it with a new one. _Never install_ assembly with a defective O-ring. Any contaminants not removed from mating surfaces will allow pressure losses resulting in inaccurate analytical analysis results.

7.	To reinstall a new SVCM relay assembly, perform steps 1 to 7 in reverse order.

IMPORTANT

To reinstall tubing on right angled fittings, simply push tubing into collar as far as it will go. Collar will automatically move with tubing. When installed, pull on tubing to be certain it is securely fastened in fitting.

8.	**(Old SVCM Only)** After reinstalling assembly, reinstall the circuit board by performing the removal procedures 1 to 5 in reverse order.
9.	Before reapplying AC power, be certain the SVCM assembly is securely fastened to its electronic enclosure mounting surface, hoses are tightly fastened to right angled fittings and assembly wiring harness connectors are connected to correct SVCM connectors.

Solenoid Valve Control Module (SVCM), Continued
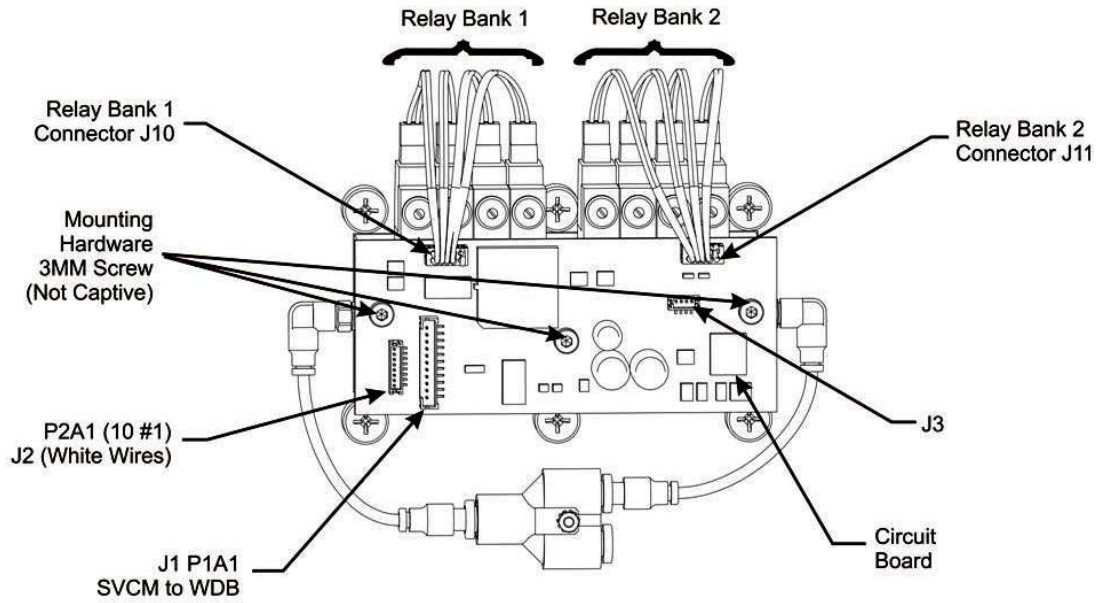
Figure 4-15: Old SVCM Installation and Removal Diagram

Solenoid Valve Control Module (SVCM), Continued

Plastic Tubing

Elbow Fitting
and Collar

Assembly Mounting
Screws — Captive (6)

To PECM
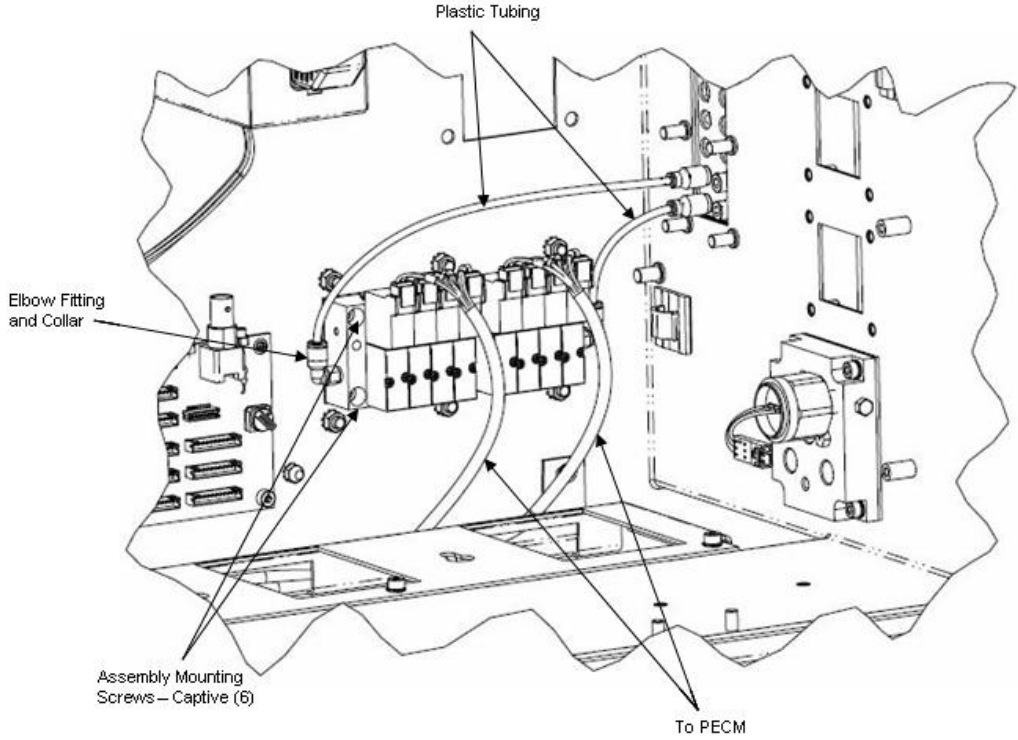
Figure 4-16: New SVCM Installed

Solenoid Valve Control Module (SVCM), Continued
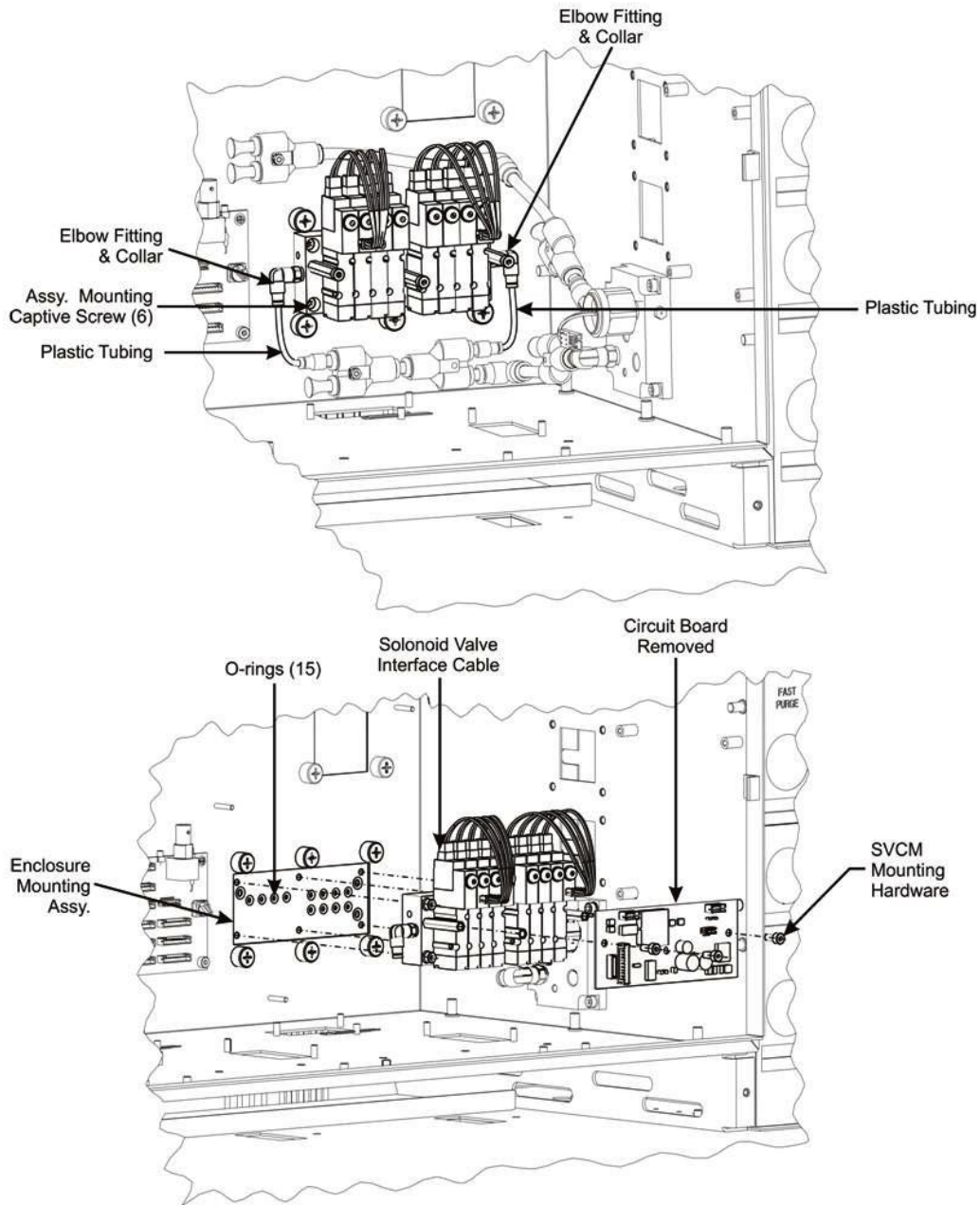
Figure 4-17: Old SVCM Assembly Removal and Installation

Solid State Relay Module

Description

This section presents the procedures for removal or installation of the solid state relay module. The module is mounted behind a protective cover plate located on the left side of enclosure back wall.

WARNING

⚠

Voltage dangerous to life exists. Before performing the removal and installation procedures, it is important that primary AC power to the Maxum II be turned off from the main circuit breaker. Observe all plant safety requirements before performing any repair or maintenance on the Maxum II.

CAUTION

⚠

To ensure correct replacement of all removed wires, label each wire as to which relay connector it is connected. For example connector SSR-2 is connected to relay SSR2 terminal 2. Also note the relay connection points for the jumper wires.

Installation Note

Two different configurations of Solid State Relay Module are available, the SSR and the Medium Wattage SSR. Procedures for both configurations are given in this section. It is not possible to replace a single relay on the Medium Wattage SSR

Solid State Relay Module, Continued

Procedures

The following procedures should be followed for removal and or installation of solid-state relay module. Also included are procedures to replace a single relay on the SSR module or to replace the Medium Wattage SSR assembly. Refer to Figure 4-18.

Solid State Relay Module Removal and Installation (Not the Medium Wattage SSR)

Step	Procedure
1.	Open electronic enclosure door (using a 4mm (5/32") Allen wrench if necessary). When door is open **DO NOT** place tension on the Maintenance Panel interface ribbon cable.
2.	Disconnect PECM to SSR Power connector. This allows for easier removal of the module.

IMPORTANT

For ease in removing relay cover, extend right side of cover outward, lift up on PECM power cable, and then extract cover.

3.	Remove the two cover plate spring loaded retaining captive screws, and then remove cover. The cover plate is mounted on standoffs and retaining screws are removed when cover is removed.
4.	Remove the plastic shield (if installed) that covers the relays on the SSR module.
5.	Before removal of each cable harness connector from its relay termination, label the harness connector with its relay connection point. For example, connector SSR-2 is connected to relay SSR2 terminal 2.
6.	Loosen cable harness clamp and remove clamp from around harness.
7.	Remove all the cable harness connectors connected to the SSR module. **DO NOT** disconnect the other internal connectors on the SSR module.

Solid State Relay Module, Continued
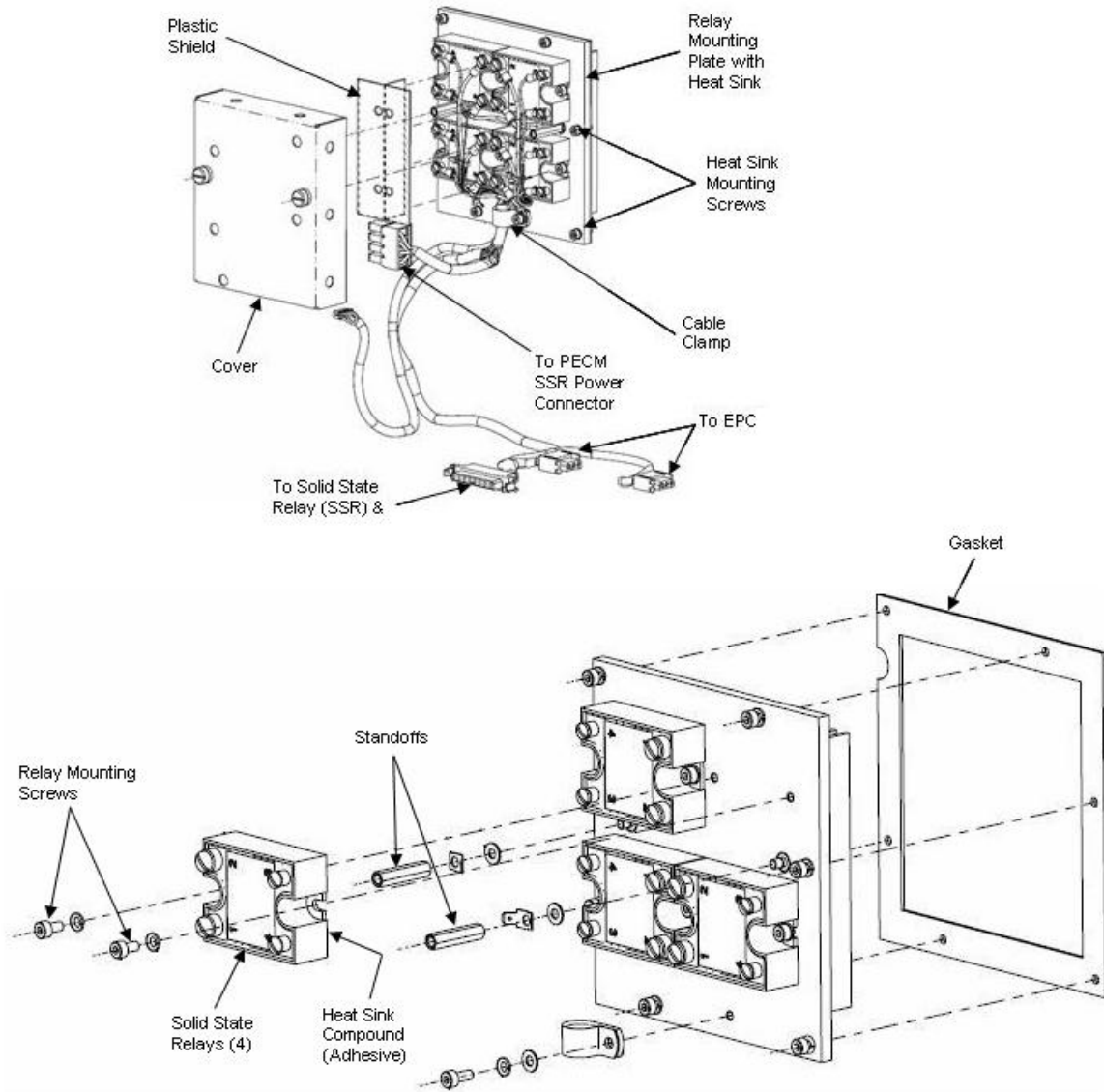
Figure 4-18: Solid State Relay Module

Solid State Relay Module, Continued

IMPORTANT   Although each cable is identified, it is recommended that you identify each cable as to its relay termination point.

Step	Procedure
8.	Remove the two ground connection lugs from each cover standoff. Depending on configuration standoffs may not need to be removed. If the lugs are a "spade" type then the standoffs will only need to be loosened. If the lugs have a closed hole, then the standoffs must be removed. To loosen or remove standoffs, use a 5mm nut driver.
9.	Using a 5mm Allen wrench, remove the six mounting screws securing relays to electronic enclosure back wall standoffs. Remove the solid-state relay module. Relays are mounted to heat sink assembly.

IMPORTANT   When the solid-state relay module is removed, the rear mounted heat sink is also removed as part of the relay mounting assembly.

10.	Remove solid-state relay module assembly.
11.	To reinstall the solid-state relay module, repeat steps 1 to 10 in reverse order.

IMPORTANT   When reinstalling relay cover, lift up on PECM power cable and insert left side of cover at an angle. Before securely tightening fastening screws, be certain wiring harness is installed within cover cutout opening. **DO NOT** pinch wiring harness.

12.	Before closing electronic enclosure door and reapplying AC power, be certain all cable harness connectors are connected to their correct relay terminations.

Solid State Relay Module, Continued

Removal and Installation of a Single Relay

Step	Procedure
1.	Open electronic enclosure door (using a 4mm (5/32") Allen wrench if necessary). When door is open **DO NOT** place tension on the Maintenance Panel interface ribbon cable.
2.	Disconnect PECM to SSR Power connector. This allows for easier removal of the module.
3.	Remove the two cover plate spring loaded retaining captive screws, and then remove the cover. The cover plate is mounted on standoffs and retaining screws are removed when cover is removed.
4.	Remove the plastic plate (if installed) that covers the relays on the SSR module.
5.	Before removal of each cable harness connector from its relay termination, label the harness connector with its relay connection point. Remove each connector from the relay that is to be replaced as well as any other connectors for wires that would prevent the removal of the relay.
6.	Remove the screws that secure the relay to the module. Since the heat sink compound on the back of the relay acts as an adhesive, the relay will remain secured to the module.
7.	Break the relay free from the adhesive by pulling firmly, and then remove the relay from the enclosure.
8.	Install the new relay by applying the heat sink compound and repeating steps 1 to 7 in reverse order.
9.	Before closing electronic enclosure door and reapplying AC power, be certain all cable harness connectors are connected to their correct relay terminations.

Solid State Relay Module, Continued

Note

Refer to Figure 4-19 on the next page when executing the following procedure.

.

Medium Wattage Solid State Relay Module Removal and Installation

Step	Procedure
1.	Open electronic enclosure door (using a 4mm (5/32") Allen wrench if necessary). When door is open **DO NOT** place tension on the Maintenance Panel interface ribbon cable.
2.	Unplug the power cable and the control cable from the Medium Wattage Solid State Relay Module. Unplug the cables only at the SSR end. Leave them plugged in at their opposite ends.
3.	Remove the Medium Wattage SSR by unscrewing the Allen head screws that secure it to the enclosure. Note: There is a gasket located between the SSR and the enclosure back wall. Set this gasket aside for use in reinstalling the new SSR.
4.	Install the new Medium Wattage SSR by executing steps 1 to 3 in reverse order.

Solid State Relay Module, Continued
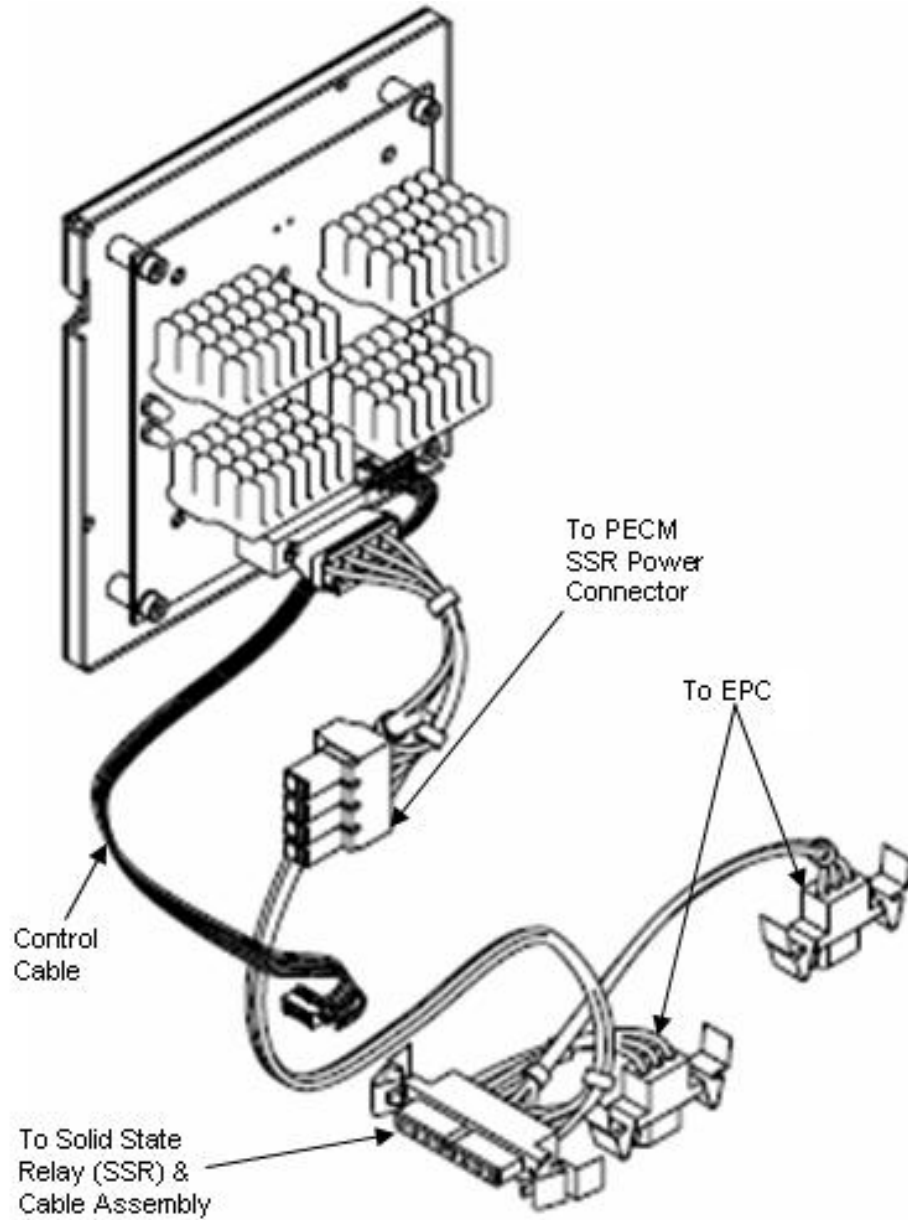
Figure 4-19: Medium Wattage Solid State Relay Module

Electronic Pressure Control Module

Description
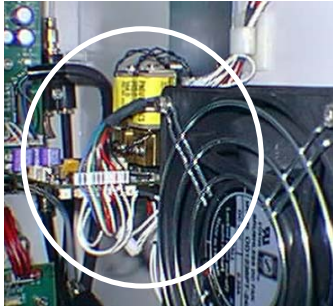
This section presents the procedures for removal or installation of Electronic Pressure Control Module (EPCM). The Module is located on the upper right side wall of the electronic enclosure directly behind the Air Circulating Fan.

WARNING

⚠️

Voltage dangerous to life exists. Before performing the removal and installation procedures, it is important that primary AC power to the Maxum II be turned off from the main circuit breaker. **Observe all plant safety requirements before performing any repair or maintenance on the Maxum II.**

CAUTION

⚠️

There are 6 Viton O-rings installed in the EPCM mounted manifold assembly. After removal of the module, the manifold assembly should be inspected to be certain all O-rings have remained installed. These O-rings *must be* in place when the module is reinstalled. For their location, refer to Figure 4-20.

Procedures

The following procedures should be followed for removal and installation of the EPCM. Refer to Figure 4-20.

Step	Procedure
1.	Open electronic enclosure door (using a 4mm (5/32") Allen wrench if necessary). When door is open **DO NOT** place tension on the Maintenance Panel interface ribbon cable.
2.	Disconnect any external interface connectors to EPCM. It is recommended that all cables be identified with their EPCM connector location.

Electronic Pressure Control Module, Continued

IMPORTANT The EPCM is made up of a manifold that is mounted to the electronic enclosure wall on standoffs and the module itself. To remove the EPCM, it is not necessary to remove the manifold.

CAUTION

⚠️

The ferrules connected on the gas supply side of the EPCM manifold are composed of vespel-graphite.   To prevent damage, these ferrules must NOT be over-tightened. Proper tightness is typically ½ turn past finger-tight.

Step	Procedure
3.	Remove the three 4mm Allen screws from the manifold then remove module from manifold assembly. These are captive screws and will be completely removed with module. Note: There is an Allen screw located between the solenoids on the assembly. Exercise caution when inserting an Allen wrench to remove this screw.
4.	After module has been removed, examine the manifold surface to be certain all 6 O-rings are still installed. Check O-rings to be certain they are not damaged or cut. Any defective O-rings **MUST BE** replaced. **O-ring PART REPLACEMENT:** QTY 6: #039006-1/8"

CAUTION

⚠️

Before installation of EPCM assembly, check enclosure mounting surface to be certain all 6 O-rings are installed. If any O-ring is lost or damaged, replace it with a new one. _Never install_ EPCM assembly with a defective O-ring. Any contaminants not removed from mating surfaces will allow pressure losses resulting in inaccurate analytical analysis results.

5.	If the new EPCM is not equipped with a module ID jumper, move the jumper that is connected to location J2 from the old module to the new module.
6.	To reinstall the new EPCM, perform steps 1 to 3 in reverse order.

Electronic Pressure Control Module, Continued

Step	Procedure
7.	Before applying AC power, be certain EPCM assembly is securely fastened to manifold assembly and interface cable connectors are correctly connected.

IMPORTANT   After replacing the EPCM assembly it is necessary to inspect the system for leaks.

Electronic Pressure Control Module, Continued
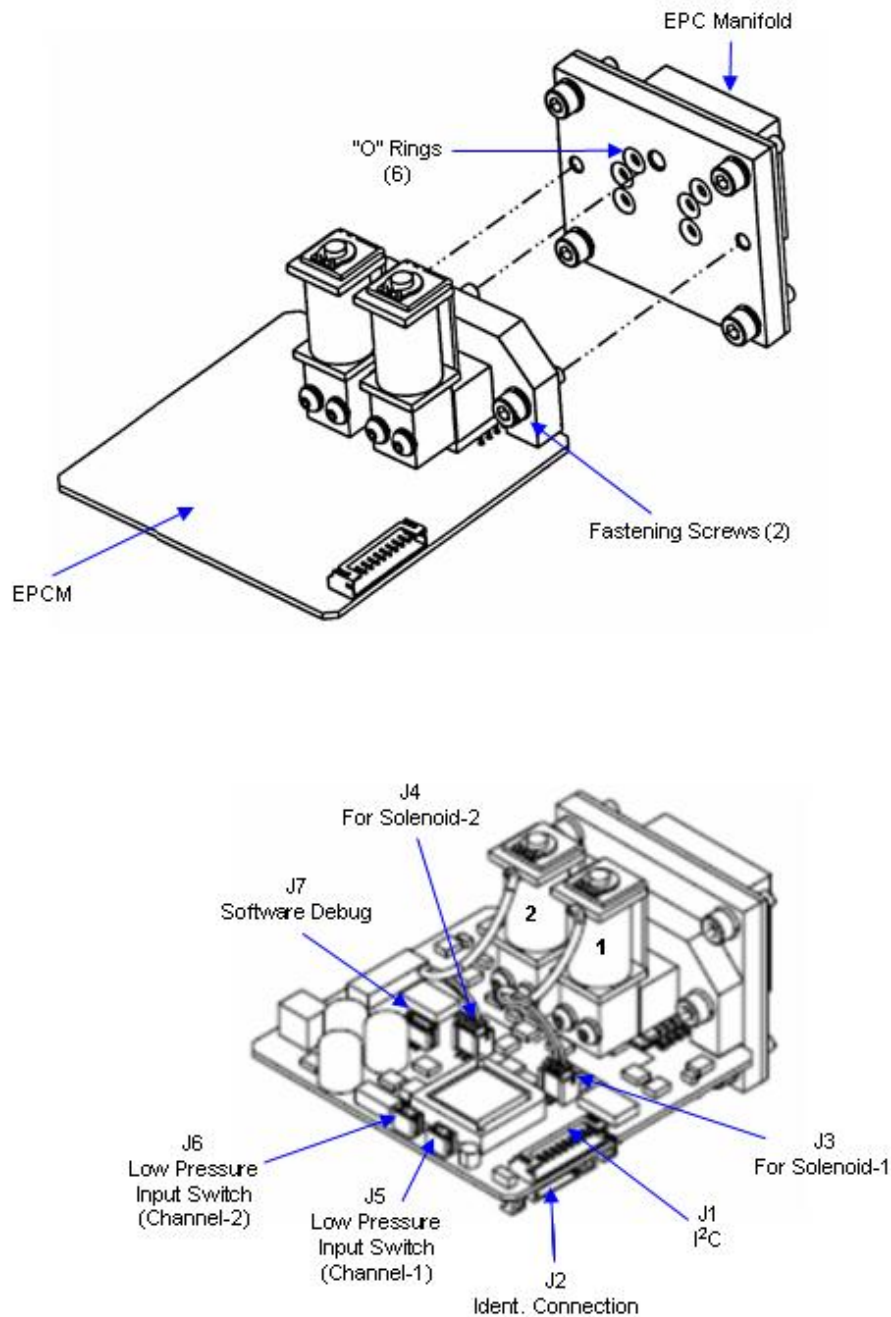
Figure 4-20: EPCM Connector Locations and Removal Diagram

Purge Control Module (PCM)

Description
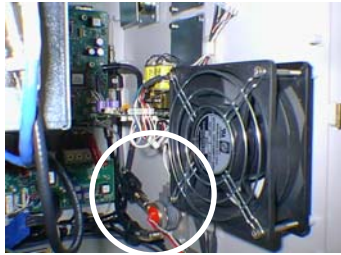
This section presents the procedures for removal or installation of the Purge Control Module (PCM). The PCM is located on lower right side wall of the electronic enclosure.

WARNING

⚠

Voltage dangerous to life exists. Before performing the removal and installation procedures, it is important that primary AC power to the Maxum II be turned off from the main circuit breaker. Observe all plant safety requirements before performing any repair or maintenance on the Maxum II.

Procedures

The following procedures should be followed for removal and installation of PCM pressure switch. Refer to Figures 4-21 and 4-22.

IMPORTANT

The pressure switch can be removed and replaced without having to remove the PCM module.

PCM Pressure Switch

Step	Procedure
1.	Open electronic enclosure door (using a 4mm (5/32") Allen wrench if necessary). When door is open **DO NOT** place tension on the Maintenance Panel interface ribbon cable.
2.	Note: In order to replace the solenoid pressure switch, it should NOT be necessary to remove the PCM assembly from the enclosure. Unplug the connector to the faulty solenoid pressure switch. Grasp connector from bottom section and pull straight out from mating section.

IMPORTANT

Before removal of pressure switch connecting wires, note pressure switch pin location that wires are connected to. It is recommended that each wire be labeled with its pin connector. Wires **MUST NOT** be interchanged.

Purge Control Module (PCM), Continued

Step	Procedure
3.	Using the appropriate size wrench, unscrew the faulty pressure switch from the PCM pressure switch control mounting assembly.

Swivel Elbow with collar (2)

.021-inch Orifice

Solenoid Pressure Switch

Solenoid Pressure Switch Connector
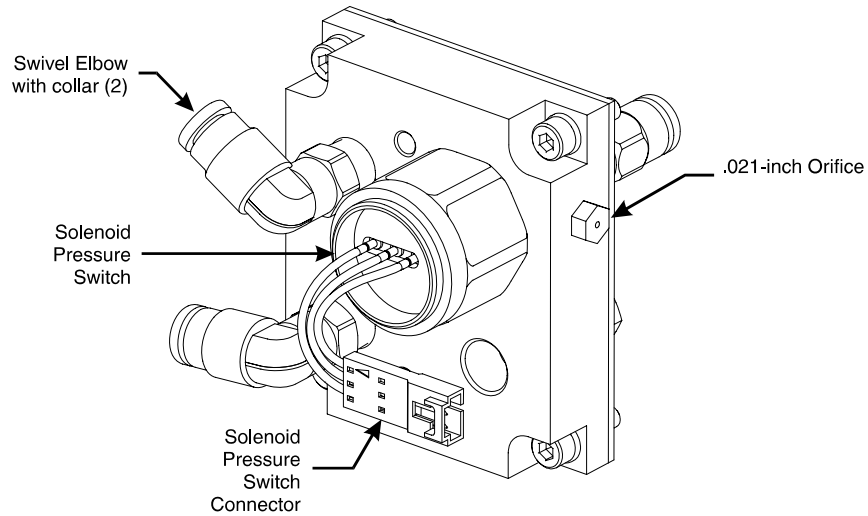
Figure 4-21: Purge Control Pressure Switch and Orifice Locations

4.	To reinstall PCM pressure switch, repeat steps 1 to 3 in reverse order. CAUTION ⚠ DO NOT over tighten pressure switch during installation. **Proper tightness should be approximately 1/4 turn past finger tight.**
5.	Before applying AC power, be certain the PCM pressure switch is securely installed.

Purge Control Module (PCM), Continued

.021-inch Orifice

The Orifice is located on the upper right side of the the PCM pressure switch control mounting assembly. The following procedures should be followed for removal and installation of PCM pressure switch .021-inch Orifice. The Orifice should be replaced if it becomes blocked-off or fails to perform its system function. Refer to Figure 4-21.

Step	Procedure
1.	Note: In order to replace the Orifice, it should NOT be necessary to remove the PCM assembly from the enclosure. Unscrew the Orifice assembly then remove from the PCM assembly.
2.	Screw the new orifice assembly into the PCM assembly.
3.	Before reapplying AC power, be certain the Orifice is securely installed. DO NOT over tighten Orifice during installation. **Proper tightness should be approximately 1/4 turn past finger tight.**

PCM Assembly Removal

The following procedures should be followed for removal and installation of PCM Assembly. Refer to Figure 4-22.

Step	Procedure
1.	Disconnect tubing connected to assembly front and rear mounted right angled elbow fittings. To remove tubing from fitting, push up on fitting collar then pull tubing from fitting. After tubing is removed, collar will return to its original position.
2.	Remove wires connecting to the solenoid pressure switch.

IMPORTANT

Note pressure switch pin locations where wires are connected. It is recommended that each wire be labeled with its pin connector. Wires **MUST NOT** be interchanged.

Purge Control Module (PCM), Continued

Step	Procedure
3.	Remove the four PCM assembly 5mm Allen mounting screws.
4.	Remove the PCM assembly from the electronic enclosure. When assembly is removed, the installation gasket should also be removed.
5.	To reinstall PCM assembly, repeat steps 1 to 4 in reverse order. **DO NOT** over tighten pressure switch during installation. **Proper tightness should be approximately 1/4 turn past finger tight.**

IMPORTANT

To reinstall tubing on right angled fittings, simply push tubing into collar as far as it will go. Collar will automatically move with tubing. When installed, pull on tubing to be certain it is securely fastened in fitting.

6.	Before applying AC power, be certain PCM assembly is correctly installed, tubing is tightly installed in right angled fittings and interface wiring is correctly connected to PCM switch pins.
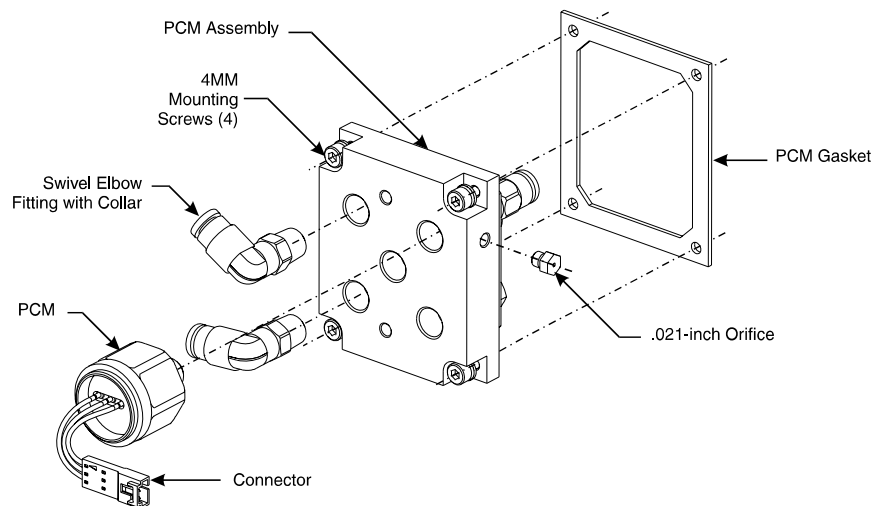
Figure 4-22: PCM Assembly Removal

Wiring Distribution Board

Description
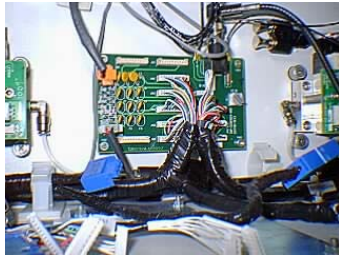
This section presents the procedures for removal or installation of the Wiring Distribution Board. The board is located on lower rear wall of the electronic enclosure.

WARNING

⚠

Voltage dangerous to life exists. Before performing the removal and installation procedures, it is important that primary AC power to the Maxum II be turned off from the main circuit breaker. Observe all plant safety requirements before performing any repair or maintenance on the Maxum II.

CAUTION

⚠

Exercise caution when removing the Wiring Distribution Board. The board is secured in place by two 5mm captive screws located in the upper left and lower right corners with the other two corners secured by push-on fasteners.

Procedures

The following procedures should be followed for removal or installation of Wiring Distribution Board. Refer to Figure 4-23.

Step	Procedure
1.	Open electronic enclosure door (using a 4mm (5/32") Allen wrench if necessary). When door is open **DO NOT** place tension on the Maintenance Panel interface ribbon cable.
2.	Disconnect all interface cables from connectors J100 to J110. Label each connector with its terminating location for reinstallation.
3.	Disconnect air circulating fan connector J5. Label function of connector for reinstallation.
4.	Disconnect power supply voltage connector J1. Label function of connector for reinstallation.
5.	Note: This step is only applicable if connected to a network.

Unplug connection to 10Base2 connector. Unplug connectors from J3 and J4. Label each connector with its termination point. |

Wiring Distribution Board, Continued

Step	Procedure
6.	Remove the upper left and lower right board mounting screws.
7.	To remove the board, place two fingers from each hand on back of lower left and upper right connectors and pull forward. Because the fasteners are a push-on type, the board will pop-off with little exertion.

CAUTION

⚠

Do not extract Wiring Distribution Board from push-on fasteners by grasping board by its sides. This will cause breakage of board or damage components.

8.	To reinstall a new Wiring Distribution Board, perform steps 1 to 7 in reverse order.

Note: The switch setting S1 is not used in Maxum II and should be left at the default setting of 1. |
| 9. | Before reapplying AC power, be certain all interface cables and network cables are connected to their correct Wiring Distribution Board terminations. |

Figure 4-23: WDB Interface Connection Locations
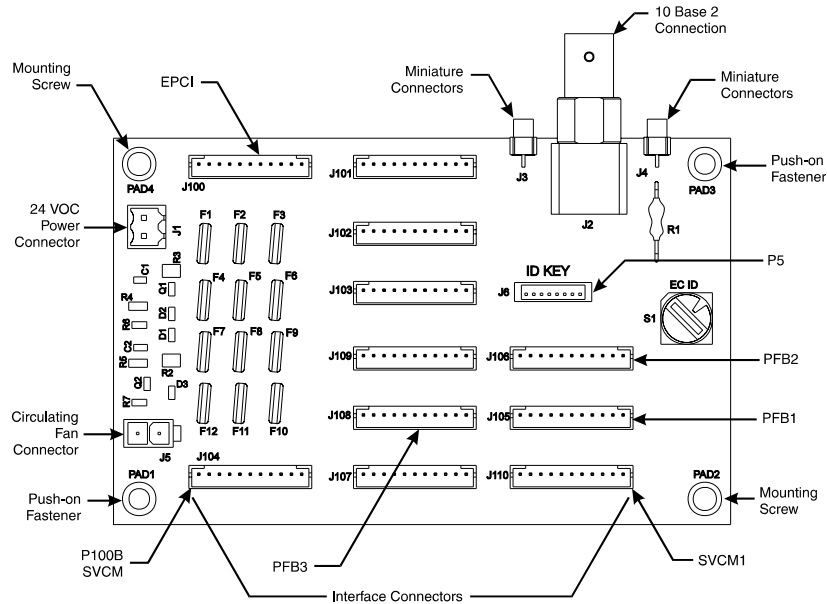
Air Circulating Fan

Description

This section presents the procedures for removal or installation of the Air Circulating Fan located on the lower right front side wall of the electronic enclosure.

WARNING

⚠

Voltage dangerous to life exists. Before performing the removal and installation procedures, it is important that primary AC power to the Maxum II be turned off from the main circuit breaker. Observe all plant safety requirements before performing any repair or maintenance on the Maxum II.

Procedures

The following procedures should be followed for removal and installation of ACF. Refer to Figure 4-24.

Step	Procedure
1.	Open electronic enclosure door (using a 4mm (5/32") Allen wrench if necessary). When door is open **DO NOT** place tension on the Maintenance Panel interface ribbon cable.
2.	Disconnect interface cable from Wiring Distribution Board (WDB) connector J5.
3.	Remove Air Circulating Fan interface cable from wiring harness bundle.
4.	Remove the four 5mm long Allen screws from each corner of Air Circulating Fan.
5.	Remove Air Circulating Fan.
6.	To reinstall a new Air Circulating Fan, perform steps 1 to 5 in reverse order.
7.	Before reapplying AC power, be certain fan power cable is securely connected to WDB connector J5 and power cable is reinstalled in wiring harness bundle.

Air Circulating Fan, Continued
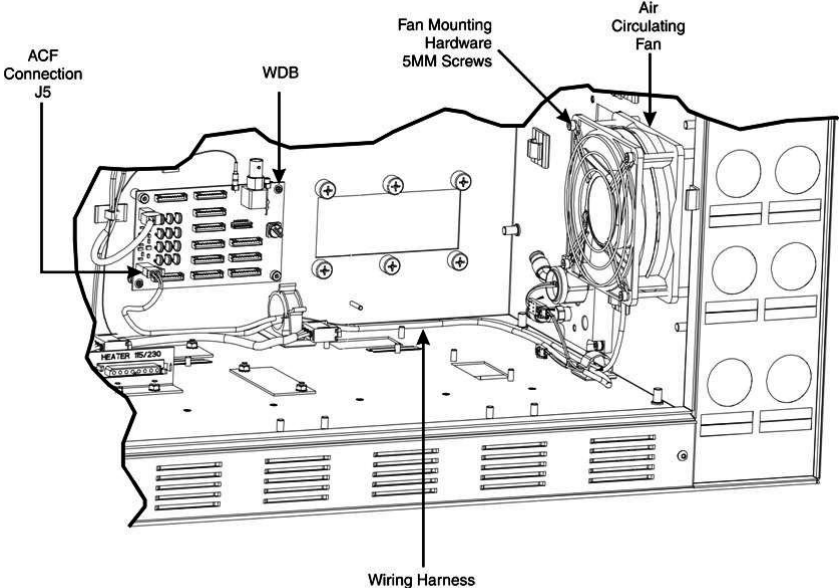
Figure 4-24: Electronic Enclosure Fan Location

Model 50 Valve

Description

This section provides maintenance instructions for the Model 50 Valve. The Model 50 is a pneumatically operated diaphragm valve specifically designed for process gas chromatography. It uses pressure-on-diaphragm activation with no other moving parts. The valve can inject vapor samples and switches columns simultaneously. It is capable of switching gasses up to 75 psig (515 kPa).
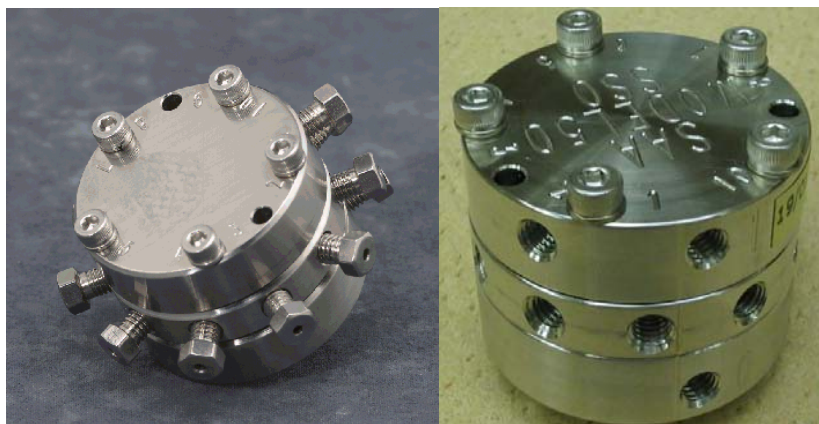
Figure 4-25: Model 50 Valve

Repair Kits & Fixtures

The following equipment is required to repair the Model 50 Valve:

Model 50 Repair Kit: Siemens PN 2020164-001 (includes 10 diaphragms, 10 screws with washers, and 12 Valco fittings).

Valve Assembly Fixture: Siemens PN 2020281-001

Torque screwdriver with Allen head bit: Siemens PN 1631005-003

Preventing Port to Port Leaks

Particulates introduced to the valve either from the sample or from the columns can prevent the diaphragms from sealing against the center plate of the valve. Also, to insure proper sealing of the diaphragms, the actuation pressure should be 25 psig higher than the carrier gas or sample gas pressure.

To help prevent leaks always turn the Sample and Carrier Gas off before the Actuation Gas is turned off. Without Actuation Gas the Model 50 Valve is in an undefined state and the flow path of the carrier or sample cannot be controlled. Leaks in the Actuation Gas lines could result in a lower Actuation Gas pressure which could result in port to port leaks. The symptoms can include small peaks, repeatability problems, contaminated columns and noise on the detector.

Model 50 Valve, Continued

Dimensions are shown as Inches (Millimeters)
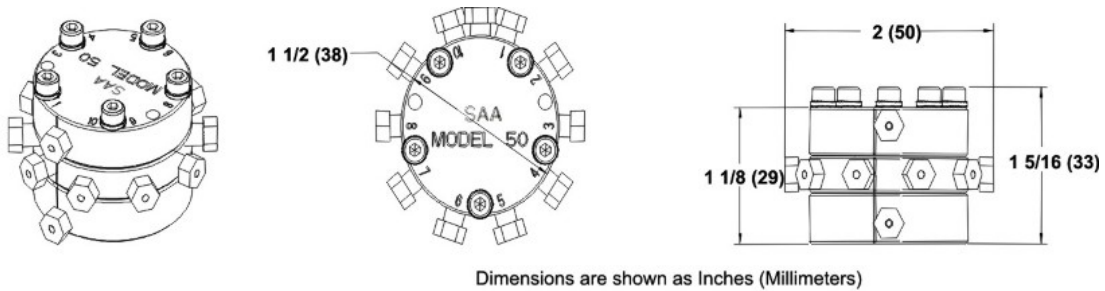
Flow Path in On Position
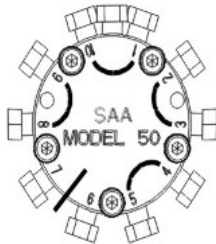
Flow Path in Off Position

Valve Assembly

Screw

Washer

Top Plate

Sample Gas & Carrier Gas Connections (10)

Diaphragm

Center Plate

Ferrule

Nut

Bottom Plate

Actuation Air or Gas Connections (2)
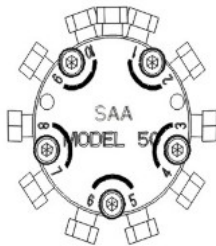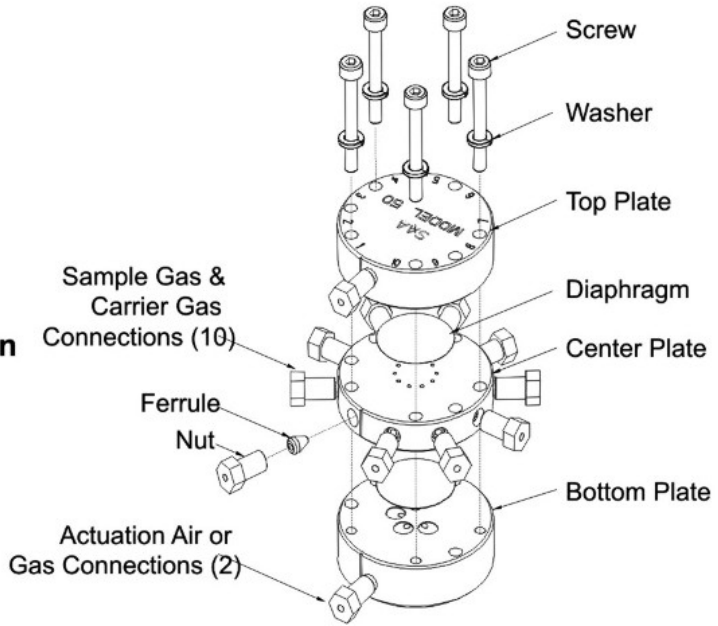
Figure 4-26: Exploded View of Model 50 Valve

Model 50 Valve, Continued

Maintenance Personnel

If customer maintenance personnel are not technically trained to repair the Model 50 Valve on site, it is recommended that the valve be returned to Siemens for repair or direct replacement.

Direct Valve Replacement

If it is determined that the problem is directly related to the Model 50 Valve system performance, the customer must make a determination if the valve can be repaired on site or if it should be returned to Siemens for repair or replacement.

Repair of Valve

To repair the Model 50 Valve on site, the customer must have the necessary maintenance tools and replacement parts. Recommended valve spare parts can be obtained from Siemens.

Maintenance Facility

When cleaning the Model 50 Valve and associated components, it is imperative that the maintenance be performed in a clean and contaminant free facility. Components should be placed on a lint free cloth to prevent impurities from contaminating the valve and its components. Hands should be clean and free of contaminants.

If Model 50 Valve maintenance is to be performed on site, the area must be clean and free of foreign contaminants. Presence of any foreign contamination can cause additional valve problems after reinstallation.

All foreign contamination adhering to valve must be removed using cleaning solvent, such as hexane, acetone, or methanol and a dust/lint free cloth. After cleaning Model 50 Valve components, shake or blow with clean air the excess cleaning fluid from the individual components. Ensure that the components are air dry before reassembling.

CAUTION

⚠

Do not allow Model 50 Valve polished surfaces to rest on any surface other than a lint free cloth. Clean sample flow openings in top plate, center plate, bottom plate and Valco fitting nuts using a syringe filled with cleaning solvent such as hexane, acetone, or methanol.

WARNING

⚠

Voltage dangerous to life exists. Before performing the removal and installation procedures, it is important that primary AC power to the Maxum II be turned off from the main circuit breaker. Only maintenance personnel with proper authorization should open the electronic enclosure.

Model 50 Valve, Continued

Maintenance Procedures

The valve is serviced by disassembling and then thoroughly cleaning the components to remove all particulates. Ultrasonic cleansing with a suitable solvent works very well. **During the cleaning and re-assembly process, care must be taken to avoid scratching or damaging the polished surfaces of the valve.** After cleaning, the valve is reassembled using new Teflon coated stainless steel diaphragms. **DO NOT attempt to reuse old diaphragms.** Notice the alignment marks on the three sections of the valve near the actuation ports. The valve should be reassembled so that these marks line up. If the marks to not line up it is possible that the center plate is upside down. The screws should be tightened evenly to 6-8 inch pounds using the appropriate torque screwdriver with an allen head bit.

Valve Removal and Disassembly
(see Figure 4-26)

Step	Procedure
1.	From primary AC circuit breaker, turn analyzer AC primary power OFF.
2.	Shut off the air to the oven heater.
3.	Open Maxum II's oven door using a 4mm (5/32'") Allen wrench.
4.	To remove Model 50 Valve from the oven, first disconnect all tubing to the valve.

CAUTION
⚠

When disconnecting Valco fastening nuts from Model 50 Valve, exercise caution not to bend or crimp the stainless steel tubing.

NOTE

Before removing Model 50 Valve from oven make note of its orientation within the oven.

5.	Remove the valve from the oven by unscrewing the two M3 x 35 socket head cap screws securing the Model 50 Valve. These mounting screws are located between ports 2 and 3 and ports 8 and 9. Refer to Figure 4-26 for port locations.
6.	Place the valve on a clean dust and lint free cloth within a clean work environment.

CAUTION
⚠

Do not place polished top plate, center plate or bottom plate against any abrasive surface. Place components on a lint free cloth free of foreign contaminants.

Model 50 Valve, Continued

Step	Procedure
7.	Place the valve bottom plate on a lint free cloth. Using a 2.5 mm Allen wrench, remove the five component socket head fastening cap screws. Refer to Figure 4-26.
8.	Separate valve Top, Center and Bottom plates, placing them on a lint free cloth. Both diaphragms are visible.

Valco & Swagelok Fittings

The ports are machined for a 1/16" Valco internal nut. The Valco ferrule or the 2-piece Swagelok ferrule can be used. It is important to follow the manufacturer's procedures when cutting tubing and seating ferrules to ensure that the fitting does not leak.

Valco & Swagelok Assembly Instructions

Parts of a Valco fitting
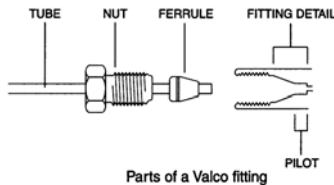
Use a wheel-cutting tool (Supelco 58692-U) to score the tubing, and then with a pair of straightening pliers (Supelco 58646) and a pair of needle nose pliers snap the tubing at the score line. Make certain that all tubing ends are cut square with the tube axis, and that both the ID and the OD are thoroughly deburred, use a deburring tool (Supelco 58804). Inspect the end of the tubing where the ferrule will seat for scratches along its length. Visible scratches along the tubing where the ferrule will seat are not acceptable, but those behind the front edge of the ferrule will not interfere with the integrity of the fitting.

Step	Procedure
1.	Slide the nut and ferrule onto the tubing.
2.	Insert this assembly in the fitting detail (valve body), screwing the nut 2 or 3 turns by hand.
3.	Push the tubing all the way forward into the details so that it seats firmly.
4.	Manually turn the nut until it is finger tight.

Step	Procedure
5.	Turn the nut ¼ turn (90 degrees) past the point where the ferrule first starts to grab the tubing.
6.	Remove the fitting and inspect it. The ferrule may be free to spin axially on the tubing but should have no lateral movement along the tubing. If it does, reinstall the fitting and tighten it another 1/8 turn past finger tight. Remove, re-inspect and repeat if necessary.

Replacing Diaphragms
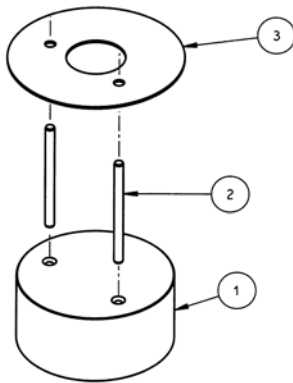
Valve Assembly Fixture 2020281-001

Use the Valve Assembly Fixture, Siemens PN 2020281-001, properly align the Diaphragms when rebuilding the Model 50 Valve. The fixture consists of a base (1), 2 guide pins (2) and a diaphragm placement disc (3). This fixture will allow the user to place the diaphragm in the center of the valve. If the diaphragm is not in the center it may leak.

Step	Procedure
1.	Remove the old diaphragms from the plates. DO NOT attempt to reuse the old diaphragms.
2.	With the pins installed in the fixture base, place the bottom plate of the valve on the base. The pins should fit in the mounting holes on the bottom plate and hold it in place.
3.	Position the placement disc on the bottom plate and set the diaphragm in place .
4.	Carefully remove the placement disc without moving the diaphragm. Inspect the diaphragm for proper alignment.. If the diaphragm is not in the center of the plate, repeat the placement procedure using the placement disc.
5.	Place the middle plate on the valve taking care to use the correct holes. Check the alignment mark on the side of the plate. It should align with the mark on the bottom plate. If not, the middle plate is upside down and must be removed, turned over, and reinstalled correctly.

Model 50 Valve, Continued

Step	Procedure
6.	Repeat steps 3 and 4 with the middle plate.
7.	Place the top plate on the valve, verifying alignment using the alignment marks.
8.	Install the 5 screws and washers finger tight.
9.	Tighten the screws down evenly (2.5mm Allen wrench) to 6 to 8 inch-pounds of torque. (It is recommended to use the torque wrench available from Siemens, PN 1631005-001, which is calibrated at 7.2 inch pounds). Remove the assembled valve from the valve fixture.
10.	Reinstall the valve in the oven and connect all tubing.
11.	Power up and check for leaks. Verify valve operation by running chromatograms.

Model 20 Valve

Description

This section presents information to perform fault diagnostic testing, maintenance and repair and installation of the Model 20 Valve. To assure optimum valve operation, a clean contaminant free operating environment is required at all times.

1.   Valve Cap
2.   Allen Screws (3 total)
3.   Belleville Washers (6 total)
4.   Teflon Disc Seal Diaphragm
5.   Dacron Cushion Diaphragm
6.   Plungers (6 total)

12. Air Loaded (Upper) Piston
13. Valve Plunger Body
14. Cylinder Base
15. Spring Loaded (Lower) Piston
16. Allen Screws (3 total)
17. Belleville Washers (6 total)
18. Inner (small) O-Ring
19. Outer (large) O-Rings
20. Large Belleville Washers (3 total)
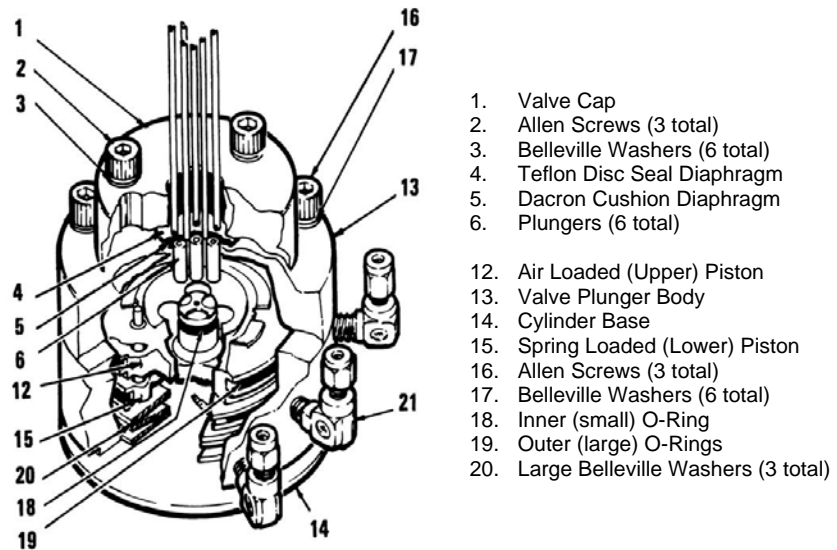
Figure 4-27: Model 20 Valve Components

Maintenance Procedures

Maintenance procedures are divided into three phases as presented below. The type of maintenance procedure to be performed is determined by the type of fault, availability of spare parts, experience of maintenance personnel and availability of tools and work place facilities. The description accompanying each type of procedure will guide the user in the type of maintenance procedure to be performed.

Within the procedures, the numbers in parenthesis denote parts referenced in the list contained in Figure 4-27 above; refer back to the list for locations.

Diagnostic: These can determine problems by a visual examination of valve.

Mini-Maintenance: Mini-Maintenance procedures should be performed with the Model 20 Valve installed in the analyzer. These procedures are the first logical step for maintenance personnel if they are not sure of what the problem is.

Model 20 Valve, Continued

If these procedures fail to correct problem with a faulty valve, or visual inspection detects an appreciable amount of foreign contamination on the diaphragm, it is recommended that the valve be returned to Siemens for repair. Procedures include the following:

Valve Cap Disassembly
Cleaning Fittings and Tubing
Valve Cap Assembly

Maxi-Maintenance: These are procedures which may be performed if the valve fault cannot be corrected using Mini-Maintenance procedures. The valve can either be replaced or the following procedures can be performed. This includes completely disassembling, cleaning, and rebuilding of the entire valve. Procedures include the following:

Valve Cap Disassembly
Cleaning Fittings and Tubing
Valve Cap Assembly
Actuator Disassembly
Actuator Assembly

Visual Valve Inspection

If system operational performance or a visual inspection of the Model 20 Valve indicates a real or potential problem with the valve, the following information will assist maintenance personnel in determining whether the valve can be repaired on site or whether it should be returned to Siemens for repair or replacement.

Maintenance Personnel

If customer maintenance personnel are not technically trained to repair the valve on site, it is recommended that the valve be returned to Siemens for repair or direct replacement.

Direct Valve Replacement

If it is determined that the problem is directly related to Model 20 Valve system performance, the customer must make a determination if the valve can be repaired on site or if it should be returned to Siemens for repair or replacement.

Repair of Valve

To repair the valve on site, the customer must have the necessary maintenance tools and replacement parts. Recommended valve spare parts including the Model 20 repair kit (PN K21000), can be obtained from Siemens.

Model 20 Valve, Continued

Maintenance Facility

When cleaning the valve and associated components, it is imperative that the maintenance be performed in a clean and contaminant free facility. Components should be placed on a lint free cloth to prevent impurities from comtaminating the valve and/or components. Hands should be clean and free of contaminants.

Presence of any foreign contamination can cause additional valve problems after reinstallation.

All foreign contamination adhering to valve must be removed quickly using a dust/lint free cloth and a cleaning solvent such as hexane. After cleaning valve cap and tubing, shake excess cleaning fluid from tubes and let valve cap air dry before reassembling.

CAUTION

⚠️

Do not allow polished face of valve cap to rest on any surface other than a lint free cloth. Clean metal parts using only a syringe and a cleaning solvent such as hexane, acetone, or methanol.

Diagnostic Procedures

Depending on the installation, the following tests can be performed with the valve mounted within the analyzer. Other tests require the analyzer to be shut down and valve ports disconnected. These diagnostic tests indicate specific areas of the fault or trouble.

Valve Leakage

Sample Pressures Lower Than Carrier Pressure: Leakage may be from a carrier port to a sample port within the valve regardless of whether valve is actuated or deactivated. With sample inlet flow turned off, sample outlet should be zero. Check carrier and sample gas for leakage.

Carrier and Sample Gas Leakage: Bubbles indicate internal leakage. For a liquid carrier, check for liquid dripping from sample outlet tube.

Sample Pressure Higher Than Carrier: Leakage between ports is visually displayed on analyzer recorder as a baseline shift when sample pressure is removed from valve.

Plugged Valve

If the valve is plugged, plungers are pressed upward by air pressure or spring action and will not release to their *open* position when sample pressure drops.

Ruptured Diaphragm

Escaping air from valve vent hole indicates a ruptured diaphragm (4), which must be replaced. Check for liquid substances escaping from the vent hole. Refer to Figure 4-28.

Model 20 Valve, Continued

1. Valve Cap
2. Allen Screws (3 total)
3. Belleville Washers (6 total)
4. Teflon Disc Seal Diaphragm
5. Dacron Cushion Diaphragm
6. Plungers (6 total)

12. Air Loaded (Upper) Piston
13. Valve Plunger Body
14. Cylinder Base
15. Spring Loaded (Lower) Piston
16. Allen Screws (3 total)
17. Belleville Washers (6 total)
18. Inner (small) O-Ring
19. Outer (large) O-Rings
20. Large Belleville Washers (3 total)
21. Control Port (Upper, Middle, or Lower depending on location)

Figure 4-28: Section View of Model 20 Valve

Model 20 Valve, Continued

Slow or Erratic Piston Switching

Improper lubrication and/or contamination of Bal-Seal (18) will increase friction on valve-actuating piston. This causes valve switching to be erratic, slow or inoperative. Refer to Figure 4-28. To correct the conditions causing slow or erratic piston switching, perform the following:

Disassemble valve body
Discard old O-ring
Thoroughly clean all components
Lubricate components per specifications
Install new O-ring
Reassemble the valve

Additional Faults

The following additional conditions can be visually observed without the valve being removed or disassembled:

Port-to-Port Leakage
Low Flow Rate (plugging)
Double Sampling and other
Sample Flow Problems

More serious conditions do require the valve to be disassembled. Procedures for disassembling the Valve are presented in the following sections.

Mini-Maintenance Procedures

The following procedures should be followed for performing Mini-Maintenance on the Model 20 Valve. Refer to Figures 4-28 and 4-29.

Model 20 Valve, Continued

1. Valve Cap
2. Allen Screws (3 total)
3. Belleville Washers (6 total)
4. Teflon Disc Seal Diaphragm
5. Dacron Cushion Diaphragm
6. Plungers (6 total)

12. Air Loaded (Upper) Piston
13. Valve Plunger Body
14. Cylinder Base
15. Spring Loaded (Lower) Piston
16. Allen Screws (3 total)
17. Belleville Washers (6 total)
18. Inner (small) O-Ring
19. Outer (large) O-Rings
20. Large Belleville Washers (3 total)
21. Control Port (Upper, Middle, or Lower depending on location)

Figure 4-29: Exploded View of Model 20 Valve

Model 20 Valve, Continued

**Valve Cap
Disassembly
and Cleaning**

Step	Procedure
1.	Loosen the three Allen screws (16), holding the plunger valve body (13) to the valve cylinder base (14). The screws should be loosened to the point that most of the spring pressure is relieved (approximately 1/8" or 3.2 mm). **DO NOT REMOVE THE THREE ALLEN MOUNTING SCREWS.**
2.	To remove valve cap (1), remove the three Allen screws (3) and six Belleville washers (2) holding the valve cap (1) to the valve plunger body (13).
3.	Remove the valve cap (1) from the plunger valve body (17).

CAUTION

⚠

Do not place polished valve cap (1) against any abrasive surface. Place it on a lint free cloth free of foreign contaminants.

4.	Inspect the valve cap *Teflon base* seal disc diaphragm (4) and the *Dacron* disc cushion diaphragm (5) for dirt, contamination or breaks. Regardless of whether damage or contamination is evident, discard old seal and cushion, and replace them with new component(s).

NOTE

If seal disc diaphragm (4) is brittle and dirty but not ruptured, or if it is ruptured but clean, **DO NOT** disassemble the rest of the valve.

5.	Visually inspect the rest of valve. If it is clean and in good condition, install a new disc seal diaphragm (4) and cushion diaphragm (5). To reassemble the valve cap, perform the following procedures.

Cleaning Fittings & Tubing

All fittings and tubing must be cleaned and valve diaphragms inspected for cleanliness, and for catalyst or polymer buildup in the valve cap. Plunger valve body faces should be wiped clean using hexane, acetone, or methanol and a lint free cloth. If port-to-port leakage or blockage exists when a valve flow passage is switched open, then contamination of flow passages or excessive friction in the lower section of the valve may exist. This impedes valve operation and the valve must be thoroughly flushed clean.

Model 20 Valve, Continued

Step	Procedure
6.	Prepare a large syringe with a Tygon tubing adapter installed. Fill syringe with a recommended cleaning solvent.

NOTE

An ultrasonic cleaner filled with a recommended cleaning solvent is recommended for cleaning all components. Solvent must not leave any residue on evaporation.

If solvent becomes contaminated during cleaning, it must be replaced with a clean supply.

Step	Procedure
7.	Clean valve cap while it is disassembled. Using syringe, flush solvent through each port in the valve cap.

CAUTION

⚠

When reassembling the valve cap, always install a new *Teflon* Seal Disc diaphragm (4) and *Dacron* Cushion Disc (5) on plunger valve body (13). Do not install the previously used *Teflon* Seal (4) and/or *Dacron* Cushion Disc (5). Before reinstalling seal and cushion on plunger valve body, remove lint and any dust particles.

Valve Cap Assembly

Step	Procedure
8.	Place the actuator assembly upright on a clean lint free cloth surface. Refer to Figures 4-28 and 4-29.
9.	Position the Dacron cushion disc diaphragm (5) between the three alignment pins on the plunger valve body (13).
10.	Using tweezers, hold *Teflon* seal disc diaphragm (4) by its edges. Before reinstalling disc, remove lint, dust and oils by sliding disk between your index and middle fingers.
11.	Install *Teflon* seal disc diaphragm (4) over the *Dacron* diaphragm disc cushion (5).

Model 20 Valve, Continued

Step	Procedure
12.	Align valve cap (1) over the three guide pins of the valve plunger body (13). Port 1 must be placed toward the upper control port.
13.	Lower valve cap (1) over plunger valve body plunger guide pins (13) then install valve cap (1) onto the plunger valve body.
14.	Install, but do not securely tighten, the three Allen screws (3) each with two Belleville lock washers (2).

NOTE

To assure proper tightness in the following two steps, it is recommended to use the torque wrench available from Siemens, PN 1631005-002, which can be adjusted over the range of torque measurements listed below.

Step	Procedure
15.	Referring to the following screw tightening rotation sequence, securely tighten the three Allen screws (3) that connect the valve cap (1) to the valve plunger body (13). One at a time, tighten each screw to first torque. Then continue with the next torque value until the final value is reached. a. Finger tighten b. 20 inch pounds (2.3 Nm) c. 40 inch pounds (4.5 Nm) d. 60 inch pounds (6.8 Nm)
16.	Tighten the three Allen screws (16) that secure the plunger valve body (13) to the cylinder base (14) to approximately 30 to 40 inch-pounds (3.4 to 4.5 Nm). **BE CERTAIN ALL THREE ALLEN SCREWS ARE SECURELY TIGHTENED. DO NOT OVERTIGHTEN.**

Model 20 Valve, Continued

Maxi-Maintenance Procedures

The following procedures should be followed for performing Maxi-Maintenance on Model 20 Valve. Maxi-Maintenance procedures include the Mini-Maintenance procedures in addition to the disassembly, inspection and assembly of the valve Actuator presented in this section. Refer to Figures 4-28 and 4-29.

Actuator Disassembly

Step	Procedure
1.	Perform the following Maxi-Maintenance procedures in the order presented. Valve Cap Disassembly (Mini-Maintenance) Cleaning Fittings and Tubing (Mini-Maintenance) Actuator Disassembly (Maxi-Maintenance) Actuator Assembly (Maxi-Maintenance) Valve Cap Assembly (Mini-Maintenance)
2.	Check valve plungers (6) for sticking.
3.	Using even finger pressure around edges of plunger valve body (13), push valve plunger body against cylinder valve base (14). All six plungers should rise.
4.	Release plunger valve body (13). The six plungers should drop. If plungers do not drop, check for oil film on plungers. This can prevent plungers from dropping.
5.	Apply gentle pressure to the top of each of the six plungers. If plungers drop, without excessive pressure, the valve is operating normally and does not require additional disassembly. If plungers stick or are sluggish in their operation, they must be thoroughly cleaned with a recommended cleaning solvent, repaired, or the entire actuator must be replaced.
6.	Turn actuator on its side. Remove the three screws (16) which secure the plunger valve body (13) to the cylinder valve base (14).

NOTE

When performing the following procedure, **DO NOT** allow actuator plungers to fall from plunger valve body (13).

Model 20 Valve, Continued

Step	Procedure
7.	With plunger valve body (13) in the horizontal position, remove the assembly. Carefully remove all six plungers (6).
8.	Place cylinder valve base (14) in upright position. Insert a 6-32 hex threaded standoff screw into the center-threaded hole and pull to remove air loaded piston (12) and spring-loaded piston (15).

NOTE

An alternate method for removing the actuator piston assembly is presented in step 9. If this method is not used, proceed to step 10.

Step	Procedure
9.	Carefully apply 10 psig (70 kPa) air pressure on bottom port of cylinder valve base (14). This extends the pistons allowing them to be pulled out of cylinder valve base by hand. **DO NOT USE MORE THAN 30 PSIG (210 KPA) OF AIR PRESSURE WHEN USING THIS METHOD.**
10.	Inspect actuator cylinder walls and the three Belleville washers (20). These components **MUST BE** clean and show no evidence of damage. If necessary, clean parts or replace them.
11.	Separate the upper air loaded piston (12) and lower spring loaded piston (15). Inspect pistons (12 and 15), silicone O-rings (18 and 19) and finger loaded valve spring (12c). These components **must be** clean and show no evidence of damage. If necessary, clean parts or replace them.

NOTE

It is extremely important that, when reassembling the actuator, the assembly area be clean and dust free. Hands of maintenance personnel must be clean and not oily and tools must also be clean.

Be certain valve cap (1) does not rest on abrasive surface and valve cap has completely air dried before reassembly. Rest valve cap on a clean lint free cloth.

Model 20 Valve, Continued

Actuator Assembly

Step	Procedure
12.	Install the three large Belleville washers (20) in cylinder valve base (14). Washers must be positioned in an alternating bevel up, bevel down manner (to form a spring). Refer to Figures 4-28 and 4-29.
13.	Apply a bead of Krytox 240 AC lubricant, or equivalent; in "O" ring grooves of spring-loaded piston (15).
14.	Install new silicon O-rings (18 and 19) in spring loaded piston (15) and apply a coating of lubricant over each "O" ring.
15.	Apply bead of lubricant in upper groove of air loaded piston (12a).
16.	Install a new silicon "O" ring (19) in the upper air loaded piston (12a) and apply a coating of lubricant over the "O" ring.
17.	Place upper piston (12a) over the small diameter of lower piston (15). Position pistons using guide pin (12b) for proper orientation.
18.	Apply Krytox 240C lubricant to each of the six finger spring (12c) pressure points. This is the point where the spring fingers contact the plunger body (13).
19.	Position the valve upright with its three ports on the left. Install a #6-32 screw in the center-threaded hole of air loaded piston assembly (12) and bottom spring-loaded piston (15).
20.	Lift the combined assembly (12 and 15), and orient it with the upper piston guide pin (12b) facing toward maintenance person.
21.	Press the piston assembly into the cylinder base (14). After installation, remove the #6-32 screw.
22.	Align plunger valve body (13) and insert the piston guide pin (12b) into one of the three bottom holes of plunger valve body (13).
23.	Rotate plunger valve body (13) to align body screw holes with cylinder base (14) threaded holes.
24.	Install three #10-32 7/8" socket head screws (16) and Belleville washers (17).

Model 20 Valve, Continued

Step	Procedure
25.	Hand tighten screws. **DO NOT** compress the Belleville washers (20) into the cylinder base (14).
26.	Install six plungers (6) into the plunger valve body (13). Plunger recess must face up.

NOTE

A clean plunger will fall with its own weight, and, when dropped into the valve body (13), it will bounce.

Step	Procedure
27.	Place a small drop of Krytox 143 AY or equivalent oil on each plunger.
28.	Using a pair of tweezers, lift each plunger up and down to allow the oil to flow around a plunger.
29.	Refer back to the previous procedure for reassembly of the valve cap.

Model 20 High Temperature Valve (HTV)

Description

This section presents the user with the necessary information to perform fault diagnostic testing, maintenance and repair, and installation of the Model 20 High Temperature Valve (HTV). The valve is actuated by air pressure. To assure optimum valve operation, a clean contaminant free operating environment is required at all times.

13. Outer (Large) Bal-Seals (2 total)
14. Plungers (6 total)
15. Spring Loaded (Lower) Piston
16. Cylinder Base
17. Valve Plunger Body
18. Air Loaded (Upper) Piston
19. Large Belleville Washers (3 total)
20. Inner (Small) Bal-Seal
21. Control Port (Upper, Middle, or Lower depending on location)

32. Valve Cap
33. Teflon Disc Seal Diaphragm
34. Nomex Cushion Diaphragm
35. Allen Screws (6 total)
36. Belleville Washers (12 total)
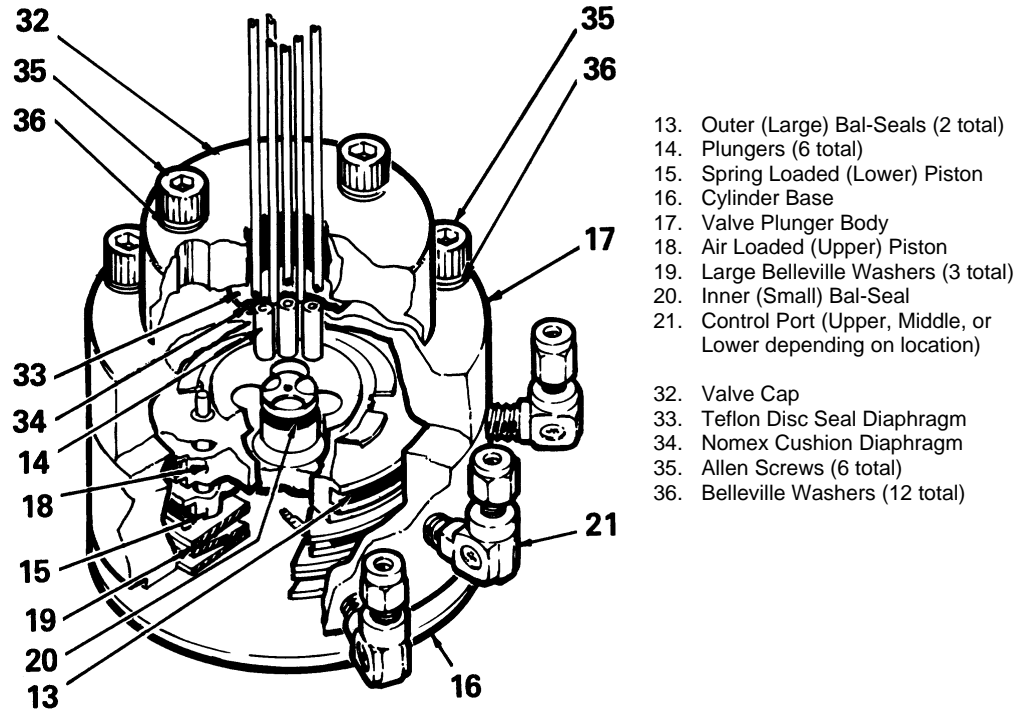
Figure 4-30: Model 20 High Temperature Valve (HTV) Components

Maintenance Procedures

Maintenance procedures are divided into three phases as presented below. The type of maintenance procedure to be performed is determined by the type of fault, availability of spare parts, experience of maintenance personnel and availability of tools and work place facilities. The description accompanying each type of procedure will guide the user in the type of maintenance procedure to be performed.

Within the procedures, the numbers in parenthesis denote parts referenced in the list contained in figure 4-30 above; refer back to the list for locations.

Diagnostic: These can determine problems by a visual examination of the valve.

Model 20 High Temperature Valve (HTV), Continued

Mini-Maintenance: Mini-Maintenance procedures should be performed with the Model 20 High Temperature Valve (HTV) installed in the analyzer. These procedures are the first logical step for maintenance personnel if they are not sure of what the problem is.

If these procedures fail to correct problem with a faulty valve, or visual inspection detects an appreciable amount of foreign contamination on the diaphragm, it is recommended that the valve be returned to Siemens for repair. Procedures include the following:

> Valve Cap Disassembly
> Cleaning Fittings and Tubing
> Valve Cap assembly

Maxi-Maintenance: These are procedures, which may be performed if the valve fault cannot be corrected using Mini-Maintenance procedures. The valve can either be replaced or the following procedures can be performed. This includes completely disassembling, cleaning, and rebuilding of the entire valve. Refer to Figure 4-30. Procedures include the following:

> Valve Cap Disassembly
> Cleaning Fittings and Tubing
> Valve Cap Assembly
> Actuator Disassembly
> Actuator Assembly

Visual Valve Inspection

If system operational performance or a visual inspection of the Model 20 High Temperature Valve (HTV) indicates a real or potential problem with the valve, the following information will assist maintenance personnel in determining whether the valve can be repaired on site or whether it should be returned to Siemens for repair or replacement.

Maintenance Personnel

If customer maintenance personnel are not technically trained to repair the valve on site, it is recommended that the valve be returned to Siemens for repair or direct replacement.

Direct Valve Replacement

If it is determined that the problem is directly related to Model 20 High Temperature Valve (HTV) system performance, the customer must make a determination if the valve can be repaired on site or if it should be returned to Siemens for repair or replacement.

Repair of Valve

To repair the valve on site, the customer must have the necessary maintenance tools and replacement parts. Recommended valve spare parts including the Model 20 HTV repair kit (PN K21021), can be obtained from Siemens.

Model 20 High Temperature Valve (HTV), Continued

Maintenance Facility

When cleaning the valve and associated components, it is imperative that the maintenance be performed in a clean and contaminant free facility. Components should be placed on a lint free cloth to prevent impurities from contaminating the valve and/or components. Hands should be clean and free of contaminants.

Presence of any foreign contamination can cause additional valve problems after installation.

All foreign contamination adhering to valve must be removed quickly using a dust/lint free cloth and a cleaning solvent, such as hexane, acetone or methanol. After cleaning valve cap and tubing, shake excess cleaning fluid from tubes and let valve cap air dry before reassembling.

CAUTION

⚠

Do not allow polished face of valve cap to rest on any surface other than a lint free cloth. Clean metal parts using only a syringe and a cleaning solvent such as hexane, acetone, or methane.

Diagnostic Procedures

Depending on the installation, the following tests can be performed with the valve mounted within the analyzer. Other tests require the analyzer be shut down and valve ports disconnected. These diagnostic tests indicate specific areas of the fault or trouble.

Valve Leakage

Sample Pressures Lower Than Carrier Pressure: Leakage may be from a carrier port to a sample port within the valve regardless of whether valve is actuated or deactivated. With sample inlet flow turned off, sample outlet should be zero. Check carrier and sample gas for leakage.

Carrier and Sample Gas Leakage: Bubbles indicate internal leakage. For a liquid carrier, check for liquid dripping from sample outlet tube.

Sample Pressures Higher Than Carrier: Leakage between ports is visually displayed on analyzer recorder as a baseline shift when sample pressure is removed from valve.

Plugged Valve

If the valve is plugged, plungers are pressed upward by air pressure or spring action and will not release to their *open* position when sample pressure drops.

Ruptured Diaphragm

Escaping air from valve vent hole indicates a ruptured diaphragm (33), which must be replaced. Check for liquid substances escaping from the vent hole. Refer to Figure 4-31.

Slow or Erratic Piston Switching

Improper lubrication and/or contamination of Bal-Seals will increase friction on valve-actuating piston. This causes valve switching to be erratic, slow or inoperative. Refer to Figure 4-31.

13. Outer (Large) Bal-Seals (2 total)
14. Plungers (6 total)
15. Spring Loaded (Lower) Piston
16. Cylinder Base
17. Valve Plunger Body
18. Air Loaded (Upper) Piston
19. Large Belleville Washers (3 total)
20. Inner (Small) Bal-Seal
21. Control Port (Upper, Middle, or Lower depending on location)

32. Valve Cap
33. Teflon Disc Seal Diaphragm
34. Nomex Cushion Diaphragm
35. Allen Screws (6 total)
36. Belleville Washers (12 total)
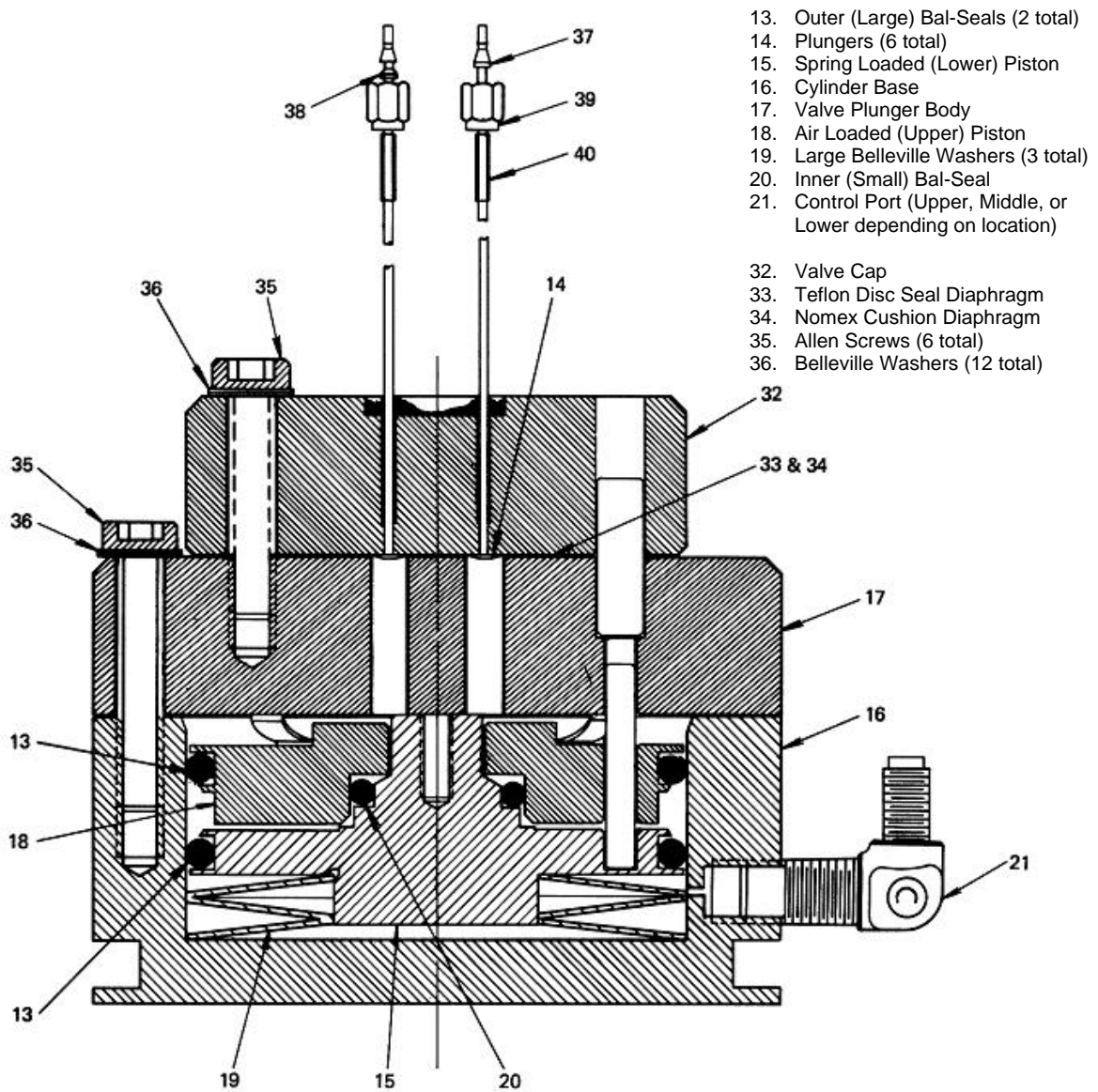
Figure 4-31: Section View of Model 20 HTV

Model 20 High Temperature Valve (HTV), Continued

Additional Faults

The following additional conditions can be visually observed without the valve being removed or disassembled:

    Port-to-Port Leakage
    Low Flow Rate (plugging)
    Double Sampling and other
    Sample Flow Problems

More serious conditions do require the valve to be disassembled. Procedures for disassembling the Valve are presented in the following sections.

Mini-Maintenance Procedures

The following procedures should be followed for performing Mini-Maintenance on the Model 20 HTV. Refer to Figure 4-31 and 4-32.

Valve Cap Disassembly and Cleaning

Step	Procedure
1.	Loosen the three Allen screws (35), holding the plunger valve body (17) to the valve cylinder base (16). The screws should be loosened to the point that most of the spring pressure is relieved (approximately 1/8" or 3.2 mm) **DO NOT REMOVE THE THREE ALLEN MOUNTING SCREWS.**
2.	To remove valve cap (32), remove the three Allen screws (35) and six Belleville washers (36) holding the valve cap (32) to the valve plunger body (17).
3.	Remove the valve cap (32) from the plunger valve body (17).

CAUTION

⚠

Do not place polished valve cap (32) against any abrasive surface. Place it on a lint free cloth free of foreign contaminants.

Model 20 High Temperature Valve (HTV), Continued

13. Outer (Large) Bal-Seals
    (2 total)
14. Plungers (6 total)
15. Spring Loaded (Lower) Piston
16. Cylinder Base
17. Valve Plunger Body
18. Air Loaded (Upper) Piston
19. Large Belleville Washers
    (3 total)
20. Inner (Small) Bal-Seal
21. Control Port (Upper, Middle,
    or Lower depending on
    location)

32. Valve Cap
33. Teflon Disc Seal Diaphragm
34. Nomex Cushion Diaphragm
35. Allen Screws (6 total)
36. Belleville Washers (12 total)

CAP   BODY   BASE

Figure 4-32: Exploded View of Model 20 HTV

Model 20 High Temperature Valve (HTV), Continued

Step	Procedure
4.	Inspect the *Teflon* seal disc diaphragm (33) and the Nomex cushion diaphragm (34). Examine valve cap base seal (33) and cushion diaphragm (34) subassembly's for dirt, contamination or breaks. Regardless of whether damage or contamination is evident, discard old seal and cushion, and replace them with new component(s).

NOTE

If seal disc diaphragm (33) is brittle and dirty, but not ruptured or if it is ruptured but clean, **DO NOT** disassemble the rest of the valve.

5.	Visually inspect the rest of valve. If it is clean and in good condition, install a new seal disc diaphragm (33) and a Nomex cushion diaphragm (34). To reassemble the valve cap, perform the following procedures.

Cleaning Fittings & Tubing

All fittings and tubing must be cleaned and valve diaphragms inspected for cleanliness, and for catalyst or polymer buildup in the valve cap. Plunger valve body faces should be wiped clean using hexane, acetone, or methanol and a lint free cloth. If port-to-port leakage or blockage exists when a valve flow passage is switched open, then contamination of flow passages or excessive friction in the lower section of the valve may exist. This impedes valve operation and the valve must be thoroughly flushed clean. For cleaning parts, an ultrasonic cleaner is recommended.

6.	Prepare a large syringe with a Tygon tubing adapter installed. Fill syringe with a recommended cleaning solvent.

NOTE

If solvent becomes contaminated during cleaning, it must be replaced with a clean supply.

7.	Clean valve cap while it is disassembled. Using syringe, flush solvent through each port in the valve cap.

Model 20 High Temperature Valve (HTV), Continued

Valve Cap Assembly

Step	Procedure
8.	Place the actuator assembly upright on a clean lint free cloth surface. Refer to Figures 4-31 and Figure 4-32.

CAUTION

⚠

When reassembling the valve cap, always install a new *Teflon* Seal Disc diaphragm (33) and *Nomex* Cushion Disc (34) on plunger valve body (17). Do not install the previously used *Teflon* Seal (33) and/or *Nomex* Cushion Disc (34). Before reinstalling seal and cushion on plunger valve body, remove lint and any dust particles.

9.	Position the Nomex cushion disc diaphragm (34) between the three alignment pins on the plunger valve body (17).
10.	Using tweezers, hold *Teflon* seal disc diaphragm (33) by its edges. Before reinstalling disc, remove lint, dust and oils by sliding disk between your index and middle fingers.
11.	Install *Teflon* seal disc diaphragm (33) over the Nomex disc cushion diaphragm (34).
12.	Align valve cap (32) over the three guide pins of the valve plunger body (17). Port 1 must be placed toward the upper control port.
13.	Lower valve cap (32) over valve plunger body guide pins (17) then install valve cap (32) onto the plunger valve body.
14.	Install, but do not securely tighten the three Allen screws (35), each with two Belleville lock washers (36), that secure the valve cap (32) to the valve plunger body (17).

Model 20 High Temperature Valve (HTV), Continued

NOTE	To assure proper tightness in the following two steps, it is recommended to use the torque wrench (PN 1631005-002) and bit (PN 1631005-701) which are available from Siemens and can be adjusted over the range of torque measurements listed below.

Step	Procedure
15.	Referring to the following screw tightening rotation sequence, securely tighten the three Allen screws (35), that connect the valve cap (32) to the valve plunger body (17). One at a time, tighten each screw to first torque. Then continue with the next torque value until the final value is reached. a. Finger tighten b. 20 inch-pounds (2.3 N m) c. 40 inch-pounds (4.5 N m) d. 60 inch-pounds (6.8 N m) **BE CERTAIN ALL THREE ALLEN SCREWS ARE SECURELY TIGHTENED. <u>DO NOT</u> OVERTIGHTEN.**
16.	Tighten the three Allen screws (35) that secure the plunger valve body (17) to the cylinder base (16) to approximately 30 to 40 inch-pounds (3.4 to 4.5 N m).

Maxi-Maintenance Procedures

The following procedures should be followed for performing Maxi-Maintenance on Model 20 HTV . Maxi-Maintenance procedures include the Mini-Maintenance Procedures in addition to the disassembly, inspection and assembly of the valve Actuator presented in this section.

CAUTION

⚠

The Model 20 HTV Repair Kit (PN K21021) available from Siemens includes adapters required for use during actuator reassembly. Failure to use the proper tools may cause damage to the Bal-Seals.

Actuator Disassembly

Step	Procedure
1.	Perform the following Maxi Maintenance procedures in the order presented: Valve Cap Disassembly (Mini-Maintenance) Cleaning Fittings and Tubing (Mini-Maintenance) Actuator Disassembly (Maxi-Maintenance) Actuator Assembly (Maxi-Maintenance) Valve Cap Assembly (Mini-Maintenance)

Model 20 High Temperature Valve (HTV), Continued

Step	Procedure
3.	Check valve plungers (14) for sticking.
4.	Using even finger pressure around edges of plunger valve body (17), push valve plunger body against cylinder valve base (16). All six plungers should rise.
5.	Release plunger valve body (17). The six plungers should drop. If plungers do not drop, check for oil film on plungers. This can prevent plungers from dropping.
6.	Apply gentle pressure to the top of each of the six plungers. If plungers drop, without excessive pressure, the valve is operating normally and does not require additional disassembly. If plungers stick or are sluggish in their operation, they must be thoroughly cleaned with a recommended cleaning solvent such as hexane, repaired, or the entire actuator must be replaced.
7.	Turn actuator on its side. Remove the three socket head screws (35) which secure the plunger valve body (17) to the cylinder valve base (16).

NOTE   When performing the following procedure, **DO NOT** allow actuator plungers to fall from plunger valve body (17).

Step	Procedure
7.	With plunger valve body (17) in the horizontal position, remove the assembly. Carefully remove all six plungers (14).
8.	Place cylinder valve base (16) in upright position. Insert a 6-32 hex threaded standoff screw into the center-threaded hole and pull to remove air loaded piston (18) and spring-loaded piston (15).

NOTE   An alternate method for removing the actuator piston assembly is presented in step 9. If this method is not used, proceed to step 10.

Step	Procedure
9.	Carefully apply 10 psig (70 kPa) air pressure on bottom port of cylinder valve base (16). This extends the pistons allowing them to be pulled out of cylinder valve base by hand. **DO NOT USE MORE THAN 30 PSIG (210 KPA) OF AIR PRESSURE WHEN USING THIS MEHOD.**

Model 20 High Temperature Valve (HTV), Continued

Step	Procedure
10.	Inspect actuator cylinder walls and the three Belleville washers (19). These components **MUST BE** clean and show no evidence of damage. If necessary clean parts or replace them.
11.	Separate the upper air loaded piston (18) and lower spring loaded piston (15). Inspect pistons and spring loaded Bal-Seal (20) and Belleville washer (19). These components **MUST BE** clean and show no evidence of damage. If necessary clean parts or replace them.

CAUTION

⚠

Replace all Bal-Seals (20) if they have any nicks, scratches or any other type of deformations.

NOTE

It is <u>extremely important</u> that, when reassembling the actuator, the assembly area be clean and dust free. Hands of maintenance personnel must be clean and not oily and tools must also be clean.

Be certain valve cap (32) does not rest on abrasive surface and valve cap has completely air dried before reassembly. Rest valve cap on a clean lint free cloth.

Actuator Assembly

Step	Procedure
12.	Install the three large Belleville washers (19) in cylinder valve base (16). Washers must be positioned in an alternating bevel up, bevel down manner (to form a spring). Refer to Figures 4-31 and 4-32.
13.	Apply a bead of Krytox 240 AC lubricant, or equivalent, in Bal-Seal grooves of spring loaded piston (15)
14.	Lubricate outside diameter of assembly tool (Part Number A00145). Be certain spring-loaded Bal-Seal (13) is properly oriented with the associated spring facing up.
15.	Using an "O" ring as a cushion, push spring loaded Bal-Seal (13) down on the assembly tool until it snaps firmly into spring loaded piston (15) ring groove. Refer to Figure 4-33.

CAUTION

⚠

When installing Bal-Seals, handle them with extreme care, do not remove Bal-Seal springs for installation and do not nick or scratch Bal-Seals.
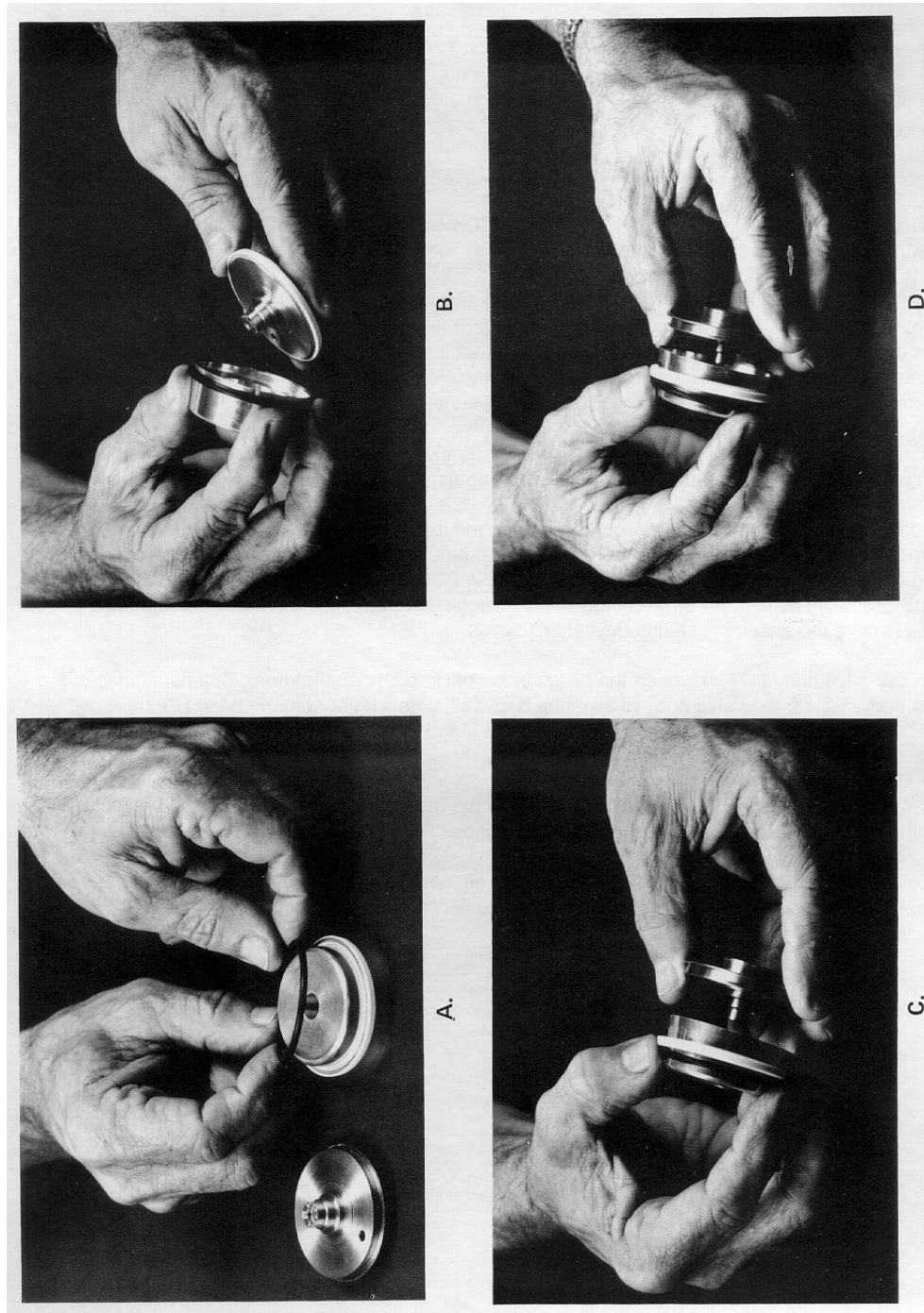
Figure 4-33: Assembling Bal-Seal (13) on Piston (15)

Model 20 High Temperature Valve (HTV), Continued

Step	Procedure
16.	Apply a bead of Krytox 240 AC lubricant, or equivalent, in both Bal-Seal grooves of air-loaded piston (18).
17.	Using pad of fingers or "O" ring as a cushion, install the small spring loaded Bal-Seal (20) in air loaded piston (18) groove with associated spring facing up. **DO NOT** use a fingernail. Refer to Figure 4-34.
18.	Push spring loaded Bal-Seal (20) to the bottom of groove.
19.	Apply small bead of Krytox 240 AC lubricant, or equivalent, on the small Bal-Seal sealing surface of lower spring loaded piston (15).
20.	Place upper air loaded piston (18) over the small diameter of lower piston (25). Position pistons using guide pin for proper orientation.
21.	Screw the assembly stud and washer into the threaded hole in the lower spring loaded piston (15) and evenly force the spring loaded Bal-Seal (20) over the bearing surface of lower spring loaded piston (15). **LEAVE THE ASSEMBLY STUD AND WASHER IN PLACE.**
22.	Moderately lubricate outsides of Bal-Seals with Krytox 240 AC lubricant, or equivalent. Also lubricate each of the six fingers of spring. This is where fingers contact plunger valve body (17).
23.	Position valve upright with the three ports on the left. Place assembly guide tool (Part Number T11000) on the valve, with the cutout on the lip of assembly tool over the upper tube fitting. Refer to Figure 4-35.
24.	Lift piston and Bal-Seal assembly and orient assembly with the upper piston index guide pin towards the maintenance person.
25.	Firmly, but evenly, press the piston and Bal-Seal assembly through the assembly guide tool into the cylinder valve base (16). Refer to Figure 4-36.
26.	Remove guide tool assembly stud and lock washer.
27.	Align plunger valve body (17) and insert piston index guide pin into one of the three bottom plunger valve body holes.

Figure 4-34: Installing Bal-Seal (20) in Piston Groove (18)
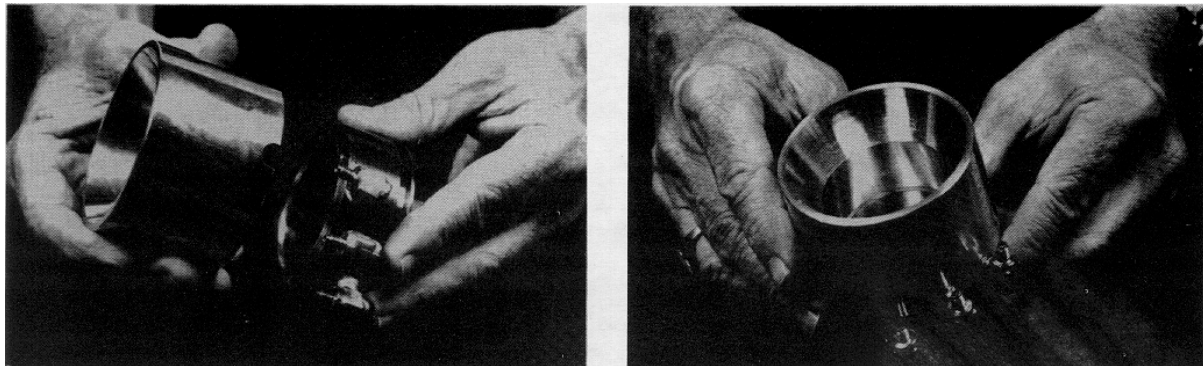
| A. | B. |

Figure 4-35: Placing Assembly Guide Tool on Valve Base (16)

Model 20 High Temperature Valve (HTV), Continued

Figure 4-36: Inserting Piston Assembly (15 and 18) into Base (16)

Model 20 High Temperature Valve (HTV), Continued

Step	Procedure
28.	Rotate plunger valve body (17) to align the plunger valve body screw holes with cylinder valve base (16) threaded holes.
29.	Install three Allen screws (35) each with two Belleville washers (36). Hand tighten screws but **DO NOT** compress the Belleville washers (19) in cylinder valve base.
30.	With the recess facing up, install the six plungers (14) in the plunger valve body (17). A clean plunger will fall under its own weight and bounce when dropped into the plunger valve body.
31.	Place a small drop of Krytox 143 AY or equivalent oil on each plunger. Using a pair of tweezers lift each plunger and move it up and down to allow lubricating oil to flow around the plunger.
32.	Refer back to the previous procedure for reassembly of the valve cap.

Model 11 and Model 11 Low Dead Volume Valves

Description

This section presents the user with the necessary information to perform fault diagnostic testing, maintenance and repair and installation of the Model 11 Valve and the Model 11 Low Dead Volume Valves. These valves are actuated by air pressure. To ensure optimum valve operation, a clean contaminant free operating environment is required at all times. Refer to Figure 4-37.

8. Valve Body
9. O-Ring
10. Finger Spring of Air Loaded Piston
11. Air Loaded Piston
12. O-Ring
13. O-Ring
14. Spring Loaded Piston
15. Compensation Plate
16. Compression Spring
17. Compression Plate
18. Retaining Base
19. Retaining Ring Clip
20. Ball 5/32"
21. Set Screw
22. O-Rings (3 total)
23. Air Signal Manifold
24. Screw 3/8"
25. Screw 1/2"
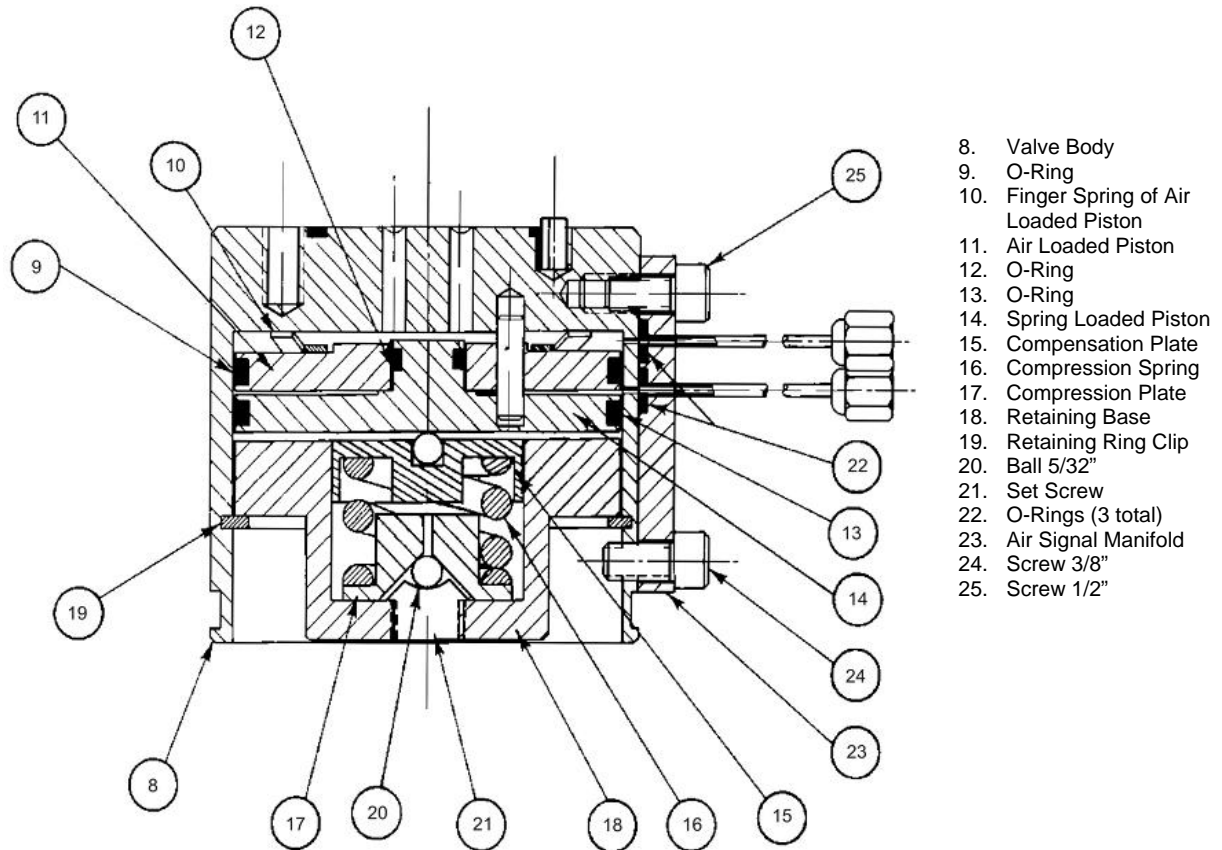
Figure 4-37: Model 11 (or Model 11 LDV) Valve Without Valve Cap

Valve Types

This Model 11 valve is broken down into two primary types, the standard Model 11 Valve and the Model 11 Low Dead Volume (LDV) valve. Within this section, maintenance procedures for these two types of valve are the same except where noted. Further maintenance procedures for these valves, including port-to-port leak tests, are available in the Model 11 Valve Repair Manual (PN M06115) and the Model 11 LDV Valve Repair Manual (PN 2015584-001).
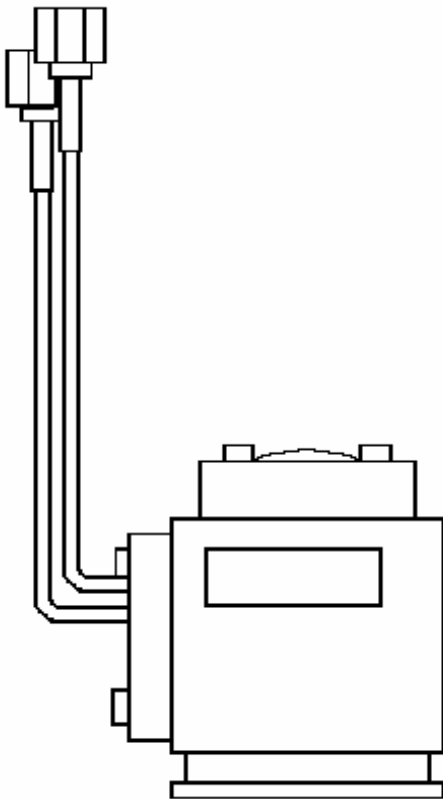
Figure 4-38: Model 11 LDV Valve
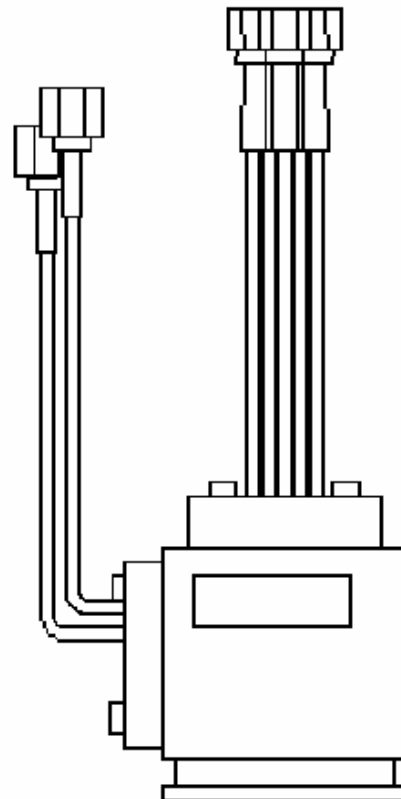
Figure 4-39: Model 11 Valve

NOTE

For maintenance purposes, the primary difference between the Model 11 and the Model 11 Low Dead Volume (LDV) valves is the sample ports on the valve cap. This can be seen in the figures above. There is an adapter tube (available from Siemens) that can be useful for some maintenance procedures involving the Model 11 LDV. None of the procedures in this section require the use of the adapter tube. For more information on the adapter tube, refer to the Model 11 LDV Repair Manual (PN 2015584-001).

Model 11 and Model 11 LDV Valves, Continued

Maintenance Procedures

Maintenance procedures are divided into three phases as presented below. The type of maintenance procedure to be performed is determined by the type of fault, availability of spare parts, experience of maintenance personnel and availability of tools and work place facilities. The description accompanying each type of procedure will guide the user in the type of maintenance procedure to be performed.

Within the procedures, the numbers in parenthesis denote parts referenced in the lists contained in the figures within this section; refer back to the lists for locations.

Diagnostic: These can determine problems by a visual examination of valve.

Mini-Maintenance: Mini-Maintenance procedures should be performed with the valve installed in the analyzer. These procedures are the first logical step for maintenance personnel if they are not sure of what the problem is.

The valve should be returned to Siemens for repair if procedures fail to correct problem of a faulty valve or a visual inspection detects an appreciable amount of foreign contamination on the diaphragm. Valve cap maintenance procedures are as follows:

    Valve Cap Disassembly
    Cleaning, Fittings and Tubing
    Valve Cap Assembly

Maxi-Maintenance: These procedures may be performed if the valve fault cannot be corrected using Mini-Maintenance procedures. The valve can either be replaced or these procedures can be performed. This includes completely disassembling, cleaning and rebuilding the entire valve. Procedures include the following:

    Valve Cap Disassembly
    Cleaning Fittings and Tubing
    Valve Cap Assembly
    Valve Body Disassembly
    Valve Body Cleaning
    Valve Body Assembly

Visual Inspection

If system operational performance or a visual inspection of the Model 11 or Model 11 Low Dead Volume Valve indicates the real or potential problem with the valve, the following information will assist maintenance personnel in determining the problem. Information will indicate whether the valve can be repaired on site or whether it should be returned to Siemens for repair or replacement.

Model 11 and Model 11 LDV Valves, Continued

Maintenance Personnel   If customer personnel are not technically trained to repair the valve on site, it is recommended that the valve be returned to Siemens for repair or direct replacement.

Direct Valve Replacement   If it is determined that the problem is directly related to Model 11 or Model 11 Low Dead Volum (LDV) Valve system performance, the customer must make a determination if the valve can be repaired on site or if it should be returned to Siemens for repair or replacement.

Repair of Valve   To repair the valve on site, the customer must have the necessary maintenance tools and replacement parts. Recommended valve spare parts including the Model 11 Valve repair kit (PN K21040) and Model 11 LDV repair kit (PN 2015581-001), can be obtained from Siemens.

If the Valve shows evidence of poor switching conditions, the following procedures should be performed.

> Disassemble the valve body
> Discard the old O-rings
> Install new O-rings
> Thoroughly clean all the components
> Lubricate components
> Reassemble the valve

Maintenance Facility   When cleaning the valve and associated components, it is imperative that the maintenance be performed in a clean and contaminant free facility. Components should be placed on a lint free cloth to prevent impurities from contaminating the valve and/or components. Hands should be clean and free of contaminants.

If valve maintenance is to be performed on site, the area must be clean and free of foreign contaminants. Presence of any foreign contamination can cause additional valve problems after reinstallation.

All foreign contamination adhering to valve must be removed quickly using a dust/lint free cloth and a cleaning solvent, such as hexane. After cleaning valve cap and tubing, shake excess cleaning fluid from tubes and let valve cap air dry before reassembling.

CAUTION   Do not allow polished face of valve cap to rest on any surface other than a lint free cloth. Clean metal parts using only a syringe and a cleaning solvent such as hexane, acetone, or methanol.

Model 11 and Model 11 LDV Valves, Continued

Diagnostic Procedures

Depending on the installation, the following tests can be performed with the valve mounted in the analyzer. Other tests require the analyzer be shut down and valve ports disconnected. These diagnostic tests indicate specific areas of the fault or trouble.

Valve Leakage

Vapor analyzers generally have the sample at atmospheric pressure, so any leakage would be from a carrier port to a sample port within the valve. With the sample inlet flow turned off, the sample outlet flow should be zero in either the "air off" or "air on" condition. Check for small leaks by immersing the sample outlet tubing in a beaker of water. Bubbles indicate internal leakage.

The liquid sample streams may have pressures several hundred pounds higher than the carrier gas. Leaking between ports will show up on the analyzer chromatogram as base-line shift when the sample pressure is removed from the valve.

Plugged Valve

Plungers in the valve are pressed upward by air or spring action, but when released depend on their own weight and sample pressure to drop them to the "open" position. Very small sample pressures 1 to 10 oz. (0.4 to 4.3 kPa) may be insufficient to open the flow path if the sealing disc has been held against the cap for a long time (such as a valve in storage). Check for flow across alternate flow paths, such as air on and air off. It may be necessary to temporarily increase the sample pressure to get the flow started, and then reduce it to normal after a few cycles.

Ruptured Sealing Disc

To test for a ruptured sealing disc apply air to valve ports, one at a time, while sealing off all others. Place a small amount of soap solution such as Leak Tec   over the upper control port's bleed tube air signal manifold (23). Any escaping air at this point indicates a ruptured disc. If this occurs, proceed with a disc replacement.

If the disc does not appear to be ruptured, remove the valve from service and replace it with a new valve.

Slower Erratic Piston Switching

Excessive friction on the actuating pistons of the valve can be caused by lack of lubricant, or dirt or contamination on the O-rings. As a result, the valve may switch erratically, switch slowly or not switch at all. These conditions can cause a leak port to port, across the sealing disc, double sampling, or complete closing of flow between two or more ports.

Model 11 and Model 11 LDV Valves, Continued

Mini-Maintenance Procedures

The following procedures should be followed for performing Mini-Maintenance on Model 11 or Model 11 Low Dead Volume (LDV) Valve. Figures are of the Model 11 but are also applicable to the Model 11 LDV.

Valve Cap Disassembly

Step	Procedure
1.	Relieve the pressure on the base Allen Set Screw (21) by turning it counterclockwise until it turns easily. Refer to Figure 4-37.

1. Screw (3 total)
2. Belleville Washer (6 total)
3. Valve Cap
4. Teflon Seal Disc
5. Dacron Cushion Disc
6. O-Ring
7. Plungers (6 total)
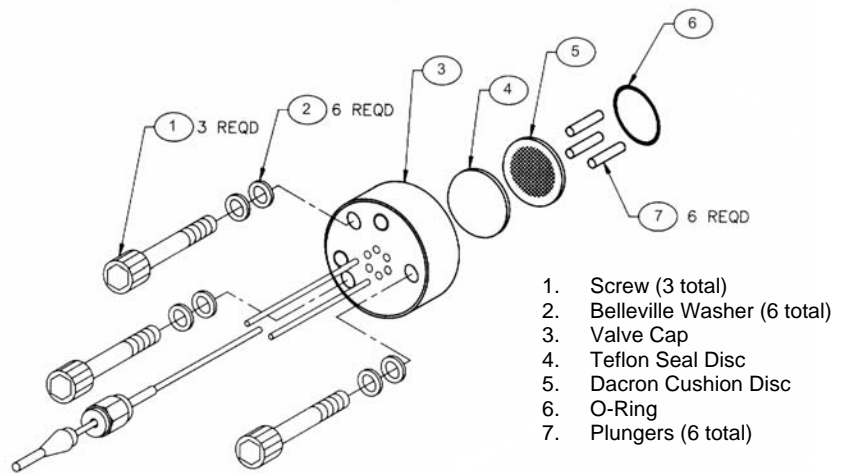
Figure 4-40: Model 11 Valve Cap Exploded View
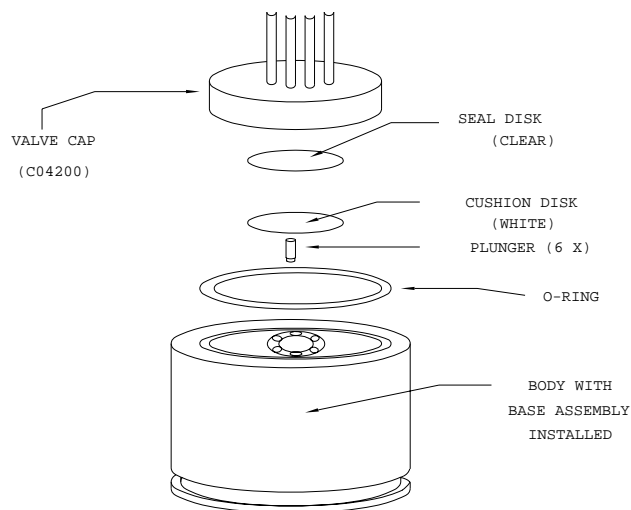
Figure 4-41: Model 11 Valve Major Components

Model 11 and Model 11 LDV Valves, Continued

Step	Procedure
2.	Remove the three Allen head cap socket screws (1) and separate the cap (3) from the valve body (8). When the valve cap is removed, the following components are exposed. Refer to Figures 4-40 and 4-41. Teflon Sealing disc (4) [clear] Dacron Cushion disc (5) [white] and "O" ring (6)
3.	Inspect the Teflon sealing disc (4), Dacron cushion disc (5) and silicon rubber "O" ring (6) for dirt or breaks. If damage is evident, discard damaged part(s) and replace with new component(s).
4.	If Teflon sealing disc (4), Dacron cushion disc (5) and "O" ring (6) are brittle or dirty, but not ruptured, or they are ruptured but clean, visually inspect the rest of the valve. If it is clean and in good order, install new Teflon sealing disc (4), Dacron cushion disc (5) and "O" ring (6) and reassemble the cap. Otherwise, either continue with valve disassembly or replace the valve.
5.	Examine each of the six plungers (7) for evidence of damage or contamination. If damage is evident, discard defective plunger(s) and replace with new ones. Refer to Figure 4-42.
6.	To reassemble the valve cap (3), refer to section Valve Cap Assembly. If the valve actuating piston assembly is contaminated or malfunctioning, refer to Valve Body disassembly.

PLUNGER ORIENTATION

THIS END TOWARD VALVE CAP

THIS END TOWARD PISTONS
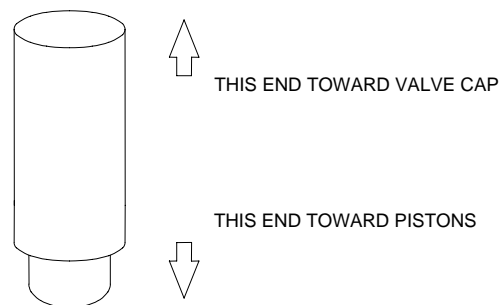
Figure 4-42: Model 11 Plunger Orientation

Model 11 and Model 11 LDV Valves, Continued

Cleaning Fittings and Tubing

All valve fittings and tubing must be clean and valve diaphragms inspected for cleanliness, catalyst or polymer buildup. Valve cap or plunger valve body faces should be wiped clean using hexane, acetone or methanol and a lint free cloth. If port-to-port leakage or blockage exists when a valve flow passage is switched open, then contamination of flow passages or excessive friction in the lower section of the valve may exist. This impedes valve operation and the valve must be thoroughly flushed clean.
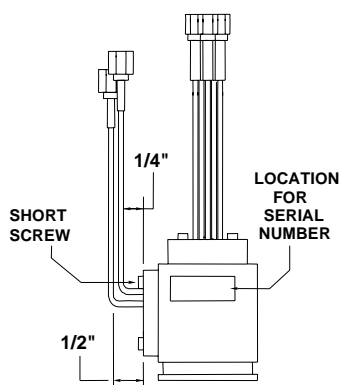
Figure 4-43: Manifold Tube

NOTE

If solvent becomes contaminated during performance of the following steps, it must be replaced with a clean supply from a clean beaker. Clean solvent must be used for each of the following steps.

Step	Procedure
7.	(For the Model 11 LDV Valve) - Clean the valve cap (3) while disassembled and visually verify that ports are clear. Use of an ultrasonic cleaner and an appropriate solvent such as hexane is recommended.
8.	(For Model 11 Valve) – Clean valve cap (3) while disassembled using a syringe and appropriate solvent. Clean each port and attached tubing on the valve cap by flushing solvent back and forth through each port while cap is immersed in a beaker of solvent.

Model 11 and Model 11 LDV Valves, Continued

Valve Cap Assembly

Step	Procedure
9.	Place the actuator assembly upright on a clean lint free cloth surface with the two valve cap guide pins facing upwards.
10.	Using a syringe with Krytox 143 AY lubricating oil, place a drop of oil on sidewall of each valve body (8) plunger hole.
11.	Reinstall the six plungers (7) into their valve body positions. Using tweezers, move each plunger up and down to thoroughly lubricate them. Plungers must not protrude above valve body (8) top surface. Refer to Figure 4-42 for plunger orientation.
12.	Using clean lint free cloths wetted with acetone, remove excess lubricating oil from top of valve body (8).

CAUTION

⚠

When installing "O" ring (6), Dacron cushion disc (5) and clear Teflon seal disc (4), do not use any type of grease as a lubricant. There must be no foreign contaminants on discs.

13.	Install silicon "O" ring (6), Dacron cushion disc (5) and clear Teflon seal disc (4). Do not lubricate "O" ring (6).

NOTE

Clear Teflon seal disc (4) MUST BE mounted on top of Dacron cushion disc (5). Refer to Figure 4-41. Align discs over plungers (7).

14.	Securely holding valve cap (3), blow out each port and/or tube with compressed air to remove all acetone and foreign matter.

Model 11 and Model 11 LDV Valves, Continued

CAUTION

⚠️

Do not use grease when installing O-ring.

Step	Procedure
15.	It is recommended that appropriate torque wrenches be used for this step (available from Siemens – PN's 1631005-002 and 1631005-003). Install valve cap (3) using the three 10-32 Allen screws (1). Screws must be tightened evenly in sequence 1, 2, 3, 1 sequence. Tightening steps are as follows. Refer to Figure 4-40. Run screws down until they contact valve cap. Tighten screws with Allen driver until they are finger tight. Tighten screws to approximately 15 inch pounds (1.69 Nm). This is a ¼ turn maximum. Tighten screws to approximately 20 inch pounds (2.26 Nm). This is another ¼ turn maximum. Tighten screws to approximately 35 inch pounds (3.95 Nm) Torque bottom adjusting set screw to 6.5 inch pounds (0.73 Nm).
16.	Valve is now ready for reinstallation and placing into operational service.

Maxi-Maintenance Procedures

The following procedures should be followed for performing Maxi-Maintenance on the Model 11 Valve or the Model 11 Low Dead Volume Valve. Maxi-Maintenance procedures include the Mini-Maintenance procedures in addition to the disassembly, inspection and assembly of the valve plunger presented in this section. Refer to Figure 4-44.

Step	Procedure
1.	Perform the following Maintenance Procedures in the order presented: Valve Cap Disassembly (Mini-Maintenance) Cleaning Fittings and Tubing (Mini-Maintenance) Valve Body Disassembly (Maxi-Maintenance) Valve Body Assembly (Maxi-Maintenance) Valve Cap Assembly (Mini-Maintenance)

Model 11 and Model 11 LDV Valves, Continued

Valve Body Disassembly

Step	Procedure
2.	Remove the six plungers (7) by inverting valve body (8) and then shaking it. Plungers should fall into the palm of hand. If a plunger(s) is stuck and does not fall out, delay removing it until after the spring loaded and air loaded pistons (14 and 11) are removed. The plungers can then be forced out from bottom of valve body.

CAUTION

⚠

When shaking plungers from valve body, do not allow them to fall on any abrasive surface. It is recommended that a lint free cloth, free of contaminants, be placed under the hand to protect plungers from damage.

Step	Procedure
3.	Examine plungers for damage. Any plunger showing defects, such as nicks, must be discarded and replaced with a new part.
4.	Remove air signal manifold (23) by removing the two screws (24&25) that secure it to the valve body (8). After manifold is detached, inspect the three o-rings (22) and replace if necessary. If the o-rings are undamaged, then set them aside (on a clean surface) for installation later.
5.	Use the plier tool supplied with the repair kit to remove the retaining ring clip (19).
6.	From bottom of valve body, remove retaining base (18), compression plate (17), compression spring (16) and compensation plate (15) from bottom of valve body (8). Refer to Figure 4-44.
7.	Use the plier tool supplied with the repair kit to remove spring-loaded piston (14) from valve body (8). Insert the tips of the plier nose into the holes in the underside of the piston and pull slowly.
8.	Remove air-loaded piston (11) from valve body (8)
9.	Using care to catch plungers (7), as presented in step 2, remove any stuck plunger using retaining ring pliers.

8. Valve Body
9. O-Ring
10. Spring
11. Air Loaded Piston
12. O-Ring
13. O-Ring
14. Spring Loaded Piston
15. Compensation Plate
16. Compression Spring
17. Compression Plate
18. Retaining Base
19. Retaining Ring Clip
20. Ball 5/32"
21. Set Screw
22. O-Rings (3 total)
23. Air Signal Manifold
24. Screw 3/8"
25. Screw 1/2"
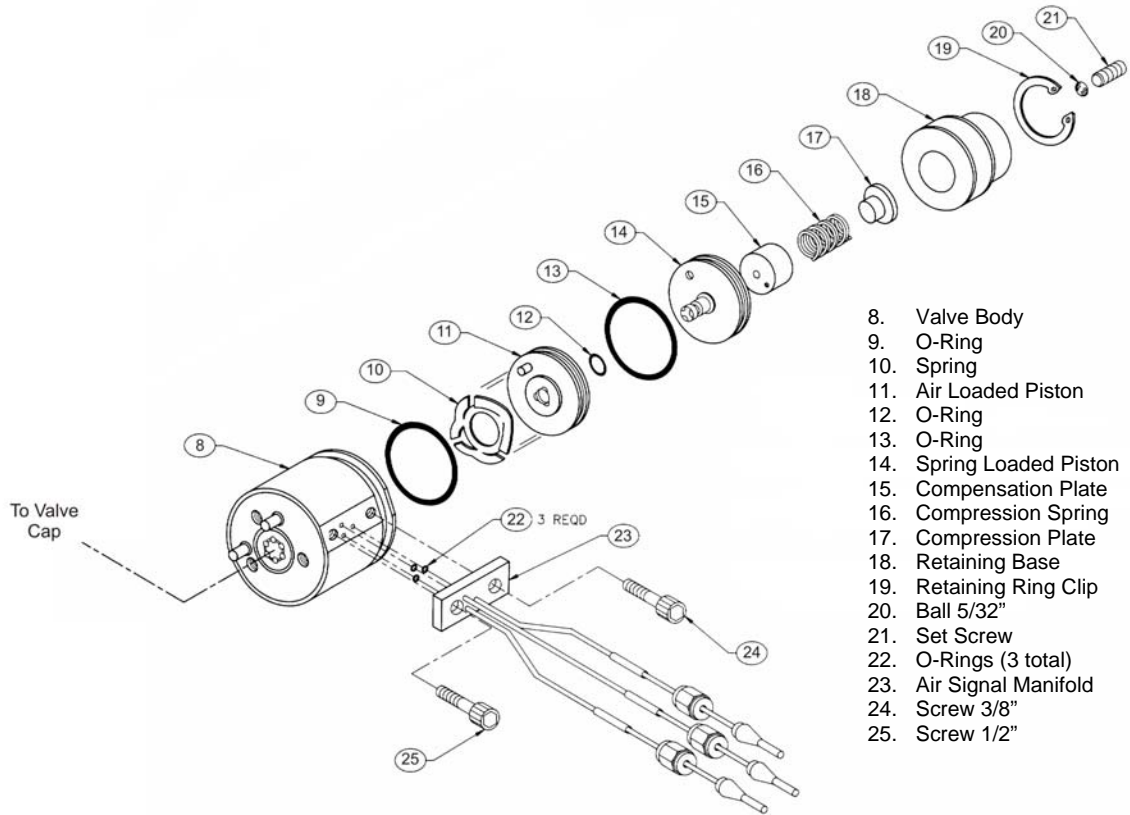
Figure 4-44: Valve Body Exploded View

Step	Procedure
10.	Examine plungers (7) for damage. Any plunger showing defects, such as nicks, must be discarded and replaced with a new part.
11.	Inspect interior of valve body (8), spring loaded piston (14) and air loaded piston (11) and silicon rubber "O" rings (13, 12 and 9) for contamination, odor or mechanical wear. Any part showing evidence of excessive wear or defects must be replaced with a new component. **DO NOT** reinstall any defective component.

Model 11 and Model 11 LDV Valves, Continued

Valve Body Cleaning

To clean the valve body after it has been disassembled, perform the following procedures.

Step	Procedure
12.	To clean the valve body, the following components are recommended: Ultrasonic cleaner recommended Cleaning solution such as strong detergent solution, hexane, acetone or methanol. Where indicated, use only Krytox Flourinated Grease (Siemens part number G87004). If a strong detergent solution is used, all cleaned parts must be thoroughly rinsed with a solvent to remove detergent residue before reassembling of valve body.

NOTE

If cleaning solvent becomes contaminated during performance of the following steps, replace it with a clean supply of cleaning solvent.

CAUTION

⚠

Do not place polished valve body (8), or associated parts, against any surface in ultrasonic cleaner or against any abrasive surface. Place parts on a lint free cloth, free of foreign contaminants.

Do not wash O-ring in any type of cleaning solvent.

13.	Fill Ultrasonic cleaner with cleaning solvent.
14.	Before placing valve body parts in Ultrasonic cleaner, wipe off all grease and foreign contaminants from valve parts.
15.	Place valve body parts on a lint free cloth in ultrasonic cleaner.
16.	Turn Ultrasonic cleaner ON and allow to run for 10 minutes.
17.	Remove parts and shake cleaning solvent from tubes. Let parts air dry before reassembling.

Model 11 and Model 11 LDV Valves, Continued

Valve Body Assembly

Step	Procedure
18.	Before reassembling valve body parts, clean hands, tools and perform reassembling procedures in a clean dust free area.
19.	Apply KRYTOX 240 AC in both "O" ring grooves of spring-loaded piston (14)
20.	Install silicon rubber O-rings (12 and 13) and apply KRYTOX 240 AC grease to their outer surfaces.
21.	Apply KRYTOX 240 AC grease to each of the fingers of the finger spring (10) of air-loaded piston (11).
22.	Place air loaded piston (11) over the small diameter of spring-loaded piston (14) with finger springs (10) outside. Align piston with guide pin. Refer to Figure 4-47.
23.	Apply a bead of KRYTOX 240 AC grease to the "O" ring air-loaded piston (11) groove. Refer to Figure 4-46.
24.	Install silicone "O" ring (9) and apply grease to the "O" ring outer surface.
25.	Apply a thin film of KRYTOX 240 AC grease to inside of valve body (8) where the pistons (14 and 11) will be sliding.
26.	Insert both pistons (14 and 11) into the bottom of cylinder. Use retaining ring pliers to install the pistons with the guide pin in the hole of the valve body (8). Refer to Figure 4-47.

CAUTION

⚠️

Exercise care not to damage the O-rings when sliding them past the lower retaining ring groove.

Step	Procedure
27.	Apply KRYTOX 240 AC grease to the compression plate (17) beveled cone. Insert the ball (20) into the greased cone.
28.	Insert both the compression plate (17) and ball (20) into retaining base (18). Refer to figure 4-45.
29.	Apply KRYTOX 240 AC grease to base socket head set screw (21) then screw it into retaining base (18). Leave about one thread of set screw showing.
31.	Place compression spring (16) on compression plate (17).
32.	Place compensation plate (15) over the compression spring (16).

P49510

S52000

P49500

V16052

B00065

H1064
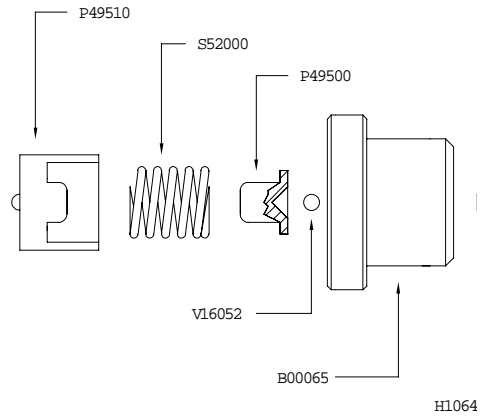
Figure 4-45: Assembly of Air Loaded and Spring Loaded Pistons

V16022

SPRING

PISTON
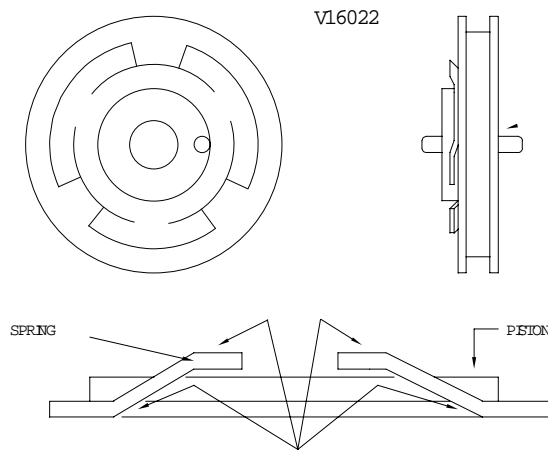
Figure 4-46: Greasing of Spring Pressure Points
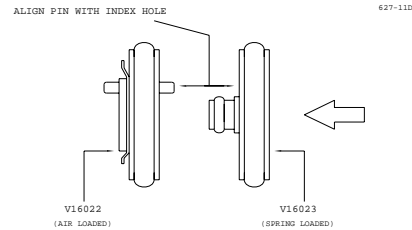
Figure 4-47: Valve Base Alignment Pin

Step	Procedure
33.	Before final assembly of components, apply a thin film of KRYTOX 240 AC grease to the outside of compensation plate (15) and inside of retaining base (18).
34.	Place the compression spring (16), compression plate (17); socket head set screw (21), retaining base (18) and compensation plate (15) into the valve body (8).
35.	Use the plier tool supplied with the repair kit to reinstall the retaining ring (19).

CAUTION

⚠

Be certain the retaining ring (19) sets into its mounting groove.

Step	Procedure
36.	Prepare to to install the manifold (23) by cleaning the flat surface on the side of the valve body (8) and then installing the three small O-rings (22) into the manifold (23).
37.	Align and install manifold (23) onto valve body (26) with two 8-32 screws (24 and 25). The shorter screw is installed in the top. Attach the manifold so that inlet holes on the manifold align with inlet holes on the valve body. Refer to Figure 4-44.
38.	If necessary, bend the top two manifold (23) tubes straight up ¼" from base of tube. Refer to Figure 4-43. Bend lower middle tube straight up ½" from manifold tube base.
39.	Reassemble valve cap (3) using the procedure provided earlier in this section.

Liquid Injection Valve

Description

This section provides routine maintenance and repair procedures for the liquid injection valve. A 6-week preventive maintenance schedule is recommended for servicing the valve; however, the schedule you choose will depend upon the:

Sample properties
Vaporization temperature
Ambient temperature
Sample pressure
Analysis Duty Cycle

Valve Service Life

You can expect a 1 year service life for the valve. However, the service life of the valve is also dependent upon the properties of the sample as well as the preventive maintenance schedule. The service life of the valve is adversely effected if the sample is injected at a high sample pressure >20 bar (290 psi.).

Part Locations

Throughout this section, the numbers located next to part names, such as "Flange (17)", refer to callouts listed in Figure 4-48. Refer back to Figure 4-48 for part locations.

Operational Notes

If the sample has a corrosive effect on the surface of the injection stem (also called a tappet), the stem must be replaced with a different material type (e.g. Hastelloy).

Over time, particles from the sample build up on the gaskets and will eventually obstruct the sample flow. Teflon and Rulon made gaskets are less subject to build up, but are not suitable for all applications. In addition, if the gaskets are subjected to temperatures outside of their rating they will loose their shape and reduce the service life of the valve.

A sample that contains non-volatile or easily polymerized components (salts, proteins, monomers etc.) can deposit residues in the vaporizer (16), in the injection hole, on the sample flow unit (15), and on the injection stem (6). Therefore, these parts should be cleaned regularly if the sample contains materials which are not vaporized. Refer to Figure 4-48 for part locations.

The sample flow unit (15) should be oriented vertically when the valve is installed. This is so that the sample will flow vertically through the valve to prevent air bubbles from forming in the valve. Make note of this when reinstalling the valve after service.

Liquid Injection Valve, Continued

Fault/Remedy Troubleshooting Chart

Fault	Cause	Remedy
All peaks appear smaller	Sample flow unit (15) or injection blocked. Buildup of material on injection stem.	Clean injection hole, stem (6), vaporizer (16) and sample flow unit (15).
Peaks are becoming wide and shifted to longer times. Baseline becomes negative before injection of sample.	Vaporizer (16) is contaminated.	Replace gaskets (14) if necessary.
Baseline becomes positive before injection of sample.	Gasket (14) between sample flow and vaporizer is leaking.	
Interruption in chromatogram: sample is not getting injected.	Leaky pneumatic actuator, grease used up, O-rings (4) damaged, control pressure too low.	Clean pneumatic actuator, replace O-rings, and grease sliding surfaces and O-rings.
Peaks too small and too wide, especially those with higher boiling points .	Heating plate is faulty. Vaporization temperature too low.	Replace heating plate. Set higher equalization temperature.
Injection quantity slowly rises until a double peak results (with calibration medium). Poor peak form, platform following peak. Increase in baseline. Visible discharge of sample.	Worn gaskets (14) and/or stem (6).	Replace gaskets (14) or stem (6).

Liquid Injection Valve, Continued

Fault	Cause	Remedy
The section of the injection stem that is normally in the sample flow stream (near the notch) is rough. Material wear on this section of the stem is visible using a magnifying glass. The effect is significantly less on the rest of the stem.	Corrosive sample	Possibly replace injection stem (6) by version made of another material (e.g. Hastelloy)
Thin scratches are visible (with a magnifying glass) on the stem near the sample groove. These scratches run along the stem for several millimeters.	Sample is contaminated by particles (most frequent case). The particles get lodged in the gasket and scratch the stem during injection.	Check filter from sample system and replace if necessary. Replace stem (6) and gasket (14).
The space between the stem (6) and the inside wall of the vaporizer (16) is filled by deposits. This can block the supply of carrier gas. In extreme cases deposits may result on the stem (6). Brown deposits are present on the vaporizer gasket (14) at the outlet to the vaporization area.	The sample contains dissolved salts and other non-volatile materials.	The deposits in the vaporizer (16) may be removed mechanically (drill/reamer with 3.3 mm diameter), or the part may be replaced.

Liquid Injection Valve, Continued

Maintenance Procedures

Figure 4-48 is an exploded view of the valve. Use this figure to aid you in removal and replacement of parts. Parts shown for the heater and sensor area may vary depending upon the valve type.

Removing Valve

Perform the following procedure to remove the valve from the oven. Removing the vaporizer (16) and flange (17) is optional when removing the valve.

WARNING

⚠

To prevent injury from burns always switch off the oven and valve heaters and allow the oven and liquid injection valve to cool down before touching the valve.

Step	Procedure
1.	Switch off oven and valve heaters and allow oven and valve to cool down.
2.	Switch off sample flow at the sample conditioning system and allow sample line to empty.
3.	Shut off power to the chromatograph.
4.	Shut off carrier gas and control air supplies.
5.	Unscrew the sample line and pneumatic actuation control lines from the liquid injection valve.

NOTE

Depending on the type of service being performed, it may not be necessary to remove the vaporizer and flange.

6.	(If removing entire valve) Disconnect the carrier gas inlet line from the carrier inlet tube (18), and disconnect the column from the vaporizer (16) outlet inside the oven and then remove the valve.
7.	(If not removing vaporizer and flange) Do not disconnect carrier gas or column. Unscrew the valve body (7) from the flange (17) and pull out.

Liquid Injection Valve, Continued

CAUTION ⚠	All work should be performed on a clean dry surface. Parts should be placed on a clean lint free cloth and hands should be clean.

Disassembling Valve   Refer to Figure 4-48 for the following procedure.

Step	Procedure
1.	If vaporizer (7)and flange (8) were not removed from the analyzer, then skip this step. Unscrew the valve body (7) from the flange (17) and vaporizer (16) and separate the components.
2.	Remove the 2 hex set screws (2) and remove the control cylinder (1).
3.	Lift off the sample flow unit (15) and adjustment assembly (13) from the injection stem (6).
4.	Remove the sample flow unit and the lens shaped gasket (if the gasket is not present it is stuck in the vaporizer) to allow the Belleville washer plate springs (10) to drop out.
5.	Pull the control piston (3) with stem (6) out of the valve body (7). Do NOT use any tools such as a screwdriver as a wedge between the piston and the valve body. This would damage the valve body and control piston.

Liquid Injection Valve, Continued

1. Control Cylinder
2. Hex Set Screws
3. Control Piston
4. Large O-Rings
5. Guide Pin (Only on Cross-Hole)
6. Injection Stem (tappet)
7. Valve Body
8. Small O-Ring and Piston Guide Hole
9. Label Indicating Injection Volume
10. Belleville Washer Plate Springs (approx. 8)
11. Adjustment Nut
12. Adjustment Counter Nut
13. Adjustment Assembly
14. Gaskets (2)
15. Sample Flow Unit
16. Vaporizer
17. Flange
18. Carrier Gas Inlet Tube

Note: The guide pin (5) is only applicable to pistons with the "cross-hole" type stem. Pistons with the much more common "groove/notch" stem are not equipped with a guide pin..

Figure 4-48: Liquid Injection Valve Exploded View

Groove for Sample Flow Unit

Label for Dosing Volume

Alignment Groove for Attaching to Control Cylinder Using Hex Set Screws

Groove for O-Ring
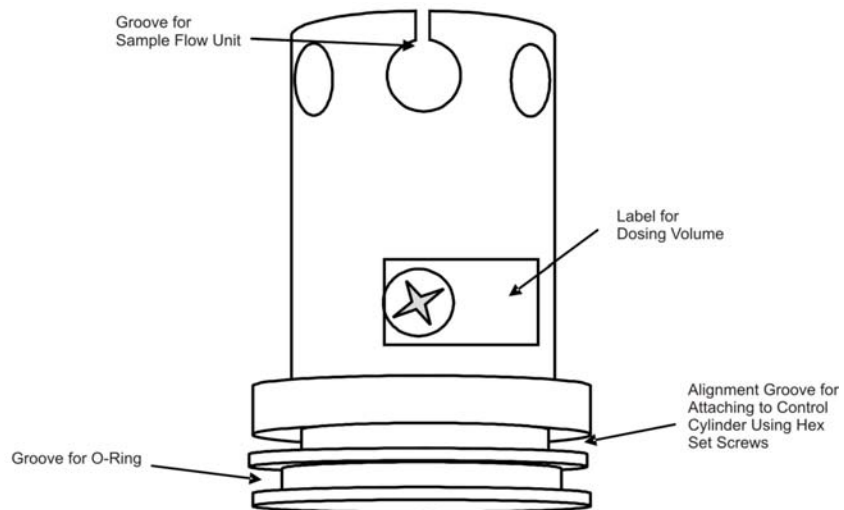
Figure 4-49: Liquid Injection Valve Body

Liquid Injection Valve, Continued

Replacing the Teflon Gasket

Refer to Figure 4-48 for the following procedures.

Step	Procedure
1.	Replace the Teflon gaskets if they show any signs of wear or contamination.
2.	Remove the gaskets (14) from the adjustment assembly (13) and vaporizer (16). To do this, gently insert the tip of the stem (6) approx. 5 mm into the gasket and then tip to the side until the gasket is loose and can be pulled out with the stem.
3.	Insert new gaskets (14) into the adjustment assembly (13) and vaporizer (16). Use the correct type gasket according to the application and temperature class.
4.	There should be no play between the new gasket and the injection stem. It should be extremely difficult to move the gasket.

O-ring Replacement

Refer to Figure 4-48 for the following procedures. The silicone O-rings of the pneumatic drive should be regularly greased with Dow Corning Grease 111, 44 or equivalent.

Step	Procedure
1.	Carefully remove the two large O-rings (4) and the small O-ring (8) out of the valve body (7) and control piston (3) using a small screwdriver or a needle. Only use silicone O-rings, temperature class -40 C to +200 C.
2.	Insert new O-rings in all three locations (4 & 8).
3.	Liberally grease the new O-rings and the sliding surfaces of the control cylinder (1) and the piston guide (2 & 8). Siemens recommends using Dow Corning 111 with a temperature range from –40 to +260 C or Dow Corning 44 grease with a temperature range from –40 to +200 C

Liquid Injection Valve, Continued

Valve Assembly

Read the following notes before performing the assembly procedure. Refer to Figure 4-48 for the following procedures

Notes

The screw threads on the flange plate (17) must move freely. Grease if necessary.

The diameter of the piston guide hole (8) should be 5.7 mm and be smooth. Replace the part if there are traces of wear on the piston shaft.

The adjustment assembly (13) must slide smoothly down inside the valve body (7).

Procedures

Step	Procedure
1.	Before assembling the valve, apply a thin film of Dow Corning 44 grease to the following parts. Use Dow Corning 111 or 44 or any grease that has a temperature rating of –40 to +260 C Internal wall of control cylinder (1) Shaft of Control Piston (3) Piston Guide hole/small O-ring (8) Outside of Large O-rings (4)following reassembly of valve body (7) and piston (3)
2.	Insert the piston (3) with stem (6) into the valve body (7) such that the stem does not become greasy.
3.	Drop the Belleville washer plate springs next to one another over the stem into the valve body. Washers must be positioned in an alternating bevel up/bevel down manner (to form a spring). Refer to Figure 4-50 for washer orientation.
4.	Slide the adjustment assembly (13) with nut (11), counternut (12) and Teflon gasket (14) onto the stem.
5.	Insert the sample flow unit (15) into the valve body (7) over the stem (6). Refer to Figure 4-51. Note that the stem hole through the sample flow unit is tapered. This tapering is not readily apparent when looking at the uninstalled sample flow unit, but it will be visible when it is installed on the stem. The narrowest side of the hole in the valve body should face outward (toward the vaporizer). The narrowest side of the hole will be apparent because it will have the least spacing between the stem and the side of the hole. Refer to Figure 4-51. Newer sample flow units have this orientation marked with an arrow.

Liquid Injection Valve, Continued

Bevel Up

Bevel Down

Bevel Up
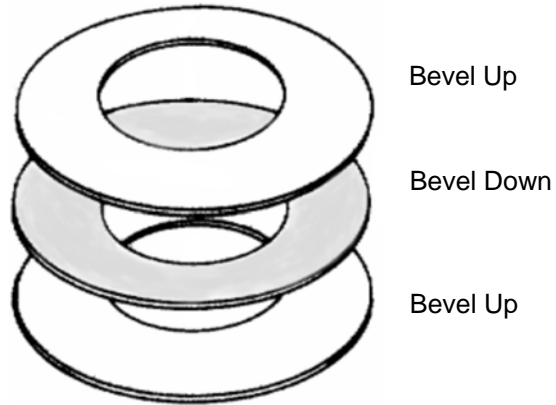
Figure 4-50: Belleville Washer Orientation
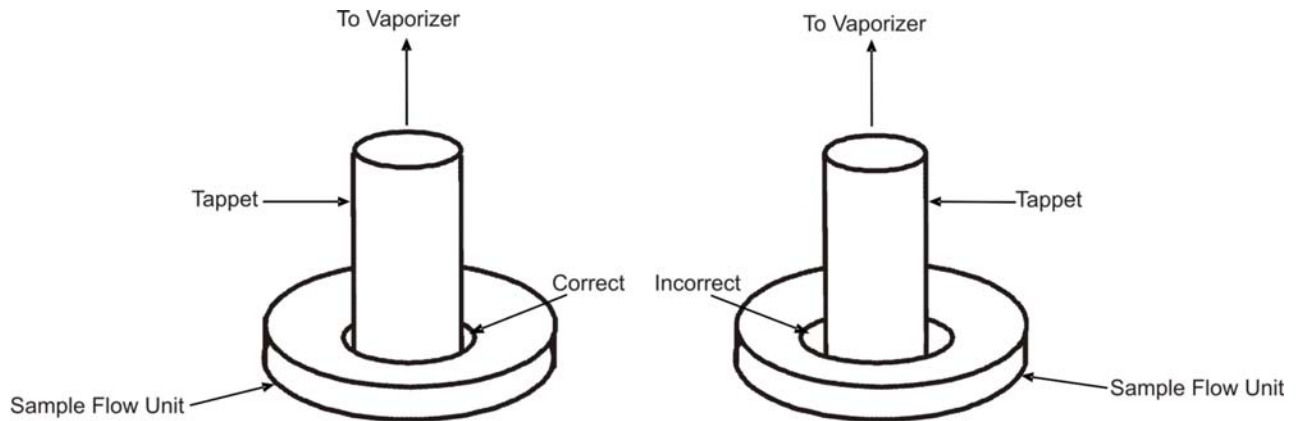
Figure 4-51: Orientation of Sample Flow Unit Hole

Liquid Injection Valve, Continued

Step	Procedure
6.	Move stem (6) into filling position. This means that the stem should be "pushed in" towards the control cylinder (1)
7.	If you have completely removed the liquid injection valve, fit the flange (17) over the vaporizer (16), and screw the valve body (7) and the flange together.
8.	If the the flange plate (17) and vaporizer (16) were not removed from the analyzer, screw the partially reassembled valve onto the already installed flange plate.

Belleville Washer Spring Adjustment

It may be necessary to adjust the amount that the Belleville washer springs are being compressed. These washers should compress about 2 mm when adjusted appropriately. This compression distance is called "spring travel" and it is adjusted using the following procedure.

Standard setting with 7 Belleville Washers: smooth round nut (11) extending about 0.5 mm past end of the threads on the adjustment assembly (13).

Standard setting with 8 Belleville Washers; about 0.5 mm of threads showing below the round nut on the adjustment assembly (13). .

The spring travel is not critical, but more compression distance should be used for higher pressures (greater than 20 bars) and less should be used for low pressures (less than 2 bars). Adjust accordingly.

Step	Procedure
1.	Check the spring travel and correct using the adjustment assembly (13) if necessary. The spring travel is correctly set if the flange (17) can be rotated a further 2.5 rotations starting with the first pressing of the Belleville washer plate springs until the flange rests on the valve body. The plate springs can be viewed through a hole when pressing together. If the flange is tightened firmly, there should be a gap of 0.3 to 0.5 mm between the plate springs.
2.	If the adjustment is necessary, loosen the flange from the valve body again, and screw the nut and counternut in or out as necessary. Then repeat the preceding step.

Step	Procedure
3.	This step is only necessary if using the less common cross-hole stem and should only be executed if the entire valve including the vaporizer is removed from the analyzer. Rotate the vaporizer (16) using a 6mm wrench until the carrier gas inlet (18) is parallel to the sample flow unit (15). The carrier gas should flow through the hole in the stem when injecting.
4.	If the entire valve was completely removed from the analyzer (including the flange and vaporizer), reinstall it at this time, but do not connect control lines, sample lines, or carrier gas. When installing the valve, adjust the valve body (7) so that sample will flow vertically through the valve. This is necessary to prevent bubbles from forming in the valve.
5.	Position the control cylinder (1), and tighten the two hex set screws (2) on the side. The screws must firmly grip the groove in the valve body (5) wall. Refer to Figure 4-49.
6.	Connect the control lines.
7.	Activate the actuator pneumatically. Check that you can hear the switching and movement noises.
8.	Connect the sample lines. After connecting the sample lines inspect that they are not subjected to any strain and that sample will flow through the valve vertically (to prevent bubbles from collecting in the valve).
9.	Complete re-installation of valve into analyzer including reconnection of carrier gas and column tubing (if these were disconnected during removal).

Dosing Stem Replacement

Although it is possible to replace the control piston (3) and stem (6) without disassembling the valve body (7), Siemens recommends that the valve body be disassembled and serviced whenever the stem is replaced.

Liquid Injection Valve, Continued

Temperature and Heating Components

To be supplied.

CAUTION

For Explosion Proof analyzers. If the heating assembly is removed, exchanged or retrofitted, the assembly must be tested and certified in accordance with appropriate regulations before the analyzer can be placed back in service.

Live Tee Switch

Description

Critical to the operation of the Live Tee Switch valve operation is the correct pressure and flow rates. This section provides procedures for setting the pressure and flow adjustments.

Procedure for Pressure and Flow Adjustments

To establish the operating pressures first ensure that the columns are not leaking and that the oven is at its operating temperature.

1. Shut off vent flows at the splitter/backflush vent, the cut vent and the purge vent.

2. Establish the desired forward column flow by adjusting the inlet pressure, then read and record the midpoint pressure at the live tee. This can be read directly from the EPC outputs.

3. Adjust the Pm (-) and Pm (+) EPC setpoint to a pressure slightly below the recorded midpoint pressure.

4. Re-establish flows at the vents, nominally 40 to 175 cc/min at the splitter vent, 10 to 70 cc/min at the cut vent and 10-30 cc/min at the purge vent. Optimum flow at the cut vent is approximately 5 times column flow. Flow instructions below 5 times column flow assume that the cut vent is connected to an ITC detector and that the purge vent is connected to the main detector downstream of the main column.

Notes Concerning Pressure and Flow Adjustments

When flows have been established at the cut vent and purge vent, the pressure at the midpoint is reduced, and flow through the pre-column increases. When the pressures at Pm(-) and Pm(+) are adjusted, flow in both columns is influenced, and peak retention times change slightly. It is better to start pressure adjustment of Pm(-) and Pm(+) at pressures slightly below the recorded midpoint pressure since the differential pressures required to operate the tee piece will be kept small and influence on the peak retention times will be minimized.

Live Tee Switch, Continued

Cut On (Pa > Pm(-) > Pm(+))

The first adjustment is made in the cut on mode (Pa > Pm(-) > Pm(+)) by reducing the Pm (+) pressure by 20 mbar (0.3 psi) via adjustment of the Pm (+) EPC setpoint. Since two peaks can appear at the main detector from one component, one through the purge vent, and one through the main column, inject a single component test sample to prevent confusion resulting from multiple peaks. A third peak may also appear on the ITC from the cut vent if an ITC is used. A multiple component sample may easily lead to confusion of the identity of various peaks.

If two peaks appear at the main detector, the earlier eluting "pre-peak" has eluted through the purge vent at the retention time of the pre-column. If a third peak has also appeared at the ITC from the cut vent, first address the ITC peak by increasing pressure at Pm (+) (or decrease the pre column inlet pressure, Pa) by 0.1 psi increments until that peak disappears on subsequent injections. Then increase Pm (+) by 0.05 psi increments until the pre-peak just disappears. If no pre-peak appears at the main detector from the purge vent, further decrease Pm (+) in increments of 0.1 psi until a pre-peak appears at the main detector. Once a pre-peak is obtained, increase Pm (+) until it just disappears.

If no ITC is used, the Pm (-) pressure must be adjusted. Reduce the Pm (-) pressure (or increase the Pa pressure) by increments of 5 mbar or 0.1 psi until the main peak at the main detector is noticeably reduced in size, and then increase the Pm (-) pressure (or decrease the Pa pressure) until the size of the peak at the main detector is maximized. Reappearance of a pre-peak at the main detector will require additional adjustment of Pm (+).

Cut Off (Pa > Pm(-) <Pm(+))

To adjust the live tee in the cut off mode of operation, reduce the Pm (-) pressure by 20 mbar (0.3 psi) and inject the test sample. If a peak appears at the main detector, the Pm (-) pressure must be further reduced until the peak at the main detector just disappears. If no peak appears at the main detector, incrementally increase the Pm (-) pressure until a peak appears, then incrementally reduce pressure until the peak just disappears.

Backflush On (Pa < Pm(-) < Pm(+))

To adjust the backflush on pressures, remove pressure from Pa and observe the backpressure at the Pa EPC output. Adjust the Pa EPC pressure to a pressure 0.5 to 1.0 psi higher than the backpressure observed in order to insure that there is a positive purge of carrier gas through the sample valve and carrier inlet to prevent backflush flow from contaminating the carrier inlet system.

Description

The following is an example of an actual application using the live tee. Actual flows and pressures are indicated and chromatograms are provided to illustrate the set up process.
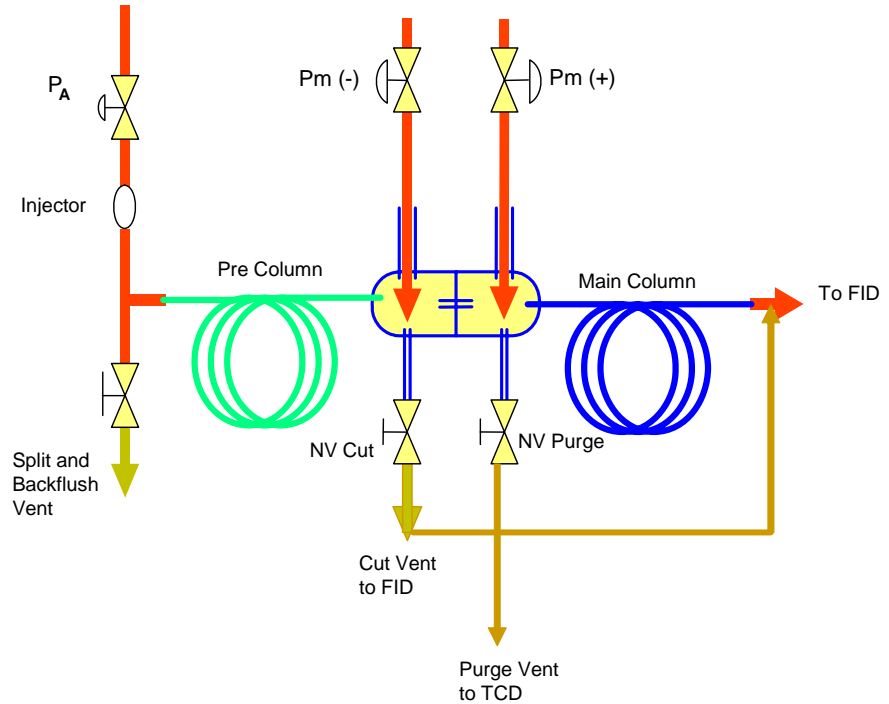
Switching Configuration:		Split Vapor Injection
		Backflush To Vent With Heartcut (Cut Vent Flow To FID)
		Purge Flow to ITC (TCD)
Pre Column:		50 m, 0.32 mm id, 1.2 um, Carbowax FSOT
Main Column:		50 m, 0.32 mm id, 5 um, ALOX Na2SO4 FSOT
Oven Temperature:		100 C
Carrier Gas:		Nitrogen
Pa	EPC 2-1	Carrier Inlet
Pm(-)	EPC 3-1	T-Piece Inlet (end of A- or Pre Column)
Pm(+)	EPC 3-2	T-Piece Outlet (Inlet of B- or Main Column)

Live Tee Example Application, Continued

Operation Checks and Evaluations

1. Columns are installed and leak checked.

2. Based on column length, diameter, carrier gas and oven temperature, Pa was set to 38.2 psi, approximately 3.5 cc/min.

3. In order to determine the midpoint pressure, the split vent and tee piece vents were capped off and Pm (-) and Pm (+) EPCs were turned off.

4. The oven was stabilized at operating temperature of 100 C.

5. A midpoint pressure Pm of 24.8 psi was recorded at Pm (-) and Pm (+) by directly reading the Pm (-) and Pm (+) EPC outputs.

6. All vents were opened and reconnected.

7. Oven temperature was allowed to stabilize.

8. Flows were adjusted as follows:

   • Splitter: 60 cc/min.
   • Cut Vent: 25 cc/min.
   • Purge Vent: 10 cc/min.

9. Open Fuel Gas and Combustion air and ignite the FID.

10. Adjust EPC pressures as follows:

   • Pa   38.2 psi
   • Pm (-)   22.8 psi
   • Pm (+)   22.8 psi

11. Inject 100% methane as a single component test sample to perform the fine adjustment of the midpoint pressures. Use of a single component sample will eliminate confusion resulting from multiple peaks.

12. Chromatogram 1: Pa=38.2 psi, Pm(-)=22.8 psi, Pm(+)=22.8 psi
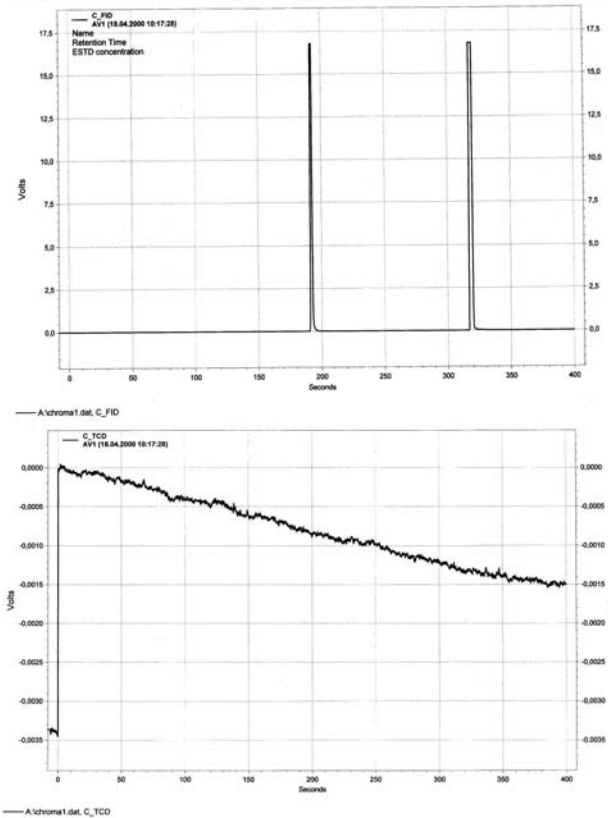
FID: Peak 192 seconds ➔ from cut vent
TCD: No peak ➔ from purge vent

Peak 318 seconds ➔ from 2nd col.
Average linear velocity through main column: 32 cm/sec.
Average linear velocity through pre-column: 26 cm/sec

Typically for equal column lengths, the ratio of pre-column to main column linear velocity will be 2:3 (20 cm/sec. to 30 cm/sec.). In this case, since the PLOT column has a higher resistance to flow than the FSOT, the ratio is higher. This ratio can vary widely with the ratios of column lengths used.

Since the pressure at the pre-column outlet is slightly higher than the Pm (-) pressure, a small component of pre-column flow is swept out the cut vent and a pre-peak shows on the chromatogram at 192 seconds. The Pm (+) pressure is slightly higher than the pressure at the inlet of the main column, so all flow through the tee piece capillary enters the main column and there is no peak at the purge vent ITC.

13. Chromatogram 2: Pm (-) adjusted to 22.9 psi, ΔP = +6.9 mBar
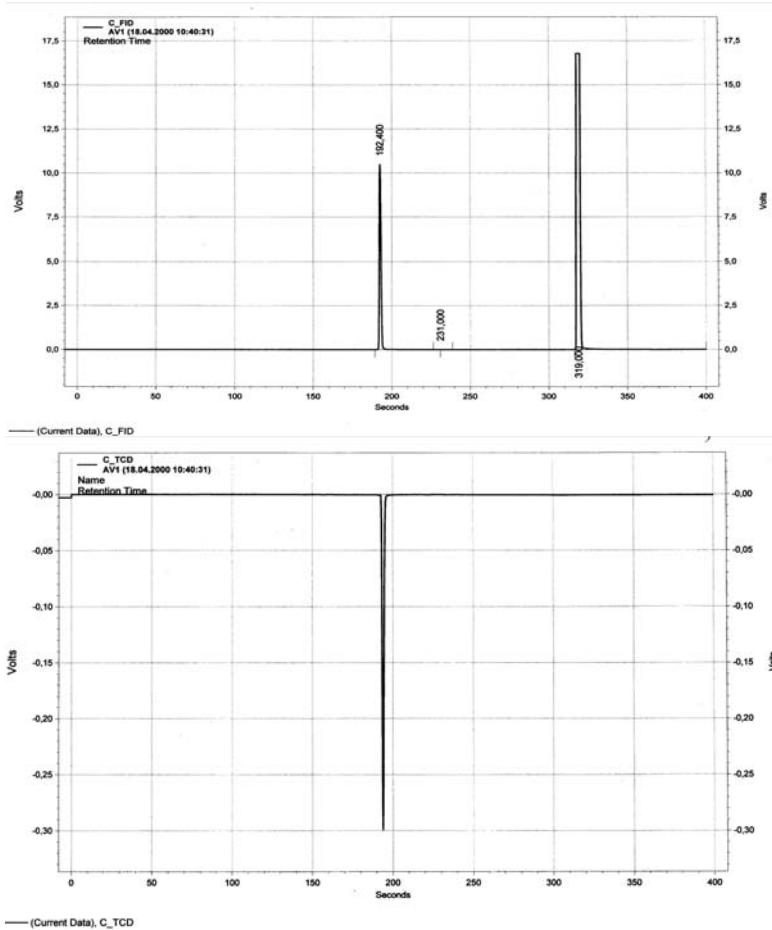
FID: Peak 192 seconds ➔ from cut vent
TCD: Peak 192 sec. ➔ from purge vent
    Peak 319 seconds ➔ from 2nd col.

Pressure at the pre-column outlet is still slightly higher than the Pm (-) pressure so there is still a peak at 192 seconds on the FID but now pressure at the main column inlet is slightly higher than the Pm (+) pressure, and some carrier flows out the purge vent causing a peak on the ITC at 192 seconds (a negative peak due to nitrogen carrier gas).

14. Chromatogram 3: Pa=38.2 / Pm (-)=24.9 / Pm (+)=24.8 psi ΔP = +6.9 mBar
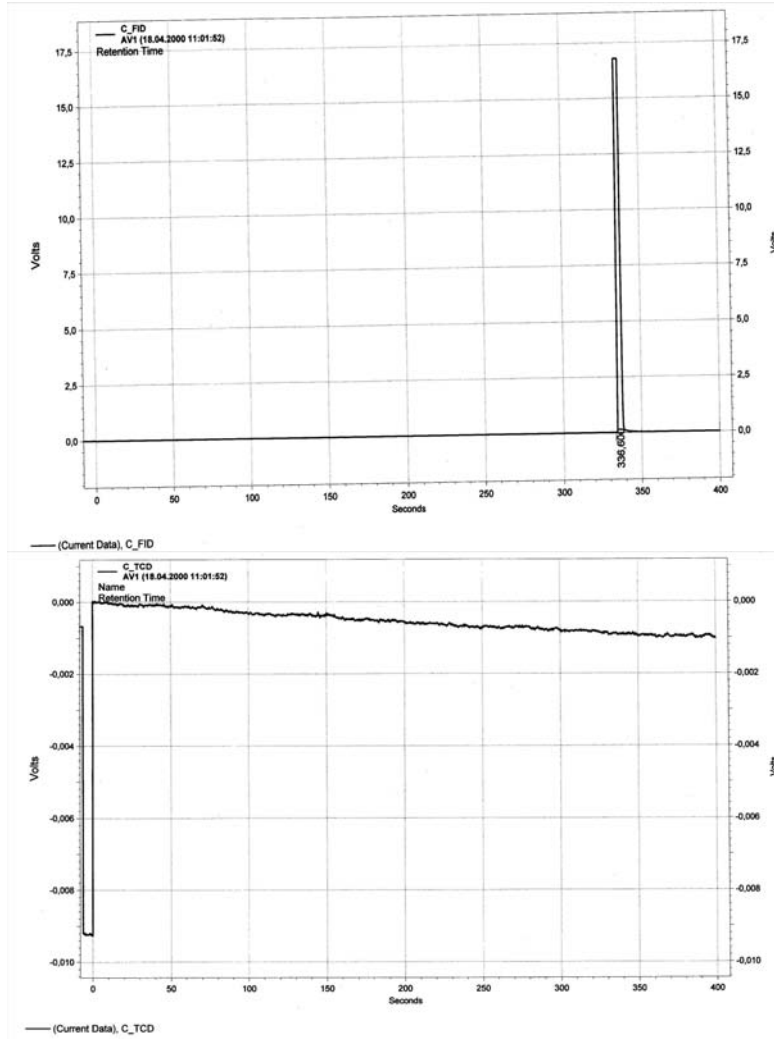
FID: Peak 336 seconds ➜ from 2nd col.
TCD: No peak

Both Pm pressures have been increased in a large step change. Pm (-) is now higher than the pressure at the outlet of the pre-column, and Pm (+) is now higher than the inlet of the main column, so only one peak shows up, on the FID at 336 seconds. The increase in retention time is due to the decrease in linear velocity in the pre-column due to the increase in its outlet pressure (Pm (-)).

15. Chromatogram 4: Pa=38.2 / Pm (-)=23.9 / Pm (+)=23.8 psi   ΔP = +6.9 mBar
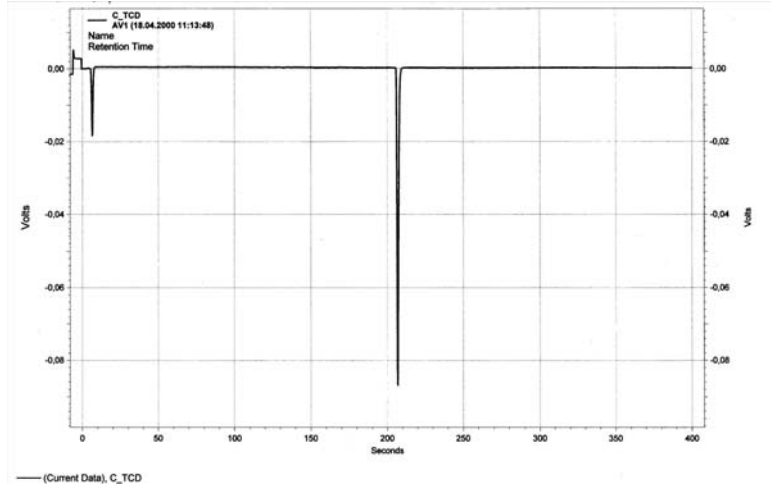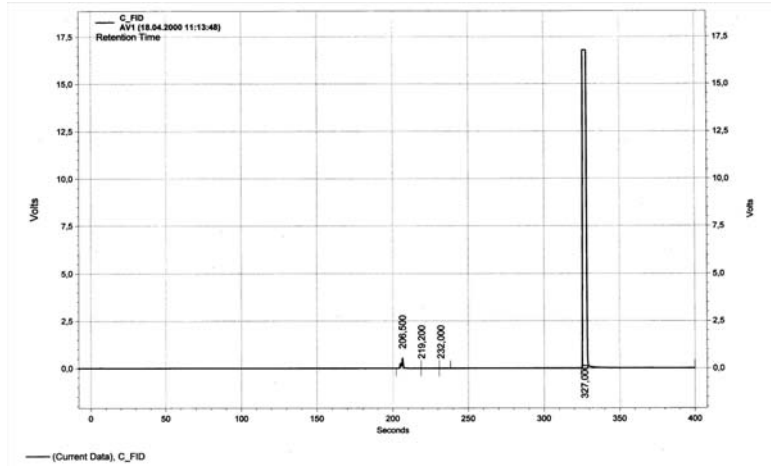
FID: Peak 206 seconds ➔from cut vent
TCD: Peak 208 sec. ➔ from bypass vent
      Peak 327 seconds ➔from 2nd col.

There is a small peak coming from the heart cut vent that indicates that almost all flow from the pre-column enters the transfer capillary. The pressures there are very nearly balanced. There is still flow from the tee piece capillary entering the purge vent, indicating Pm (+) is still slightly low.

Live Tee Example Application, Continued

16. Chromatogram 5: Pa=38.2 / Pm (-)=24.4 / Pm (+)=24.3 psi ΔP = +6.9 mBar

(Current Data), C_FID

(Current Data), C_TCD
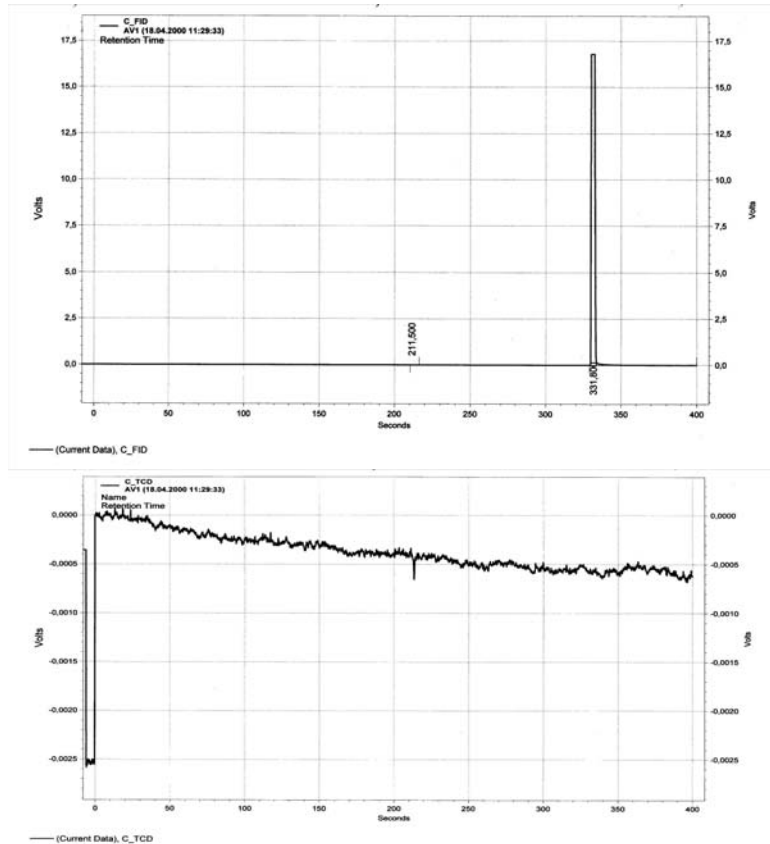
FID: Peak 211.5 sec. ➔ from cut vent
TCD: Peak 204 sec. ➔ from bypass vent
      Peak 331 seconds ➔ from 2nd col.

There is a very small peak coming from the cut vent that indicates that virtually all flow from the pre column enters the transfer capillary. There is a very small peak coming from the purge vent that indicates that virtually all flow from the tee-piece transfer capillary enters the main column.

These are the threshold settings under these conditions for the **Straight or Cut On** settings. To ensure perfect conditions even when injecting a high concentration of a fast-eluting, tall peak, the parameters are set to **Pa=38.2 / Pm (-)=24.5 / Pm (+)=24.42 psi, ΔP = +5.5 mBar.**

17. Chromatogram 6: Pa=38.2 / Pm (-)=23.5 / Pm (+)=24.42 psi ΔP = -63 mBar
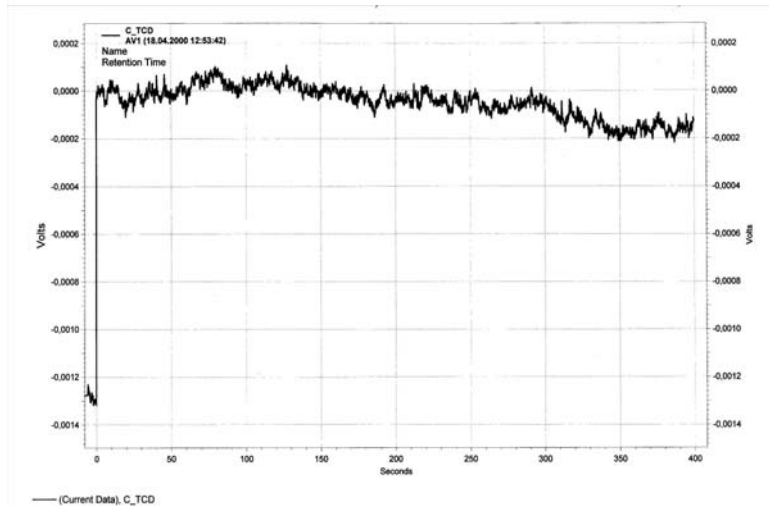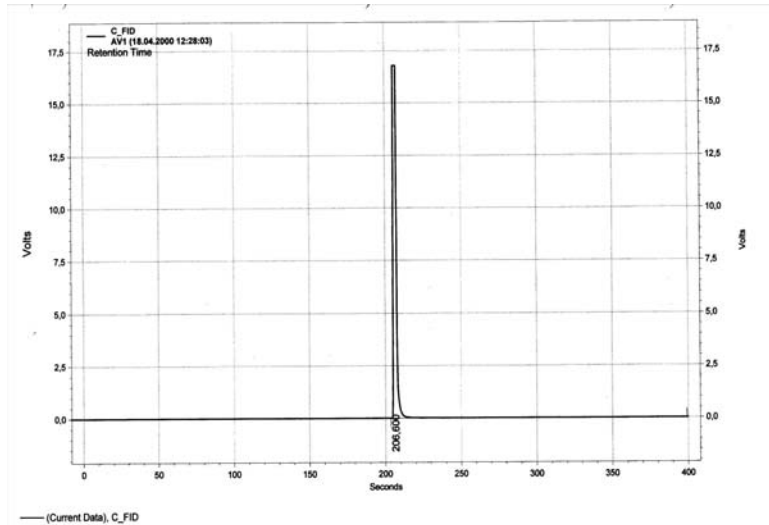
FID: Peak 206.6 sec.➔from cut vent
TCD: No peak

There is no peak on the bypass vent or after the second column. Therefore, all flow from the first column is vented through the cut vent. The pressure of Pm (-) is low enough to prevent any pre-column flow from entering the main column. However, since retention times change with the pressures applied, the differential pressures must be kept as low as practical to minimize the influence on retention times.

18. Chromatogram 7: Pa=38.2 / Pm (-)=24.0 / Pm (+)=24.42 psi ΔP = -30 mBar
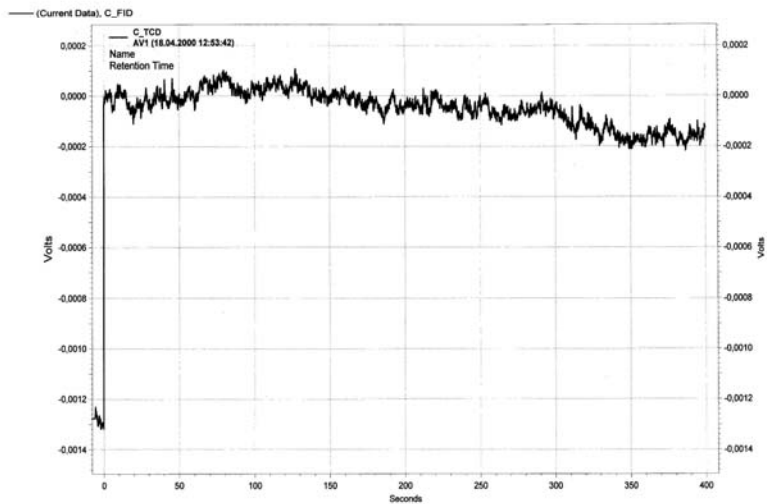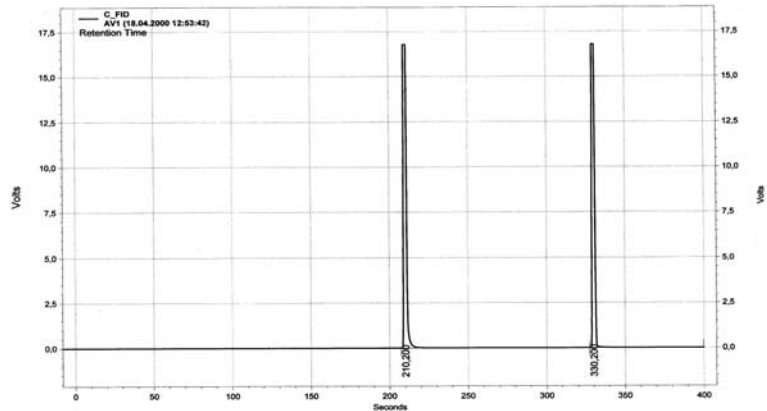
FID: Peak at 210.2 sec. ➔ from cut vent
TCD: No peak
Peak at 330.2 sec. ➔ from 2nd col.

There is a peak coming from the main column. Therefore, there is some flow from the pre-column transferred through the tee-piece to the main column. Consequently, the slightly pressure of Pm (-) is not sufficiently low to ensure that all pre-column flow is vented. Therefore, the previous setting of **Pm (-) at 23.5 psi** for the **Cut Off** position is accepted.

Live Tee Example Application, Continued

19. In order to determine the backflush Pa settings, adjust;

EPC 2-1 (P_a)	to	0 psi
EPC 3-1 (P_m -)	to	23.5 psi
EPC 3-2 (P_m +)	to	24.42 psi

The EPC 2-1 output settles at 1.5 psi. Consequently, in order to prevent any backflush components from contaminating the injection valve and the carrier gas supply, the backflush pressure P_a is set to **2.0 psi** for **Backflush On.**

Parameter Summary:

Pre Column: 50 m, 0.32 mm id, 1.2 um, Carbowax FSOT
Main Column: 50 m, 0.32 mm id, 5 um, ALOX Na2SO4 FSOT
Oven Temp: 100 C
Carrier Gas: Nitrogen
Split Vent: 60 cc/min.
Cut Vent: 25 cc/min.
Bypass Vent: 10 cc/min.

EPC 2-1, Pa	Backflush Off: 36.2 psi	Backflush On: 2.0 psi
EPC 3-1, Pm(-)	Cut Off: 23.5 psi	Cut On: 24.5 psi
EPC 3-2, Pm(+)	Cut Off: 24.42 psi	Cut On: 24.42 psi

The following chromatogram shows the result for this application using a process sample. The group Ethylene to cis-2-butene is transferred from the pre-column to the main column (Straight). After elution of cis-2-butene from the pre-column, MeCl and Isoprene are diverted to the detector via the cut vent (Cut Off). After Isoprene has eluted from the pre-column, the backflush is triggered (Backflush On).

——— (Current Data), C_FID
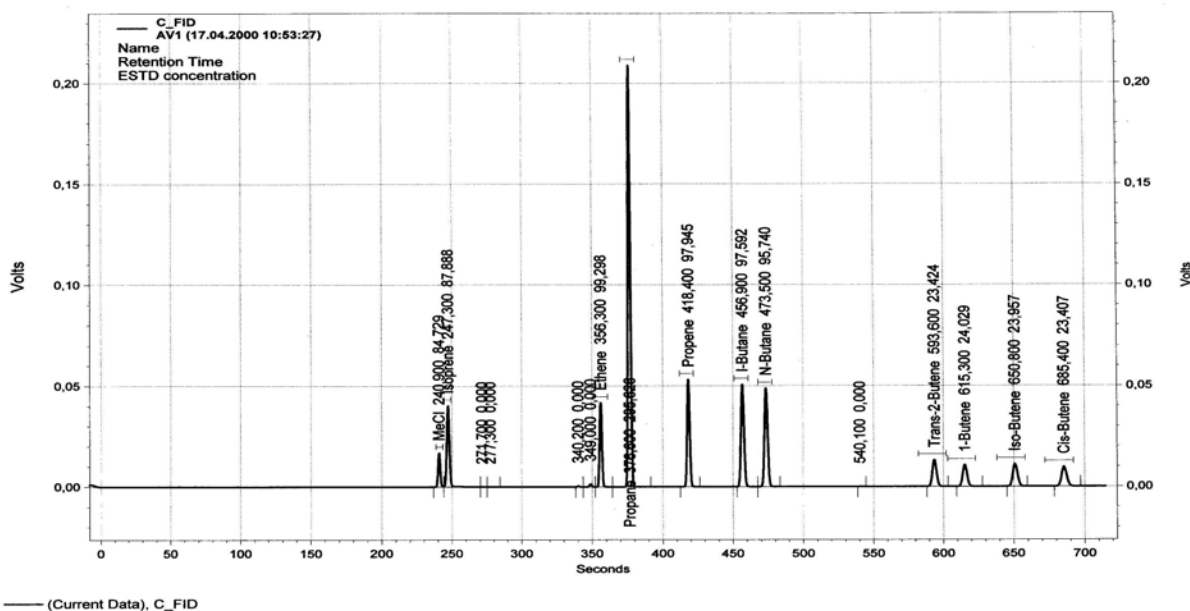
Live Tee Example Application, Continued

The Back - T:

A special case of the Live-T is the Back-T, a valveless column-switching device that incorporates only the backflush function of the Live-T. Figure 4-52 is a schematic representation of the Back-T. In this device, there is no capillary tube at the junction of the two columns; rather a small make-up flow is added at the column junction within the Back-T by operating EPC-2 at a slightly higher setpoint than the observed midpoint pressure. In Figure 4-52, the diaphragm valve at the splitter vent is optional, and the purge vent flow from the Back-T can be routed to the main detector as a make-up flow, to vent, or to a second detector.
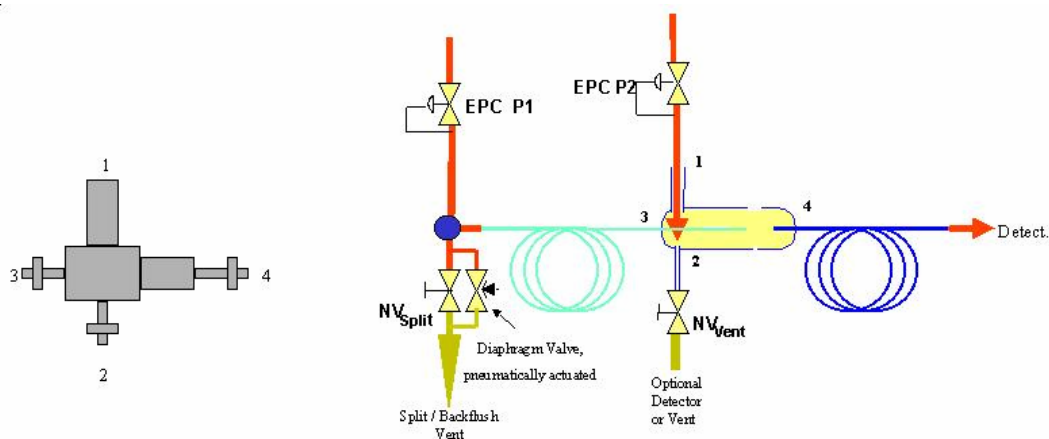
1 EPC 2	Carrier In	1/16" Tubing	7 mm Thread
2 Vent	Carrier Out	Capillary / < 1 mm Tubing	5 mm Thread
3 Pre Column Inlet		Capillary /< 1 mm Tubing	5 mm Thread
4 Main Column Inlet		Capillary /< 1 mm Tubing	5 mm Thread

Figure 4-52: Back-T Configuration for Backflush

Operation and flow adjustment of the Back-T is identical to that of the backflush function of the Live-T. To summarize, first the split and purge vents are disconnected and capped and EPC-2 is disabled. EPC-1, P1 is adjusted to the pressure necessary to yield the desired column flow at the main detector. The mid-point pressure for the column system is observed at EPC-2. EPC-2 is then enabled and its setpoint adjusted to 0.2 to 0.3 psi higher than the observed mid-point pressure. The splitter and purge vents are then reconnected; the purge vent flow is adjusted to 15 to 25 cc/minute and the split vent adjusted as necessary. To operate in the backflush mode, switch EPC-2 to P2 and operate P2 at about 3.5 psi to maintain a small flow sweeping through the inlet system. For detailed treatment, refer to the appropriate section of the Live-T instructions.

Flame Photometric Detector

Description	This section provides preventive maintenance and repair procedures for the original flame photometric detector (FPD), and the redesigned flame photometric detector (FPD II). Troubleshooting charts are provided should the detector fail to operate. The troubleshooting charts are applicable to both the FPD and the FPD II.
	FPD parts should be removed or replaced only by a trained Siemens maintenance engineer or by the user's maintenance personnel trained by Siemens.
Before You Begin	The photo multiplier in the FPD is sensitive to light. Avoid any unnecessary influence of light on the multiplier, even in the voltage-free condition. Never subject the light entry window to a bright light source.
	Shut down the FPD Switch off chromatograph
Shut-down Procedure	Shut off the detector Hydrogen Allow the detector to cool down. If the detector is to be shut down for a longer period, shut off detector air and cover the detector vent. Never disconnect the fiber optic cable (from either end) while the power is applied to the PMT module.
Preventive Maintenance	The detector baseline noise and balance level should be noted when the analyzer is first installed and then checked on a periodic basis.
	Using a workstation, the baseline noise can be noted manually by zooming in and observing the baseline on a chromatogram. One can also observe the digital signal of the detector on the Maintenance Panel on the "detector" screen. To be effective, the scan rate for the detector AI must be set to 1 second.
	If the analyzer has software release 4.2 or higher the noise can be measured automatically by setting up a measurement RMS (root mean square) noise measurement in the "smoothing" module in EZChrom. The measurement can be output as a "result" and handled as any component result is handled.

Flame Photometric Detector, Continued

Quartz Tube Handling and Cleaning

The quartz tube requires special handling procedures and special cleaning processes. Do not touch the tube with your hands or any metal object. Plastic tweezers are preferred. Dustless rubber or low lint gloves may be used to handle the tube. When the tube is replaced, replace the o-rings at the same time.

The tube is properly cleaned before shipment. If cleaning becomes necessary, cleaning of the quartz tube should be performed either by Siemens or within a properly equipped lab environment by trained personnel. For lab purposes, the recommended cleaning method is placing the tube in an equal-part mixture of H2O (deionized), HCl, and HNO_3 in an ultrasonic cleaner for 30 minutes. The tube should be rinsed in deionized water and air dried. Caution should be used handling the tube after it is cleaned to prevent contamination.

Flame Detection

The best way to tell if the flame is lit is to use the program supplied with the analyzer. The next best way to tell if the flame is lit is to observe the detector baseline. If the detector is lit the baseline will have a noise level of 100µV or higher. If it not lit the noise will be on the order of 10µV with occasional single spikes of 20-30µV. Also, the noise is at a higher frequency when the flame is not lit than when it is lit. The detector balance signal will be higher with the flame lit than with it off.

An alternative visual test can be used to determine if a flame is not lit. The flame produces water vapor which can be seen on a mirror held up to the detector vent. If there is no water vapor coming from the vent, the flame is not lit. However, water vapor may at times come from the vent when the flame is not lit (because of a condition where water is produced catalytically on the glow plug). Therefore, this test can only be used to verify if the detector flame is NOT lit.

Flame Photometric Detector, Continued

Installation: Replacing Original FPD with FPD II

Instructions for replacing an existing FPD with an FPD II in a Maxum II are included in the Maxum II Extended Service Manual.

Troubleshooting Charts

The following troubleshooting charts should be used in the event of an FPD failure

Observation: FPD is cold:

Cause	Remedy
Heater is turned off.	Switch on the heater.
Heater or temperature sensor not connected correctly.	Connect the cables correctly.
Fuse, heating cartridge, Pt100 or heater control element faulty.	Replace faulty part.

Observation: Flame Does not Ignite

Cause	Remedy
Combustion gas and combustion air connections are reversed.	Connect correctly. Correct leaks if necessary.
Air flow rate not sufficient.	Temporarily increase air pressure to 2-3 times normal pressure during the ignition process.
Glow plug faulty	If the glow plug is faulty the amber light will not light when an attempt is made to light the flame. Check the wiring connections then replace the glow plug

Flame Photometric Detector, Continued

Observation: Detector Balance Level is Too High

Cause	Remedy
Light enters the detector.	Check connections on light pipe.
Detector temperature is too high.	Set lower detector temperature.
Contaminated combustion or carrier gas.	Use high purity hydrogen and breathing quality air - replace cylinders.
Faulty light pipe (rarely defective)	Replace light pipe.

Observation: High Detector Noise with Flame Off

Cause	Remedy
Bad electronic connection	Check wiring and connections
Electronic failure	PMT module and DPM are suspect Change each one at a time to determine cause. Note: Replace DPM first as PMT modules are rarely defective.

Observation: High Detector Noise with Flame On

Cause	Remedy
Contaminated gas	Change cylinder
Leak	Perform a leak test on the system
Gas flow rates are incorrect	Check gas flows and correct

Observation: No Peaks on Chromatogram

Cause	Remedy
Gas flow rates are incorrect	Check gas flows and correct
Sample valve not working correctly	Repair/replace sample valve
Flame not lit	See below*
No sample flow	Check analyzer flow rotometer
Other Causes	Refer to low sensitivity section

Flame Photometric Detector, Continued

Observation: Sensitivity is Too Low

Cause	Remedy
Sample incorrect	Check with calibration blend
Sample flow too low	Check analyzer flow rotometer
Contaminated sample lines	Check with calibration sample connected with clean tubing to sample valve
Calibration sample incorrect	Check with new blend or have blend checked on another analyzer or lab
Leak	Perform a leak test on the system
Combustion gas flows incorrect	Check and correct flows
Hydrocarbon co-eluting with sulfur peak	Check chromatograms for deviations from normal. Have sample checked in lab for unusual components
Columns degraded or contaminated	Replace columns with new set
Integration parameters incorrect	Correct EZChrom method
Wrong method loaded	Load the correct method
Temperature of detector too low	Correct cause of low temperature
Contaminated quartz tube	Replace tube (refer to special handling instructions for quartz tube listed earlier in this section).

Flame Ionization Detector (FID)

Description

This section provides preventive maintenance and repair procedures for the Flame Ionization Detector (FID). Troubleshooting charts are provided should the detector fail to operate.

FID parts should be removed or replaced only by a trained Siemens maintenance engineer or by the user's maintenance personnel trained by Siemens.

Shut-down Procedure

1. Shut off the detector Hydrogen and allow the detector to cool down. Carrier gas should remain on during cool down to prevent condensation.

2. Turn off all supply gasses.

3. Power off the analyzer

4. If the FID is shut down for an extended period of time, the exhaust gas nozzle should be sealed to prevent dust contamination.

Cleaning Procedures

The following cleaning procedures can be performed without removing the FID from the oven. Refer to Figure 4-53 for all procedures. However, a clean work surface is necessary for maintenance of detector parts.

Danger

⚠

Never open the Ex-FID in explosive areas with the flame burning or with the power on!

Clean/Replace Flame Arrestor Insert Assembly

1. Shut down as described above.

2. Loosen and remove the Flame Arrestor Insert Assembly (1) from the FID Bottom Body (3) using a 9/16 inch open-end wrench.

3. If Flame Arrestor Insert Assembly is clogged, it may be possible to clean it using solvent and a syringe. However, replacement is recommended. If attempting to clean the assembly, blow out any excess solvent using carrier gas.

4. When cleaning/replacing Flame Arrestor Insert, it is necessary to replace the Flat Washer (2). Because this washer is made of soft aluminum, it should not be reused.

5. Place the Flame Arrestor Insert (1) and the new Flat Washer (2) in the Bottom Body (3) and tighten using a 9/16" open-end wrench. Make sure that the Flat Washer fits into the recessed cavity at the lower end of the Bottom Body (otherwise leaks may result).

Flame Ionization Detector (FID), Continued

1. Flame Arrestor Insert Assembly
2. Flat Washer
3. Detector Body (Bottom)
4. Filter
5. Retainer - Small
6. Retainer - Large
7. Outer Ferrule
8. Graphite Ferrule
9. Pressure Ferrule
10. Burner Nut
11. Quartz Jet (with flame tip nozzle)
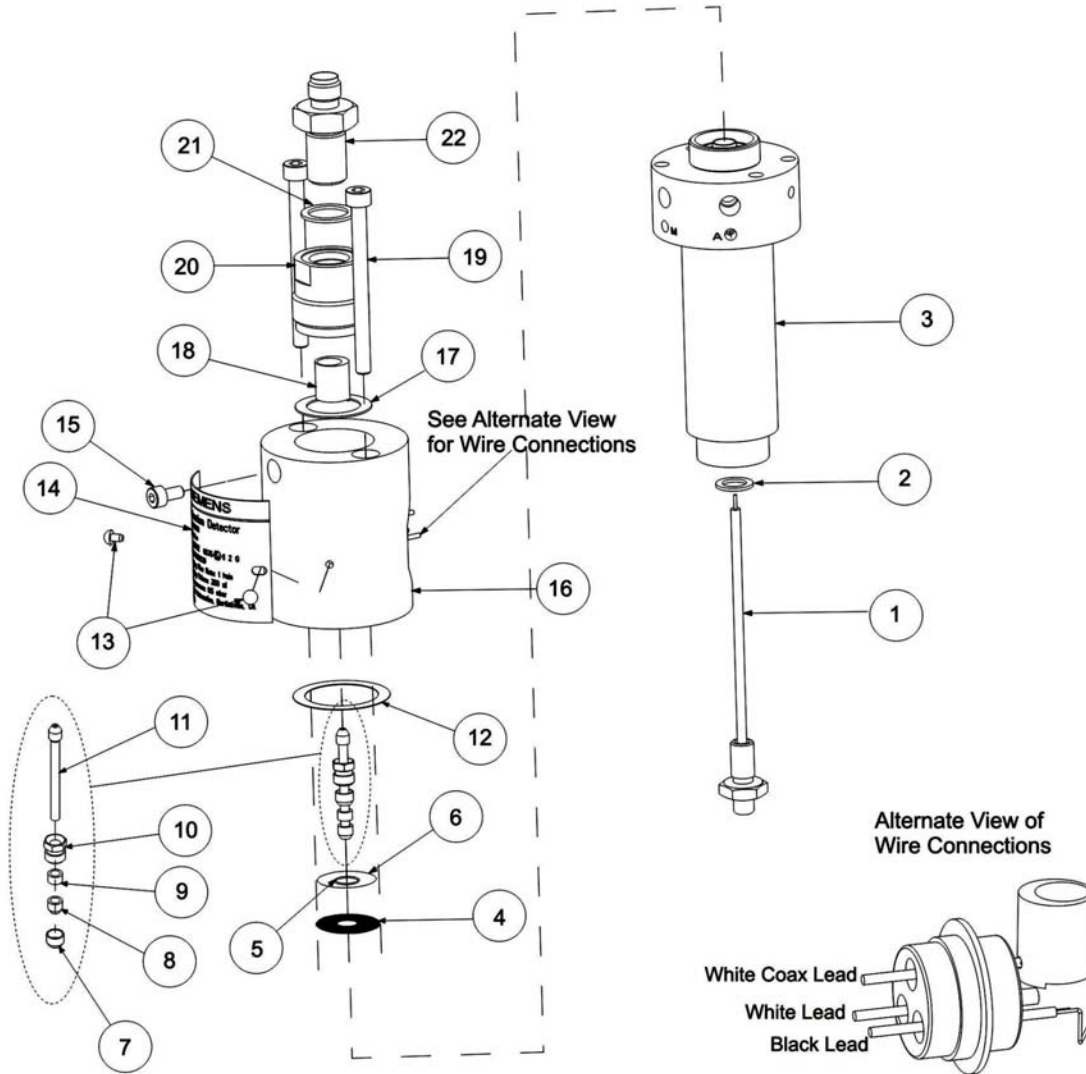
12. Graphite Seal
13. Hammer Drive Screws (for Label)
14. Label
15. Socket Heat Cap Screw
16. Detector Body (Upper)
17. Teflon Seal
18. Collector
19. Socket Heat Cap Screw (M5 x 60)
20. Flame Arrestor Bushing
21. Flat Washer
22. Flame Arrestor

Figure 4-53: FID Assembly

Flame Ionization Detector (FID), Continued

Clean/Replace Quartz Jet Nozzle (11)

In the unlikely event that the Quartz Jet (11) becomes dirty or clogged, instructions for replacing the Quartz Jet and associated hardware (7, 8, 9, 10, and 11) are included in the Maxum II Extended Service Manual.

Replacing/Cleaining of Mesh Filter (4)

Because of the very small diameter of the Combustion Air Restrictors, it is unlikely that the Filter (4) will become dirty or clogged. Because it is difficult to remove this filter without damaging it, if the filter is ever removed during rebuilding/cleaning of the valve, it should be replaced and not reused. Instructions for replacing the Mesh Filter are included in the Maxum II Extended Service Manual.

Clean/Replace the Flame Arrestor Hardware (20, 21, and 22)

1. On the side of the FID loosen the mounting screw (15), which is used to secure the Flame Arrestor (22).

2. Unscrew/Remove the Flame Arrestor (22), Flat Washer (21) and Bushing (20).
   Note: Earlier versions of the FID are equipped with a single piece Flame Arrestor (referred to as a "rattler" because it rattles when shaken). This Flame Arrestor can be replaced with the newer Arrestor/Washer/Bushing combination with no additional hardware.

3. It may be possible to clean the Flame Arrestor with a solvent. However, replacement it recommended. If attempting to clean using solvent, allow all solvent to dry before reinstalling.

4. Reinstall the Flame Arrestor (20, 21, and 22) and secure using the mounting screw (15) on the side of the FID.

Flame Ionization Detector (FID), Continued

Replace Gas Restrictor Connectors

If Combustion Gas or Combustion Air restrictors become clogged, replacement is recommended as the crimps and coils on the restrictors will prevent effective cleaning. Unscrew and replace the restrictor using the appropriate open-ended wrench.

Caution

⚠

Install only the prescribed gas connectors with pressure reducers in the Ex-FID, otherwise the ex-protection becomes invalid.

Checking/Replacing Coaxial Cable

If the coaxial cable is bent or crushed or if the connectors are damaged or defective, the cable must be replaced. Care should used when replacing the cable so as not to damage the insulation around the electrode connector.

Cleaning Upper Body (16) and Electrodes

Cleaning of the electrodes is NOT recommended. Do NOT use solvent on the electrodes. However, separations involving silicon may lead to buildup of silica (white powder) in the body. This can cause reduced flow and loss of sensitivity. In this instance it is possible to brush off the silica using a glass brush.

Igniter Replacement

A few very sporadic issues (refer to the troubleshooting charts in this section) have been observed in association with autoignition of the FID. A redesigned FID igniter board, has been developed to address these issues. If you are experiencing issues with the igniter, contact Siemens regarding the possibility of upgrading to the new igniter. If experiencing issues with the igniter, avoid using auto-ignition until igniter is replaced.

All future igniter replacements will utilize the new version of the igniter. Detailed procedures for upgrading the FID igniter are included in the Maxum II Extended Service Manual.

Flame Ionization Detector (FID), Continued

Troubleshooting Charts

The following troubleshooting charts should be used in the event of an FID failure.

Observation	Cause	Correction
Flame does not ignite.	Combustion gas flow rates are wrong.	Adjust correct gas flow rates.
	Combustion gas flow low because restrictors are clogged by small dirt particles.	Clean or replace restrictors.
	Combustion gas filter (4) clogged.	Clean or replace filter.
	Combustion gas and combustion air connectors are reversed.	Connect H_2 to combustion gas connector.
	Ignition spark does not jump from ignition electrode to quartz jet.	Check insulation of the ignition line (also in the ignition module).
	Flame arrestor (22) clogged by deposits.	Clean or replace flame arrestor (22).
	Quartz jet (11) is defective or improperly installed	Replace or reinstall the quartz jet (11).
Base line drifts at stable temperatures.	Less drift without carrier gas?	
	Yes: Column or carrier gas is contaminated.	Replace column or switch carrier gas bottle.
	No: Contamination in quartz jet (11) and/or in the bottom detector body (3)	Heat detector overnight at the maximum allowable temperature.
	Low supply gas pressure.	Immediately change bottle.

Flame Ionization Detector (FID), Continued

Observation	Cause	Correction
Baseline current is too high.	Contamination of: - supply gases	Filter supply gas.
	- lines	Clean gas supply lines.
	- detector: signal even without flame.	Disassemble and clean detector.
	Combustion gas flow is too high.	Optimize flow.
	Column contaminated This can be verified by checking baseline current without column attached. If the baseline current is ok without the column connected, then the column is contaminated. Note – this check will not work if using hydrogen carrier.	Replace column. Heat detector over night at 160 to 180 C.
Baseline is noisy. If noise is gone when measurement cable is unplugged from the DPM, then either the detector or measurement cable is faulty.	Detector is faulty if noise is gone without flame.	Disassemble and clean detector.
	Measurement cable is faulty if noise exists even without flame.	Properly insulate and connect measurement cable/replace measurement cable.

Flame Ionization Detector (FID), Continued

Observation	Cause	Correction
Baseline raised to 4-5 Volts (signal completely dead)	Possible problems with old FID igniter.	Contact Siemens regarding whether it is necessary to replace the igniter.
RTD Failure alarms on the temperature control circuits (in the PECM or DPM).	Possible problems with old FID igniter. May cause affected module to fail.	Contact Siemens regarding whether it is necessary to replace the igniter. Replace affected module if it is faulty.
I^2C failure issues after FID auto-ignition.	Possible problems with old FID igniter.	Contact Siemens regarding whether it is necessary to replace the igniter.
Measurement sensitivity is too low.	Leaks before and after separation column.	Find and correct leak.
	Quartz Jet (11) is broken or clogged.	Replace quartz jet.
	Additive air is missing. Combustion gas supply is too high or too low.	Optimize flow rates.
	Substance volume is larger than linear range.	Inject lower volumes.
	White deposit on measurement electrode (for separations involving silicon)	Brush off white deposit using glass brush, blow dustfree.
	Injection device is defective.	Perform maintenance on injection device.

Thermal Conductivity Detector (TCD)

Description

This section provides preventive maintenance and repair procedures for the Thermal Conductivity Detector (TCD). Troubleshooting charts are provided should the detector fail to operate.

TCD parts should be removed or replaced only by a trained Siemens maintenance engineer or by the user's maintenance personnel trained by Siemens.

TCD Thermistor Board or Filament Board Replacement

Possible configurations for the TCD include the 2-Cell Filament Detector and the 8-Cell Thermistor Detector. The drawings in this section are for the 8-Cell Thermistor Detector. However, replacement of the Filament Board on the Filament Detector follows the same basic procedure.

It is possible to replace the Filament/Thermistor Board with the detector installed in the analyzer. Within this procedure, the numbers in parenthesis denote parts referenced in the list contained in Figure 4-54; refer back to the figure for locations.

Caution

⚠

Do NOT attempt to open the TCD with the power on.

Important

When removing materials from the analyzer, all items must be placed on a clean, non-abrasive surface. Use a clean lint-free cloth.

Step	Procedure
1.	Shut off flows and shut down power to the analyzer. Allow the detector to cool down.
2.	Remove the 4 screws and lockwashers (3) that secure the cover to the detector block (4) and remove the cover.
3.	Making note of the connection location for each wire, remove the wiring (8) that is connected to the Thermistor/Filament Board (12) that is to be removed.
4.	Remove the Thermistor/Filament Board (12) by removing the Button Head Hex Screw (9), the Lockwasher (10), and the Flat Washer (11).

Thermal Conductivity Detector (TCD), continued
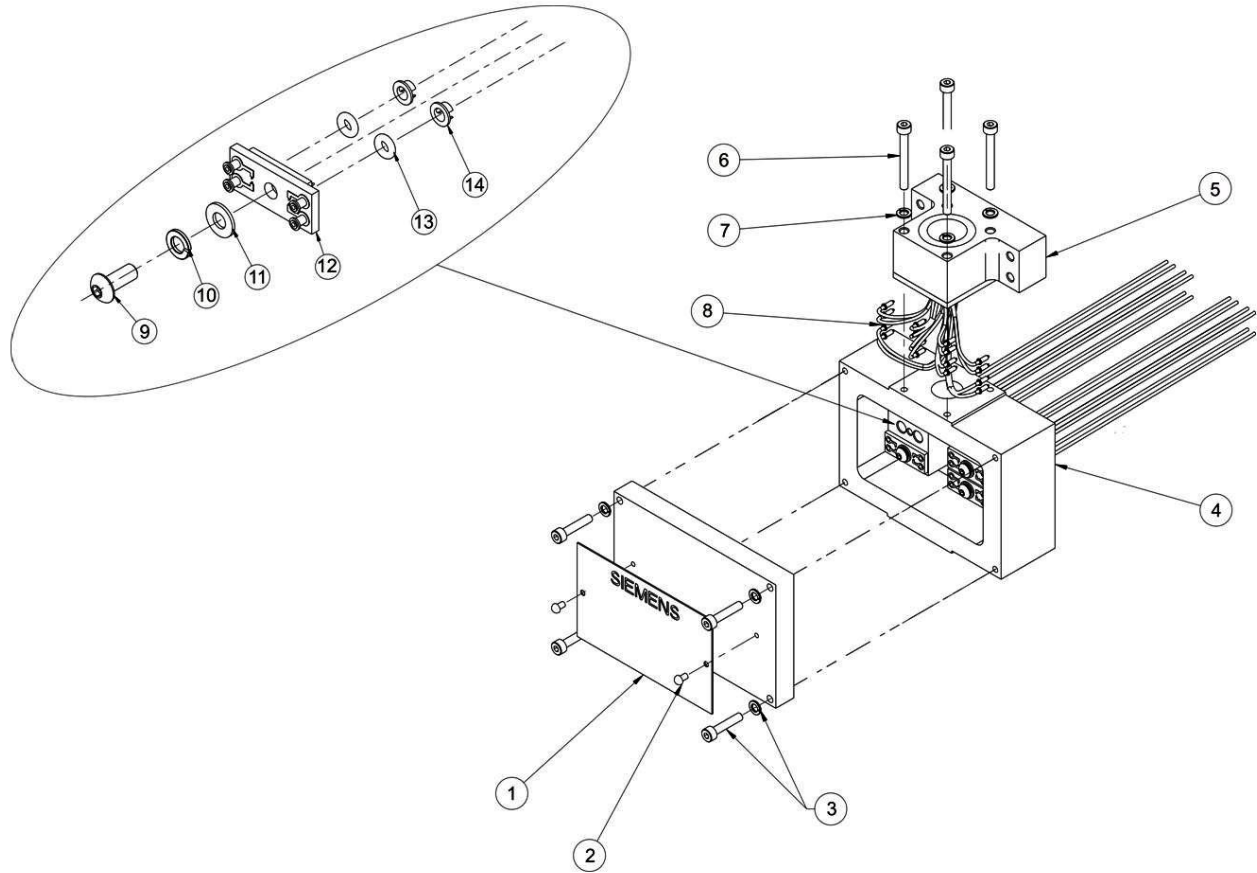
1. Label, Certification	8. Detector Wiring
2. Hammer Drive Screw (2 each)	9. Button Head Hex Screw
3. Hex Head Screw and Lock Washer (4 each)	10. Lock Washer
4. Detector Block	11. Flat Washer
5. Detector Connector Block	12. Thermistor Board (Filament Board for 2-Cell)
6. Hex Head Screw (4 each)	13. O-Ring
7. Lock Washer (4 each)	14. Flow Diverter (or Low Volume Metal Insert)

Figure 4-54: TCD 8-Cell Assembly

Thermal Conductivity Detector (TCD), continued

Step	Procedure
5.	Discard board (12) and O-rings (13). Do not attempt to reuse old O-rings.
6.	Remove the two metal inserts (14). These CAN be reused.
7.	Before installing new board, examine the mounting surface and the holes for the Filaments/Thermistors to verify there is no contamination or scratches on the machined surface.

If there is contamination on the surface, clean it using a lint free cloth and a cleaning solvent such as acetone or hexane. If the surface is scratched it may be necessary to replace the complete assembly. |
| ⚠ | **The elements on the board are exposed and are very delicate. Handle the board only by its edges.**

Hands and tools must be clean. |
| 8. | Install the metal inserts (14) in the detector block (4). These inserts should be installed with the groove perpendicular to the tube holes in the block (so that air cannot flow in a straight path between the holes). Refer to Figure 4.55 |
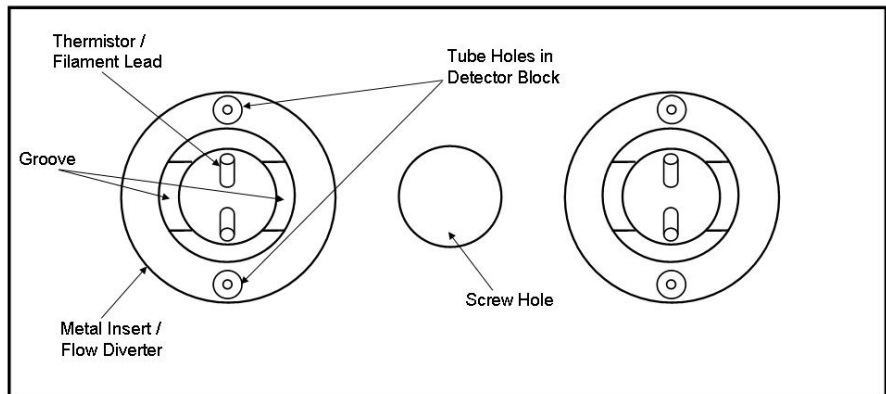
Figure 4-55: Proper Alignment of Metal Inserts

Thermal Conductivity Detector (TCD), continued

Step	Procedure
9.	Install the new O-Rings (13) in hole in the Detector Block (4).
	It is also possible to install the O-Rings on the Thermistor / Filament board (12) instead of in the hole. If installing the O-Rings on the board, be careful not to damage the element.
10.	Install the Board (12) into the Detector Block (4). When installing the board, exercise caution not to damage the exposed elements.
11.	Reinstall the Flat Washer (11), Lock Washer (10), and Button Head Hex Screw (9). Do not over tighten the screw as this can damage the Board (12).
12.	Reconnect wiring (8) to the board (12). Wiring MUST be connected to the same cells as before. Verify all termination points.
	Note: The color coding information for the wiring should be on the Detector Certification Label (1). Also note that there are two wires of each color. For a specific cell it does not matter which wire is connected to which lead as long as the color is correct.
13.	Before installing cover back on the Detector Block (4), turn on carrier air to verify there are no leaks between the Board (12) and the Block (4). Turn off carrier after this check is complete.
14.	Set the cover in place and reinstall the 4 screws and lockwashers (3) that secure the cover to the detector block (4).

Thermal Conductivity Detector (TCD), continued

Troubleshooting Chart

The following troubleshooting chart should be used in the event of a TCD failure.

Observation	Cause	Correction
Excessive noise	Chromatographic system is leaky.	Find and correct possible leaks.
	Temperatures are not stable.	Verify oven temperature.
	Measurement and supply line connections are not tight.	Retighten connections at terminal strip.
	Flow rate is too high.	Reduce flow rate.
	Column is filled improperly	Replace column.
Drift	Separation column bleeds.	Turn off TCD. Remove column from TCD and condition.
	Temperature not stabilized yet.	Await stabilization.
	Filament or Thermistor element is faulty	Replace element.

Miscellaneous Maxum II Procedures

Before You Begin

This section contains references to various procedures useful for maintenance of the Maxum II Process Gas Chromatograph. These procedures are all included in the Maxum II CD Document Library (Part Number 2000597-001) which is available from Siemens.

Maxum II Startup Procedure (Using the Workstation Software)

Startup of the Maxum II is covered in the Maxum II Installation Manual (Siemens Part Number 2000596-001). This procedure contains the elements that should be followed to restart the Maxum II after maintenance.

Backup of Maxum II Database

The procedure to backup the Maxum II Database to the System Manager PC is contained in the System Manager Overview help file of the System Manager program. The procedure is found by clicking the "How To" tab when the help file is first opened.

In addition to being part of the System Manager Software, the System Manager Overview help file is also included on the Maxum II CD Library (under the Maxum System Manager Help Files menu selection).

Alternatively, the procedure to backup the Maxum II database is included in the section of this manual titled "Maxum System Manager".

Add an Analyzer or Connect to an Analyzer Using Workstation Software

Instructions for working with the System Manager software are included in the System Manager Overview help file. Several specific procedures can be accessed by clicking the "How To" tab when the help file is first opened. Topics covered include: adding an analyzer, connecting to an analyzer, adding an analyzer group, clearing alarms, and other topics

This help file can be accessed from the System Manager software. The help file is also included on the Maxum II CD Library (under the Maxum System Manager Help Files menu selection).

Chapter 5

Parts

Introduction

Overview

This chapter provides maintenance personnel with information concerning parts and assemblies for the Maxum II.

Chapter Highlights

Topic	Page
Introduction	5-1
Maxum II Acronyms	5-2
Available Parts	5-3
Part Location Drawings	5-4

How to Place an Order

Parts can be ordered from:

Siemens Energy & Automation, Inc.
408 US Highway 60
Bartlesville, Oklahoma 74003

Tel: (800) 448-8224 (USA)
Tel: 001 918-662-7030 (International)
Fax: (918) 662-7482 (USA)
Fax: 001 918-662-7482

To ensure an immediate response to your request, you should provide the following:

Purchase order number. If ordering by phone, a confirming P.O. should be sent.

Address where the parts are to be shipped.

Address where the invoice is to be sent.

Siemens part numbers as listed.

Quantity needed of each part.

Equipment Serial number or project number of the system (especially for warranty related orders).

Preferred method of shipment.

Maxum II Acronyms

AD-4	Analog/Digital Input and Output Board
ANCB	Advance Network Communications Board; Connects Ethernet or DataNet to Advance Data Hiway Communication
ANG	Advance Network Gateway; connects high- and low-speed networks
AO-8	Analog Output Board
CEU	CAN Extension Unit; used to house additional input and output boards
DIO-4	Digital Input and Output Board
DNH	DataNET Hub; connects multiple DataNET segments together
DPM	Detector Personality Module; amplifies and digitizes detector signals
EC	Electronics Enclosure
EPCM	Electronic Pressure Control Module
FD	Filament Detector
FID	Flame Ionization Detector
FPD	Flame Photometric Detector
GC	Gas Chromatograph
HMI (MMI)	Human to Machine Interface
NAU	Network Access Unit
OEFT	Oven Entry Feed Through; linkage between SNE and detector
PCM	Purge Control Module; allows entry of purge air to electronics enclosure
PDD	Pulsed Discharge Detector
PECM	Power Entry and Control Module
SNE	Sensor Near Electronics; controller attached to oven detectors
SNECON	SNE Controller Board; processor board inside SNE enclosure
SVCM	Solenoid Valve Control Module
SYSCON	System Controller; main control computer board in GC and NAU
TCD	Thermal Conductivity Detector
WDB	Wiring Distribution Board; distributes cable harness inside GC electronics

Available Parts

Description

A spare parts list is available from Siemens that provides users with detailed spare parts information including all available part numbers as well as detailed descriptions and identifying information for many parts. Also included are photographs of most spare parts to allow for easier identification.

More than just a manual, this Spare Parts List is an interactive tool that allows users to search for parts by function or name. In many cases the user will be able to view a photograph of the part for verification.

In addition to Advance Maxum and Maxum II, the Spare Parts List Tool also contains parts information for the Optichrom, and MicroSAM products. Contact the Siemens Spare Parts Group for instructions on how to obtain a copy of the Spare Parts List Tool.

Information regarding ordering of spare parts is available by contacting the Siemens Spare Parts Group using the contact information below.

Siemens Energy & Automation, Inc.
408 US Highway 60
Bartlesville, Oklahoma 74003

Tel: (800) 448-8224 (USA)
Tel: 001 918-662-7030 (International)
Fax: (918) 662-7482 (USA)
Fax: 001 918-662-7482

NOTES:

1. ENCLOSURE, DOOR AND COVERS MATERIAL: 16 GAUGE (1.5 mm) POWDER COATED STEEL PER ASTM A366.

⚠2 DOOR GASKET MATERIAL: REINFORCED CLOSED CELL SILICONE RUBBER, 3/16" THICK X 3/4" WIDE, ADHESIVE BACKED, FURON CHR # SNS300AR.

3. ELECTRONICS ENCLOSURE VOLUME 85 LITERS.

⚠4 SOUTHCO COMPRESSION LATCH, LIFT AND TURN SERIES, TOOL-SECURED (4MM HEX) P/N 62-420-251-3

5. Max inlet pressure to EPC module – 700 kPa

Purge/Pressurization Vent

Atmospheric Pressure Port

Electronics Enclosure (Ex p)

50.8

662.0

340.0

20.2

48.0

343.0

TOOL TO OPEN LATCH ⚠4

REGULATOR TOWER (PNEUMATICS)

542.0

kEYPAD (PIEZO) (STAINLESS STEEL)

145.0

SAFETY GLASS & POLYCARBONATE WINDOW

DISPLAY (INSIDE ELECTRONICS ENCLOSURE) (Ex p)

PRIMARY CHASSIS GROUND
TERMINAL, M5 THREAD X
18.0 LONG STUD,
MATERIAL: STAINLESS STEEL

AUXILIARY CHASSIS
GROUND TERMINAL (2)
M5 THREAD X 10.0
LONG STUDS MATERIAL:
STAINLESS STEEL

ATEX CERTIFIED CABLE GLAND (POWER)

PURGE CONTROLLER (Ex em(ib))

ATEX CERTIFIED CABLE GLAND (I/O)

POWER SUPPLY

SYSTEM CONTROLLER MODULE (SYSCON)

I/O BOARDS (OPTIONAL)

OVEN AIR

VALVE AIR

WIRING DISTRIBUTION
BOARD (WDB)

DISPLAY WITH KEYPAD
FACING FRONT OF DOOR
(MMI)

POWER ENTRY CONTROL
MODULE (PECM)

POWER RELAY (Ex me)

SOLID STATE RELAY
MODULE (SSR)

SENSOR NEAR ELECTRONICS
CONTROLLER (SNECON)

AIR SUPPLY

PURGE/PRESSURIZATION
CONTINUOUS FLOW
PROPORTIONAL VALVE
(Ex ed)

| SCALE | SIZE | FSC | DRAWING NO. | REV | SHEET |
| NONE | D | CD | 2021643 | AA | 2 of 6 |

PURGE/PRESSURIZATION CONTROLLER
(Ex em(ib))

POWER SUPPLY

FS850S

ELECTRONIC PRESSURE CONTROL MODULE (EPC) (OPTIONAL)
Up to four EPC Modules can be installed for pressure
control of flammable gas with limited release using
pressurization with continuous flow with air for the
protective gas.

EPC Modules can be installed for pressure control
of non-flammable gas using pressurization with
leakage compensation with air for the protective gas.

BACK VIEW
(EXTERNAL GROUND
SCREW)

PRESSURE SWITCH
AIR BATH HEATER
(WHITMAN CONTROLS CORP.
P119G-5H-F1243-X)

HEATER 115/230

POWER RELAY
(Ex me)

M5 STAINLESS STEEL
LOCK WASHER

M5 X 10 MM STAINLESS STEEL SCREW

BACK VIEW (EXTERNAL GROUND SCREW)

SCALE	SIZE	CODE	DRAWING NO.	REV	SHEET
NONE	D	CD	2021643	AA	3 of 8

POWER SUPPLY

+24 VDC

SYSTEM CONTROLER (SYSCON)

MMI SIGNALS 5 VDC

INTERNAL ETHERNET

115/230 VAC INPUT

+24 VDC

PECM

115/230 VAC

5 VDC

MMI−2

KEY PAD

EPC #4 DUAL REGULATORS (OPTIONAL)

EPC #3 DUAL REGULATORS (OPTIONAL)

EPC #2 DUAL REGULATORS (OPTIONAL)

EPC #1 DUAL REGULATORS (OPTIONAL)

PERIPHERAL DATALINK +24 VDC

SOLID STATE RELAY MODULE (SSR)

HEATER CONTROLS

PERIPHERAL DATALINK

WIRING DISTRIBUTION BOARD (WDB)

PERIPHERAL DATALINK +24 VDC

PERIPHERAL DATALINK +24 VDC

OVEN AIR PRESSURE SWITCH #1

OVEN AIR PRESSURE SWITCH #2 (OPTIONAL)

INTERNAL ETHERNET

INTERNAL ETHERNET

115/230 VAC HEATER SELECTOR

SNECON #1

SNECON #2 (OPTIONAL)

SNECON #3 (OPTIONAL)

SVCM #1 8 VALVES

SVCM #2 8 VALVES (OPTIONAL)

SVCM #3 8 VALVES (OPTIONAL)

RTD SIGNALS

115/230 VAC

AIR BATH HEATER #1

AIR BATH HEATER #2 (OPTIONAL)

EXTERNAL SIGNALS

EPC	ELECTRONIC PRESSURE CONTROL
SVCM	SOLENOID VALVE CONTROL MODULE
SNECON	SENSOR NEAR ELECTRONICS CONTROLLER
PECM	POWER ENTRY CONTROL MODULE
MMI	MAN MACHINE INTERFACE

SCALE	SIZE	DOC TYPE	DRAWING NO.	REV	SHEET
NONE	D	CD	2021643	AA	4 OF 6

ADVANCE® MAXUM GAS CHROMATOGRAPH
LIST OF APPROVED ITEMS BY AAI PART NUMBER FOR USE
IN HAZARDOUS AREA WHEN WITHIN A PRESSURIZED ENCLOSURE
(Ex p)

STANDARD MODULES	OPTIONAL INPUT/OUTPUT MODULES	OPTIONAL DETECTOR MODULES
SYSTEM CONTROLLER MODULE 2017559	ANALOG OUTPUT 8 CHNL 2017520	SENSOR PERSONALITY MODULE 2017546
SOLENIOD VALVE CONTROL MODULE 2017711	DIGITAL OUTPUT/ DIGITAL INPUT 4 EACH 2017524	THERMISTOR PREAMP ASSEMBLY 2017540
POWER ENTRY CONTROL MODULE 2017799	ANALOG INPUT/ ANALOG OUTPUT/ DIGITAL INPUT/ DIGITAL OUTPUT 2 EACH 2017528	SENSOR NEAR ELECTRONICS CONTROLLER 2017500
POWER SUPPLY 1481000	SERIAL INTERFACE 4 CHANNELS 2017532	MAN—MACHINE INTERFACE 2020972
ELECTRONIC PRESSURE CONTROL 2015950		
SOLID STATE RELAY MODULE 2017788		
WIRING DISTRIBUTION BOARD 2017580		

NOTES:
1. ALL FITTINGS AND TUBING ARE 316 STAINLESS STEEL

TEMPERATURE CONTROL ELECTRONICS

INPUTS   OUTPUTS

AC POWER

OVER TEMP. & TEMP. LIMIT

ISOTHERMAL OVEN TEMP. SENSOR

SOLID STATE RELAY

SOLID STATE RELAY

GORDOS #GA5-6D25 OR EUROTHERM SSDA/25A/330V/LDC

WHITMAN CONTROLS CORP. #P119G-5H-F12U3-X (1605001-007)

PRESSURE SWITCH

AIR SUPPLY

PRESSURE GAUGE

AIR PRESSURE REGULATOR

RESTRICTOR

MANIFOLD

OVER TEMP. & TEMP. LIMIT CONTROL			
RESISTOR VALUE KΩ	MAXIMUM HEATER SURFACE TEMP.		TEMP. CODE
	°C	°F	
14.3	128	262	T4
16.9	193	379	T3
20.5	288	551	T2
26.1	438	821	T1

ELECTRONICS ENCLOSURE (PURGE/PRESSURIZED)

ELECT. WIRE 16 GAUGE STRANDED NICKEL-PLATED COPPER TEFLON INSULATION

THERMOMETRICS CORP. #S0269-01 PROBE TEMPERATURE SENSING, RTD, EPOXY SEALED IN METAL SHEATH ISOTHERMAL OVEN

TEFLON REDUCING FERRULE

B

PROBE, TEMPERATURE SENSING, RTD, SEALED IN METAL SHEATH ISOTHERMAL OVEN SEE VIEW "A"

CRIMPED CONNECTOR SHELL

GLASS FILLED TEFLON INSERT

SPLICE

TEFLON TUBING

TOP MICA RING

HEATER ELEMENT

VIEW B

HEATER, ELECTRIC, FARNAM CUSTOM PRODUCTS
PART NUMBER — 1400 WATT 115/230V
RATING — 1400 WATT, 115/230 VAC
EXTERNAL SHEATH, 38mm
WALL 1.6mm THICK
304 STAINLESS STEEL

AIR SUPPLY INLET

D   D

THERMOMETRICS CORP #S0276-01 DUAL RTD PROBE TEMP. LIMIT & OVER TEMP CERAMIC SEALED THIS END, EPOXY SEALED AT WIRE EXITING END

PROBE, RTD PAIR SEE VIEW "A"

HOT AIR OUTLET NOZZLE

HOT AIR OUTLET NOZZLE

CERAMIC INSULATOR/SUPPORT

HEATER ELEMENT WIRE

CERAMIC INSULATOR/SUPPORT
HEATER ELEMENT WIRE

SECTION D-D

VIEW A

Maxum System Manager

Overview

Introduction

This chapter is intended to provide the user with a printed version of the Maxum System Manager on-line help files. It presents a description of the software functions of System Manager and how to use them. The chapter contains a glossary that will answer many questions for both new and experienced users:

Before You Begin

The information in this chapter is written for Maxum software version 4.2. If your version of System Manager is different from version 4.2, then features and functions may appear different. For information regarding your version of System Manager Software refer to the on-line help files that can be accessed by selecting the Help menu while running System Manager. The latest versions of these help files are also available on the latest version of the Maxum II Online Documentation Library CD.

The software version of System Manager can be accessed by choosing the "Help" menu item and then selecting "About Maxum System Manager". The resulting window shows the version of the installed software.

Overview

Chapter Highlights   In this Chapter, the following information is provided:

Maxum

Getting Started with Maxum

System Manager Concepts

Maxum System Manager allows you to manage a network of Siemens analyzers. These analyzers can be configured, maintained, and monitored with workstation software specially designed for them. This workstation can be anywhere on the network.

Maxum Analyzer

A Maxum Analyzer is any of a family of Siemens analyzers that conform to the Siemens Maxum Gas Chromatograph (GC) hardware and software. These analyzers are: Maxum GC, Advance Plus GC, MicroSAM GC, Maxum NAU(Network Access Unit) and Quantra MS NAU. The Maxum analyzer will have a variety of different hardware configurations that may or may not include

> An HMI (Human-Machine Interface),
>
> A database (for data storage and communications)
>
> Analytical hardware and software

System Manager Concepts

The database consists of a set of tables. These tables provide storage, both temporary and permanent, for all inputs and outputs of the Analyzer. They also store the configuration of that Analyzer.

Each table contains records (also called occurrences or rows) of data (attributes or columns) and functionality (scripts) that are associated with the attributes. When the data (attributes) change in value, the scripts cause actions to occur. Action also occurs when the system is activated and when records are created or deleted. The database can be viewed in two modes: Static and Dynamic.

Viewing the Database Tables

Database tables are viewed in either Static or Dynamic mode.

A unit selected in the System View has two types of tables. System Tables apply to all applications within the analyzer, and Application Tables apply to a specific application.

System Tables

Application Tables

Application

This term refers to the supporting hardware and software required to perform an analysis. An application can be compared with a single Advance Optichrom® analyzer. The flexibility of the Maxum II analyzer gives it the ability to run multiple applications. Each application has the following:

- Streams
- I/O
- Active Stream Sequence
- Multiple Methods
- Basic Events
- Chromatograms
- Temperature and Pressure Control
- Results

Applications on a Maxum II Analyzer share hardware and a sample system.

Note: An EZChrom instrument is attached to a single application.

Method

A method is the set of information needed to perform a component analysis on a stream. It is the part of an application that contains the parameters for controlling the hardware. In other words, the method tells the hardware what to do. The method includes instrument setup (detectors, valves, etc.), peaks/groups, data collection events, and integration events. Methods are developed in Maxum EZChrom and exported to the database. They are transmitted to the SNECON at the beginning of each cycle specified in the stream/method sequence.

Sequence

A Sequence, called an Online Sequence in Maxum EZChrom, is an ordered list of stream/Method pairs. Each application has at least a normal process sequence, and a calibration sequence. Additional sequences, such as validation, are allowed. Only one sequence is active, or being used, at a time.

Calibration and Validation sequences have special actions associated with them and return to the process sequence when they are completed.

Configuring Maxum

In most cases, an analyzer will come pre-configured. This is done at the time the GC is built by using a database load file. To verify the configuration or add to it, start the System Manager (SM) and select the analyzer of interest in the System View or connect to an offline database (.amd file) using SM [System][Analyzer-Offline].

Note: In the above paragraph, and elsewhere in this chapter the path to execute functions is indicated using the form [System][Analyzer-Offline]. The information in brackets refers to the menu selections.

The local HMI (display screen) is automatically attached to the local GC. To attach the HMI to another analyzer, use the HMI emulator and choose **Select Analyzer** from the Monitor menu.

The HMI can be used for some of the configuration, as indicated.

Configuration should be executed in the following order. For more information including the step by step process with illustrations of the various windows involved in configuration, refer to the online help file.

> Analyzer
>
> Applications
>
> Detectors
>
> Temperature Controllers
>
> Pressure Controllers
>
> I/O
>
> Streams
>
> EZChrom Instrument, Methods, and Sequences
>
> Results
>
> External Results
>
> Printers
>
> Hosts

System Manager Overview

Workstation Software Overview

The Maxum Workstation Software includes the following functions:

System Manager

Most system functions are handled through this part of the software.

Use System Manager to:

- monitor Maxum, MicroSAM, Optichrom, etc. units

- edit database tables, configure hardware, application IO, and other related tasks.

- control the operation customized MaxBasic programs for analyzer operation.

- perform various utility functions, like Network diagnostics, StatMon, and Data Logger, and to launch tools such as Maxum HMI emulation.

Maxum EZChrom

A stand alone program that can be launched from within the System Manager, MaxumEZCHROM is a powerful tool for the analyzer method development tasks, such as setting up the day to day routines. Use the Maxum EZChrom functions to:

- configure applications and modify methods such as valve switching, integration events, peak and data acquisition parameter definition, and other related utilities. These activities may be, but are not necessarily, based on acquired chromatograms.

- generate stream/method online sequence definitions.

- manage chromatograms such as export, import, off-line analysis, re-integration.

About the System Manager

The main divisions of the System Manager are:

System View

This is the monitoring function of the software. It requires no action on the part of the user, because this is a comprehensive overview of what is happening with any unit that is connected to the system at any given time. For a complete description of this window, see System View Window.

Table Editor

The editor is used to configure database tables, add rows to existing tables and similar activities. Many hardware modules, like the SNE and IO, are completely "plug and play" and will automatically configure themselves. In cases where this is not true, the Table Editor is used. For more information, refer to the "Database and Tables" section of this chapter.

MaxBasic

This powerful programming language is used to change and customize different programs that involve decisions, calculations, alarm generation, and custom printing. Although it can be launched from System Manager, MaxBasic is a stand-alone program that is purchased and licensed separately from Maxum System Manager.

Other Utilities

Some of the main features are:

- HMI Emulation - This feature, found on the Tools menu, allows a user to view what can be seen on the Maxum analyzer's local Maintenance Panel display (called an HMI or, previously, MMI). Only one HMI can run on the workstation at a time.

- Maxum Utilities – This powerful application is used for several functions such as upgrading the analyzer, configuring data logging, loading and unloading Modbus maps, and loading and unloading database text files.

- Data Logger – This feature allows a user to save all results and alarms of a specific application and stream into a file on a continuous basis. The user selects the Application, Stream, and Unit for logging, and the results are saved in a text file in the Results directory.

- Network Diagnosis – If there are concerns about an analyzer's response to the network, this option will check certain aspects of the system. Currently there are four options available which allow a user to check and view reports. Refer to the Network Diagnosis section of this chapter (under "How to Use the Maxum System Manger") for more information.

- StatMon – The "Statmon" table in the Maxum database can be configured to store key database values over time. This "StatMon" utility, available under the Tools menu, is the interface to the results of this feature.

- APC – This selection, available under the Tools menu, is used to start the Advance Optichrom workstation tool (APC 8.1). The APC tools are used for display, configuration, and data capture of the Advance Optichrom GC. The APC is described in Optichrom documentation. **Although it is possible to launch APC from System Manager, it is recommended that APC software be started separate from System Manager.**

General Functions

Soon after the Maxum System Manager software is installed and started, all the analyzers that are part of the network appear in the System View Window. Each Maxum Analyzer broadcasts on the network on a regular basis about the status of the analyzer and other information. The System Manager listens to the broadcast and populates the System view window with all the units reported in the ALL group. However, if any particular unit is out of service, not powered up, or having network problems, such units do not broadcast and therefore do not appear in the System View.

When the System Manager listens to such a broadcast from any unit and there is a change in the status, an icon showing the new status is displayed in the System View Window. In addition to the broadcast, analyzers' status can also be updated manually or monitored on a regular basis.

Supervisory users can use the Maxum System Manager software to edit tables and write MaxBasic programs.

Looking at the System Manager Work Area

The Maxum System Manager software follows standard Windows screen format and includes:

- **Title Bar.** Extends across the top of the window, displays the name of the software, and serves as a convenient "handle" to move the window.

- **Menu Bar** – Provides a drop-down set of commands. The Menu Bar changes depending on whether you are disconnected, connected, or editing.

- **Main Toolbar** – Provides a shortcut to the most commonly used general commands and tools on the Menu Bar. Refer to the "About the Toolbars" section of this chapter for more information.

- **Processing indicator –** This status button is located to the left of the main toolbar. It is used to notify you that the System Manager is working on a blocking call. When the button is animated and colored, Maxum System Manager is processing data.

- **Analyzer Window –** This is a child window similar to Windows Explorer and displays the Maxum Analyzer organized as different modules with options to view details in a tree view. It displays all the applications on the analyzer with detailed information of all the methods, results, tables, and basic programs underneath each of them.
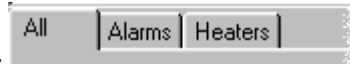
- **Analyzer Groups –** Tabbed windows that display selected groups of analyzers.

- **System View –** The tabbed window section of the Maxum System Manager interface that displays all the Analyzer Group Tabs. This view is an important and useful module of the software because it graphically displays the status of each analyzer attached to the workstation on a continuous basis.

- **Status Bar –** The lowest part of the Maxum System Manager screen is called the Status Bar. It extends horizontally across the bottom of the window.

The default text on the left side of the bar is a reminder to press the F1 key for help. When the cursor moves across the various commands in the drop-down menus, a short description of the command function appears on the status bar.

The right side of the status bar indicates whether the alpha characters are locked in upper case (CAP), whether the numeric key pad is in the number locked position (NUM), or whether the Scroll Lock is active (SCRL).

Workstation Interface

System View Window

This is the lower section of the Maxum System Manager window. It is identified by a tab labeled "**All**" and any custom group tabs you add after installation.

If the View menu option **Float System View** is selected, this window can be moved around the screen and "docked" in any convenient location similar to the toolbars. The same action can be accomplished if you place the cursor on the System View window frame, click the right mouse button, and select the option from the drop-down menu. When the window is floated, it behaves like a toolbar and can be placed within the window or elsewhere on the desktop. It can also be "docked" on either side, top or bottom of the window itself.

The System View Window can also be hidden using the Toggle System View button when performing a maintenance task, but the window is generally in view for instant status review. Icons on the window represent the analyzers and show their status.

Every unit that is part of the network is represented on the **All** tab. Depending on the System View Style, the name of the unit and the Internet Protocol (IP) address is displayed either below the icon or beside it.

A "quick menu" is also available in this window using the right mouse button. Position the cursor on an analyzer icon and click the right mouse button to see a menu that includes the Update Unit command.

.

Context Sensitive Menus

The Maxum System Manager menu bar changes depending on whether any Analyzer Frame window is open. Another menu option appears when authorized users are using the Table Editor.

Menu Options

Main Menu – (No Analyzer Window Open)

The basic main menu is displayed when the Maxum System Manager starts up or when no analyzer frame window is open. It shows the **System**, **View**, **Tools**, and **Help** menu options.

In the main menu, you can make changes to the System View window such as adding or deleting individual analyzers and adding and deleting groups. Users with the necessary permission can use the Maxum Basic and Maxum EZChrom application programs to work on files off-line. Other utilities like the Data Logger, Network Diagnostics, the Statmon utility, Backup/Download, HMI Emulation, and monitoring of all units in the group can be performed without a particular analyzer window being open.
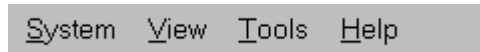
*The Maxum System Manager - **Main Menu***

System Menu Commands - Main Menu

The following topics describe the Main Menu commands. Many of these commands are also available on the Main Toolbar or the System View Toolbar.
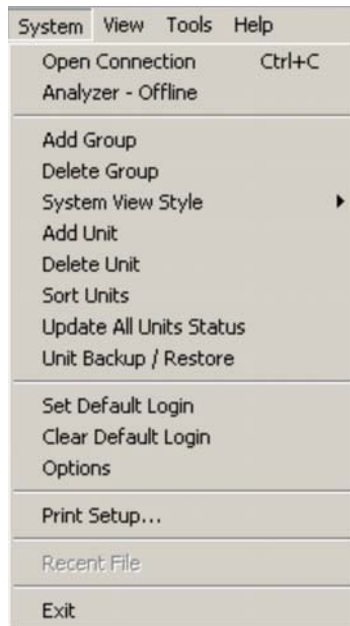
System Menu Commands - Main Menu

Open Connection

Select this menu option or click the ⬚ icon to view the Analyzer Selection dialog box. The box lists all existing units connected to the network. To connect to a specific analyzer, select the Unit Name and click the Connect button or double click the listing.

Shortcut: Double click the Analyzer icon in the System View Window , or select a unit in the system view and click the right mouse button to bring up a drop-down menu and select connect.

Analyzer - Offline

Instead of connecting to a real analyzer, you can use this function from the System Menu to work with tables from a database file that was saved during backup. This is the recommended procedure, because changes made off-line are not instantly written to the database. They can be saved to the file, and they can be downloaded later.

You can also use this option when trying to configure a new analyzer that does not yet exist on the network.

Add Group

Select the **Add Group** menu option to create a customized group of analyzers in addition to the **All** group. The dialog box that appears prompts you to type the name of the new group, then click **OK**. The group name that is typed should be unique and different from any other existing group name (regardless of capitalization).

The new name will appear on a tab in the System View window. As many as 32 groups can be added. The new group remains empty until you add one or more units using the **Add Unit** command. This option is also available by clicking the ⬚ button on the System View toolbar.

Shortcut: Click the right mouse button in the System View window frame, the area at the top of System View next to the group tabs. Select 'Add group' from the drop-down menu.

Delete Group

Select the Delete Group menu option to delete a customized group of analyzers. The dialog box that appears prompts you to select the name of the group you want to delete. After selecting the group, click the Delete button. You cannot delete the 'All' group. This option is also available by clicking the ⬚ button on the System View toolbar.

Note: Deleting a custom group does not affect analyzers listed in the **All** group.

Shortcut: Click the right mouse button in the System View window frame, the area at the top of System View next to the group tabs. Select 'Delete group' from the drop-down menu.

System View Style

Select this option to change the appearance of the analyzer icons in the System View window. The sub-menu that appears shows the three options.

A check mark appears next to the option that is active. Select the desired style.

Shortcut: Click the right mouse button anywhere in the System view window. Select 'System View Style' from the drop-down menu.

List Style
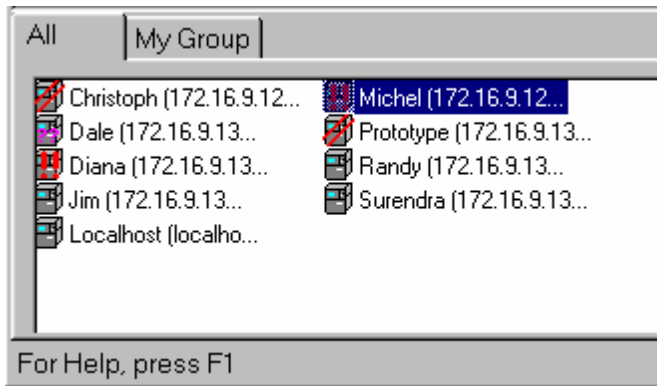
System View Window - List Style Icons

In the List Style, small icons are aligned vertically on the left side of the window with the analyzer name and Internet Protocol (IP) address to the right of the icon.

This option is also available by clicking the button on the System View toolbar.

Small Icon Style
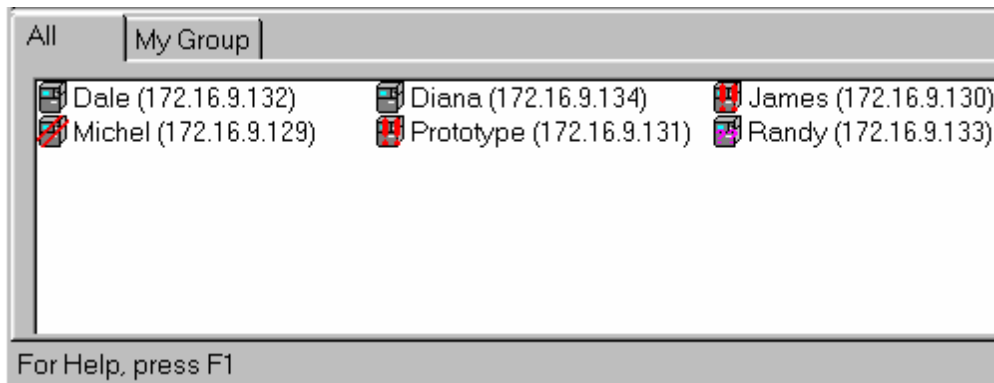
System View Window - Small Icon Style

Using Small Icon Style, the analyzer icons are arranged horizontally across the System View window with the analyzer name and Internet Protocol (IP) address to the right of the icon.

This option is also available by clicking the ![button] button on the System View toolbar.

Large Icon Style
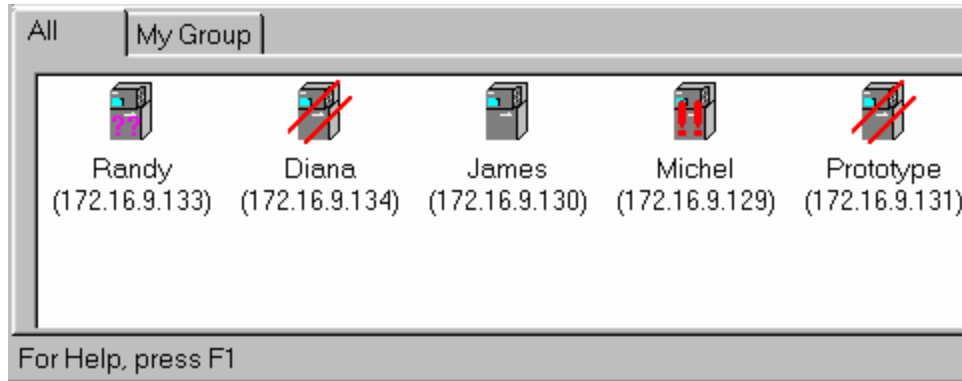
System View Window - Large Icon Style

The Large Icon Style displays the analyzer icons arranged horizontally across the System View window with the analyzer name and Internet Protocol (IP) address shown below each icon.

This option is also available by clicking the ![button] button on the System View toolbar.

Add Unit

Select this System Menu option to add an analyzer to the group that is selected in the System View window. The **Add unit to 'group name'** dialog box prompts you for the **Unit Name**, **IP Address**, and **Unit Type**. This option is also available by clicking the ![ADD button] button on the System View toolbar.

Delete Unit

Select this System menu option to open the **System View - Delete unit from group** dialog box. Select a unit and click the **Delete** button on the dialog box. The dialog box can also be opened by clicking the ![DEL button] button on the System View toolbar.

Note: Deleting an analyzer from the **All** group deletes the unit from every other System View tab

Sort Units

Select this System menu option to open a dialog box that can be used to sort the units that are displayed in the currently selected tab in the System View window.

Update All Units Status

Select this command from the System Menu to request the latest broadcast information for all units that are part of the currently selected group. If the current group is the **All** group then all analyzers known to the System Manager will be updated. This function may also be accessed by clicking the button on the System View Toolbar.

Unit Backup / Restore

Select this System Menu command to gain access to the Analyzer Backup/ Restore dialog box. It is not necessary for the Analyzer Frame window to be open in order to backup the database. Select the unit from the list box, and type or select a name for the backup file in the File name field. If you do not specify a file extension, the system will add the default extension of .amd.

For **Backup**, no security login is needed. In addition, the recommended (default) procedure saves all changes to flash, but, using the **Advanced** button, you have the option to instruct the system not to save recent changes before backup. When the unit and file name have been selected, click the **Backup the analyzer** button.

The function **Restore to the analyzer**, that is, to write a file to the Maxum database, is an action that is restricted to users with Super or Configure level passwords. Once the source file name has been chosen and the security options have been entered, click the "**Restore to the Analyzer** button.

Caution: Unit Restore is a complete download, not individual applications, and it rewrites the entire flash memory. This is an irreversible task and can crash the analyzer.

Set Default Login

Use this System Menu command to type your assigned Login name and Password. Click the **Set** button to complete the Login. Once you set the default login, this Login name and Password are used for logging into all the units. If you click the checkbox to save the password, the data is stored in the registry, and the System Manager uses it every time a password is requested. To clear the default login, use Clear Default Login (see below)

Reminder: Passwords are case sensitive for alphanumeric characters. However, only numeric passwords can be entered when using the HMI interface. If a password is used that includes other characters, then it will not be possible to login to the HMI with that user name.

Clear Default Login

Select this System Menu command to clear the default Login name and Password. No dialog or message box appears. As soon as the command is selected, the saved parameters are cleared. In order to do more than view the windows, you will need to type the login manually or set the default Login again.

Options

Use this command to open the **System Manager Options** dialog box. Use this dialog to select or remove several software preferences. Choices are then saved and used each time the application is started. When you check any of the following options, the system maintains this as the new default until you remove the check mark.

- **Do not start local HMI maximized** – Check this box to open HMI as one quarter the size of a standard VGA screen.

- **Do not update units at startup** – Click this checkbox if you do not want an initial update of units that are connected to the network but prefer to wait until the next broadcast. By default the System Manager checks the status of all analyzers on the network in the previous run. On larger networks, this procedure may take a few minutes. When this option is selected, the application opens immediately. Since the status of all analyzers is broadcast regularly, there is a maximum of 15 minutes before the units are updated.

- **Minimize help information in Table Editor** – If this box is clear, the lower portion of the Table Editor screen expands so that the user can see all definitions and helps. The default is to minimize this window and free more of the window for the table editor, otherwise the window is divided equally between the table information and the help information. In some cases the splitter frame must be resized for better access to the table. When "Minimize" is checked, the size of the help information frame is reduced (80/20), but you can scroll through the information or resize the section manually

- **Prompt to save during row movement** – Click this checkbox if you want to be prompted to save the table as you move from one row to another.

Even if you exit the System Manager application, the Options selected will remain in effect until you change them.

Print Setup

Select this System Menu command to gain access to the Print Setup dialog box where you may specify a printer (different from the default), the paper size, the paper source, and paper orientation.

Recent File

Use this System menu command to select the name of a file that was opened during this or a previous session.

Exit

Use this System menu command to exit the System Manager program.

View Menu Commands

In the Main menu, all commands on this menu are toggle options. This means that a check mark next to the command indicates the option is "on." By default, all toolbars and windows are checked except the **Float System View** (which allows the System View Window to be moved around the screen similar to a toolbar).

In addition to "floating" the **System View** window, use the View menu to hide the **System View** (window), the **Main Toolbar**, the **System View Toolbar**, the **Table Editor Toolbar**, and the **Status Bar**. Select the desired option and click it to toggle (hide / display) the selected item.
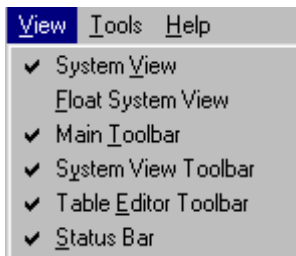
View Menu - Main Menu and

Analyzer Frame Menu

The View menu is the same when an analyzer window is not open (main menus) as it is when an analyzer window is open (analyzer frame menus) .

System View

This command will show or hide the lower portion of the Maxum System Manager window. It is identified by a tab labeled "All" and any custom group tabs you add after installation.

Float System View

Select this View menu option to move and "dock" the **System View Window** like a toolbar. When the Float System View option is checked, you can click and drag the window anywhere on the screen. If the Maxum System Manager is not maximized, the window can be floated outside the window on the desktop. It can be dragged to either side, top, or bottom of the window itself and "docked." That is, it will connect to that area of the System Manager window.

Main Toolbar

This View menu option will show or hide the Main Toolbar (which is described earlier in this chapter.

System View Toolbar

This View menu option will show or hide the System View Toolbar (which is described later in this chapter.

Table Editor Toolbar

This View menu option will show or hide the Table Editor Toolbar (which is described later in this chapter.

Status Bar

This View menu option will show or hide the Status Bar (which is described earlier in this chapter.

Tools Commands

The Tools menu is the same when an analyzer window is not open (main menus) as it is when an analyzer window is open (analyzer frame menus).
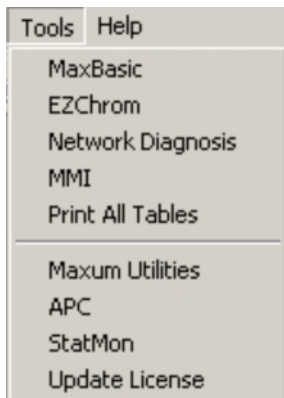
Maxum System Manager Tools Commands

MaxBasic

Select this option on the Tools menu to start MaxBasic and write your own custom programs. MaxBasic is a powerful programming language used to change and customize different programs that involve calculations, averages, sums, normalizations, etc. MaxBasic is a separately purchased workstation product that may not be licensed for every workstation.

Shortcut: Click the MaxBasic button [button icon] on the Main Toolbar.

EZChrom

Select this Tools menu option to run the Maxum EZChrom application to work with chromatogram and method files. This application can be used either on-line or off-line.

Shortcut: Click the Maxum EZChrom button [button icon] on the Main Toolbar.

Network Diagnosis

If there are concerns about an analyzer's network response, select this option to run the Network Diagnosis. Refer to the Network Diagnosis section later in this chapter for more information.

Shortcut: Click the Network Diagnosis button [icon] on the Main Toolbar.

HMI

Select this Tools menu option to view an HMI window for a selected unit. Use the mouse to click the buttons and make selections to perform tasks as if you were using the physical Maintenance Panel (HMI) device.

Shortcut: Click the HMI button [icon] on the Main Toolbar.

Print All Tables

Select this option on the Tools menu to print all the table information for tables that are available in the System Manager. You are prompted to select the analyzer of interest from a list of existing analyzers. System Manager connects to the analyzer, downloads the information, and prints each table sequentially.

As a rule, the default selections are acceptable, but you have the option of changing both Page Setup and Header/Footer Setup. The "Fit to page width" and "Landscape" checkbox options are especially useful and recommended.

Maxum Utilities

This option launches the Maxum Utilities software from within the Maxum System Manager workstation software. Maxum Utilities includes a set of additional Maxum tools including Software Upgrade, Datalogger, and database loaders. Maxum Utilities can be run independently from outside the System Manager program.

Shortcut: Click the Maxum Utilities button [icon] on the Main Toolbar.

Advance Personal Computer

This selection is used to start the Advance Optichrom workstation tool (APC 8.1). The APC tools are used for display, configuration, and data capture of the Advance Optichrom GC. These tools include the Service Panel, Datalogger, Table Editor, and Chromatogram display. The APC help file can be viewed from within the APC program. The APC program can be run independently from outside the System Manager program.

Shortcut: Click the APC button [icon] on the Main Toolbar.

Statmon

Select this Tools Menu item to access the results from the Statmon feature. Starting in version 4.2, the Statmon table in the database can be configured to store key database values over time. These historical archives are available on the workstation with the StatMon utility under System Manager Tools. Timestamp and status information are also available for access from the workstation. At the workstation, the data may be easily imported into Excel or printed.

Shortcut: Click the Statmon button on the Main Toolbar.

Update License

Select this Tools Menu item to update your software license for Maxum Workstation. This selection allows you to see Maxum software modules that are installed. A new software key can be entered to validate installed software.

Maxum II Analyzer Menu

When you connect to an analyzer using the **Menu - Open Connection** function, new selections are available on the drop-down sub-menu. Also an additional drop-down sub-menu, **Window**, appears on the Maxum System Manager Menu bar when an analyzer window is open.

Within this manual, this modified set of menus is referred to as the Analyzer Menus.

Use the **Window** drop-down menu to arrange open windows or view a list of unit windows that are opened. The commands on this menu are similar to other Microsoft Windows applications. For example, **Cascade** stacks the open windows in an offset fashion so the title bar of each window is visible, and **Tile** sizes all windows proportionally such that an area of each window is visible.

The Maxum System Manager Menu – With Analyzer Connected

System Menu Commands - Maxum II Analyzer Menu

When connected to an analyzer, the System drop-down menu provides the selections shown below. Many of these functions are also available on the Main Toolbar and the System View Toolbar.
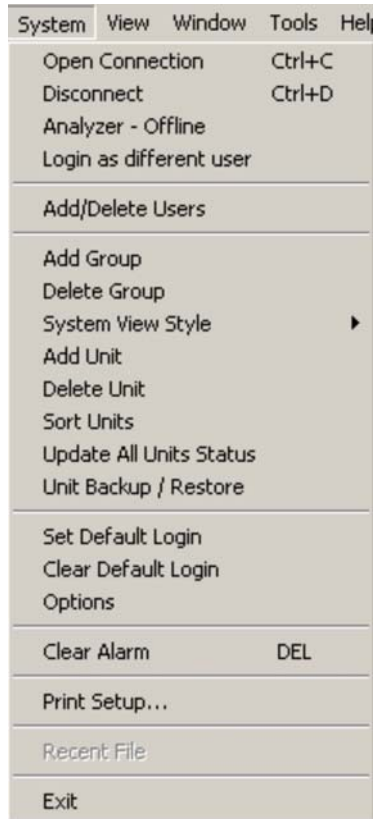
Selections on this menu that are not on the Main System Menu (with no analyzers connected) are:

- Disconnect
- Login as Different User
- Add/Delete Users
- Clear Alarm

These additional options are described below.

Disconnect

Select this System menu command to disconnect from a selected Analyzer. Using the command is the same as clicking the Disconnect button on the main toolbar.

Login as different user

This System menu selection is available when connected to an analyzer and when the Analyzer window is in focus. Use the option if a user with fewer privileges has logged in and it is necessary to perform more advanced procedures (for example, supervisory functions).

Add/Delete Users

This System menu selection is available to supervisory personnel only (user level =super). It is used to authorize new users or remove authority for others.

Clear Alarm

Select this System menu option to clear a highlighted alarm for a selected analyzer, or you can press the **Delete** key and remove the alarm. An authorized password is required to clear alarms.

Window - Commands

This additional menu entry appears when the Maxum System Manager has an analyzer window open or when editing a table. Most of the commands are similar to the standards set for all Microsoft Windows software applications. The selections available on this menu are:
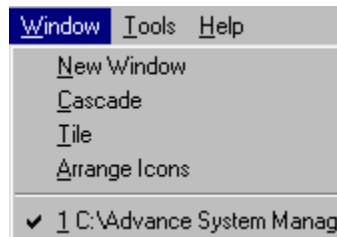
Window Menu - Maxum II Analyzer Menu

The name(s) of open analyzer window(s) appear as the last entries on this menu. If the windows are maximized, use this menu to switch from one window to another.
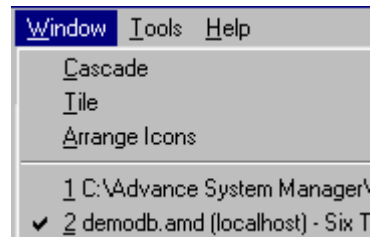
Window Menu - Table Editor Mode

When editing tables, the New Window option is not available, but the name(s) of open analyzer window(s) and table(s) are displayed.

New Window

This option creates a duplicate of the selected unit window.

Cascade

This option stacks the open windows in an offset fashion so the title bar of each window is visible. This is the function when you want to see windows in a large size and switch easily between different windows.

Tile

This option sizes all windows proportionally such that an area of each window is visible. This is the function to use when you want to see all windows at the same time.

Arrange Icons

Arrange icons at the bottom of the client area in the main window. The icons here represent any minimized child windows (such as analyzer windows or table windows) and not the icons in the System View Window.

Table Editor Menu

Menu - Edit

The **Edit** menu appears on the Maxum System Manager menu bar when you open a table. The commands on the Edit menu are available so that users may change, add, or delete information in the table as well as re-query the database for updated information.

System	Edit	View	Window	Tools	Help

The Maxum System Manager Menu – While Editing Tables

System Commands - Edit Mode

When connected to an analyzer, the System drop-down menu provides the following selections. Many of these functions are also available on the toolbars.

System	Edit	View	Window	Tools
Open Connection			Ctrl+C	
Disconnect			Ctrl+D	
Analyzer - Offline				
Login as different user				
Add/Delete Users				
Add Group				
Delete Group				
System View Style			▶	
Add Unit				
Delete Unit				
Sort Units				
Update All Units Status				
Unit Backup / Restore				
Set Default Login				
Clear Default Login				
Options				
Print Setup...				
Page Setup..				
Header/Footer ..				
Print Preview				
Print				
Recent File				
Exit				
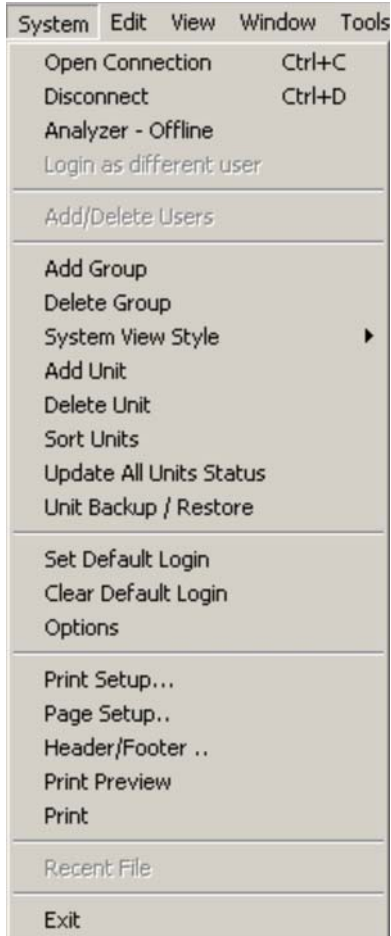
System Menu - Table Edit Mode

This menu is similar to the Maxum Analyzer system menu, however several print commands are added (such as Page Setup and Headers/Footers), and the Clear Alarm command is not available in Table Edit.

Shortcuts: Many of these functions are also available on the toolbars.

Page Setup

Select this System menu command to configure the print format of a table. The default options for Page Setup are recommended for most situations.

If changes are made, a Preview window reflects the changes to help you visualize the configuration. You may change or specify the following:

- All margins
- Options for titles and gridlines (print or omit)
- Page Order *
- Center vertically or horizontally on the page
- Save special settings for future use

* Many tables exceed the page size. The recommended procedure is to print the balance of a truncated row before continuing with the next rows.

Header/Footer

Select this System menu command to activate the dialog box to add headers and footers to the print format of a table. Access to the Header/Footer dialog box is available on the System menu only when working in Table Editor mode. Headers and footers are used when printing tables. As a rule, the Header and Footer default options are satisfactory. That is, a centered title in the header with the date and page number in the footer at the left and right margins.

Use the Header/Footer dialog to change or specify:

- Font type and size
- Alignment on the page
- Contents of headers or footers
- Proximity of headers or footers to the table frame
- Different starting page numbers
- Save special settings for future use

The format symbols (such as $D to represent date) follow general document print specifications.

Print Preview

Select this System menu command to see a full page representation of the table, logs, or other reports before sending them to print.

Print

Select this System menu command to send the selected items to the printer.

Shortcut: Click the Print button ![Print icon] on the Main Toolbar.

Edit Menu Commands

The Edit Menu appears when you open a table. The commands are available if you want to change, add or delete information in the table as well as re-query the database for updated information.
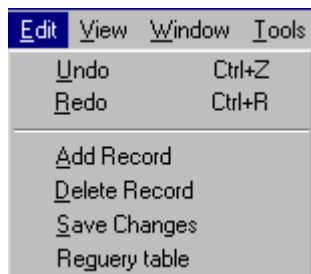
Maxum System Manager Edit Menu

Undo

Select this Edit menu option to revert to the previous edit and delete the most recent editing changes. Note that the table view is single record (row) locked with the analyzer database. This means that any changes made to a current record (row) are written to the database once the cursor moves off the record. As long as the cursor is moved among the fields within the record, no data is written to the database and can be undone.

Redo

Select this Edit menu option to recall the editing change that had been previously deleted with the Undo command. Note that the table view is single record (row) locked with the analyzer database. This means that any changes made to a current record (row) are written to the database once the cursor moves off the record. As long as the cursor is moved among the fields within the record, no data is written to the database and can be undone.

Add Record

Select this Edit menu option to insert a new row in a table. Depending on the table, the Add Record dialog box may appear. The Add Record dialog box allows the user to input data, such as Application ID and ID name, for the new record.

Tip: IDs usually follow in numerical sequence. If the table is long, scroll to the bottom to see the last number before choosing to add a record.

Delete Record

Select the Delete Record command from the Edit menu to remove a row of data from a table.

To delete a record, first select the row by moving the cursor to the leftmost column of the table (called the row header)> When the cursor changes to a black arrow (➡), click the left mouse button. The row will be highlighted in reverse video. Then select the Delete Record command from the Edit Menu.

The record is displayed with strike-through marks until you update or exit the table. Delete Record **cannot** be reversed with the Undo command. If you want to restore the record, use the Add Record command and re-type the information.

Note: Records are permanently deleted from the database. When you delete a record, a dialog box will remind you that this is a permanent change and ask for confirmation to continue, but the Save Changes dialog box does not appear when you exit the Table.

Save Changes

Select the Save Changes command from the Edit Menu when you have made changes to a table record. If you are editing several records, the change is saved as soon as you click a different record. Unless saved, changes are not committed to the database, and the Table reverts to the previous settings. If you exit a Table without selecting the Save Changes command, a dialog box prompts you to save changes.

Shortcut: Click on the Table Editor Toolbar to save changes.

Requery Table

Use this Edit menu selection when working in the table editor. The Requery function will refresh the database with any entries made by others since you have opened the table.

Shortcut: Click the Requery Table button on the Table Editor Toolbar.

View Menu

In the Main menu, all commands on this menu are toggle options, that is, a check mark next to the command indicates the option is "on." When editing tables, the **Reference Table** and **Table Information** options also appear.
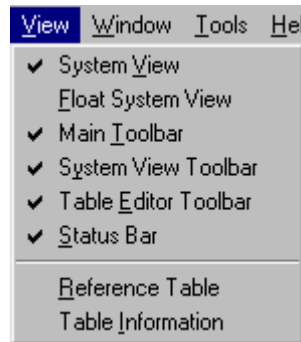
View Menu - Table Editor Mode

Reference Table

Select this option from the View menu to view the Reference Table when you are working with the Table Editor. A Reference Table is a table linked to the parent table. In other words, the column in the current table is linked to a column in another table. If a column has a linked reference table, the Reference Table function is enabled when an item in the column is selected. When you choose the Show Reference Table function, the linked table is shown in the bottom pane of the table editor window.

Shortcut: Click the Reference Table button on the Table Editor Toolbar.

Table Information

This option on the View menu is enabled when authorized users work with the Table Editor. When a table is first opened for editing, the table information shows at the bottom of the table window. When the Reference Table view is selected, it removes the table information in order to display the reference table. Select the Table Information option form the View menu to redisplay the description of the current table.

Shortcut: Click the Table Information button on the Reference Table Toolbar.

Toolbars

About the Toolbars

The Maxum System Manager software contains three separate tool bars. Any toolbar can be moved around the screen and positioned where it is convenient for you.

Main Toolbar

The Maxum System Manager Main Toolbar contains buttons that perform various system functions such as connecting and disconnecting with analyzers, as well as launching various utilities. Also included are print and help buttons.

This toolbar can be moved so that it appears to "float" anywhere on the screen. Position the cursor on a blank area of the toolbar (not on a button), click and drag the toolbar across the screen to a different location. To restore it to the original position, double click the title bar.

The Main toolbar is pictured below. Descriptions of the various buttons are included in previous sections of this chapter.

The Maxum System Manager Main Toolbar

System View Toolbar

The System View Toolbar in Maxum System Manager contains buttons that perform various functions related to the System View Window. This includes adding and deleting groups, adding and deleting analyzers, modifying the type of icons used (e.g. large or small icons), updating the status, and turning the System View window on and off.

Like the Main Toolbar, the System View Toolbar can also be moved and "floated" anywhere on the screen. Position the cursor on a blank area of the toolbar (not on a button), click and drag the toolbar across the screen to a different location. To restore it to the original position, double click on the title bar .

The System View toolbar is pictured below. Descriptions of the various buttons are included in previous sections of this chapter.

The Maxum System Manager System View Toolbar

Table Editor Toolbar

The Maxum System Manager Table Editor Toolbar contains buttons that are used when editing a table. These buttons will only be active when a table is opened for editing. The functions include common edit functions like cut, copy, paste, and save. Commands specific to editing of Maxum tables are also included. These are table reference, table information, add record, and re-query table.

This toolbar can be moved so that it appears to "float" anywhere on the screen. Position the cursor on a blank area of the toolbar (not on a button), click and drag the toolbar across the screen to a different location. To restore it to the original position, double click on the title bar.

The Table Editor toolbar is pictured below. With the exception of Cut, Copy, and Paste, the descriptions of the various buttons are included in previous sections of this chapter. The Cut, Copy, and Paste functions in System Manger are similar to the Cut, Copy, and Paste functions of other windows programs.

The Maxum System Manager Table Editor Toolbar

How To Use the Maxum System Manager

Add a Group

At times it is convenient to limit the number of analyzers that are monitored. Up to 32 different groups can be added to the System View Window.

To create a group tab that will contain your selection of Analyzers, follow these steps:

1. Click the **Add Group** button on the System View Toolbar.

2. Type the name of the new group in the New Group dialog box. The name should be unique and different (case <u>in</u>sensitive) from all other group names.

3. Click **OK**.

4. Your new group appears as the next tab on the System View Window.

   NOTE: This new group is empty until you add Analyzers. For more information, see Add a Unit.

Add a Record

If you want to add a new row (record) to a table, follow these steps:

1. Open the desired analyzer. On the left frame of the analyzer window, select the type of table (system tables, or tables within an application).

2. In the right frame of the analyzer window, double click the name of the table you wish to edit. If you're not logged in, the Login dialog box will request user name and password.

3. When the table window appears, click the Add Record button on the Table Editor toolbar or select **Add Record** from the Edit menu.

4. If necessary, type the requested information in the **Add Record** dialog box, and click OK.

5. The new record is added to the table.

Make the desired modifications to other fields in this new record as needed, and save the changes. You will be prompted to save the records to the database.

Note: Some tables cannot be edited. If the Add Record or Delete Record menu commands are not enabled, it indicates that the action is either not permitted or must be performed in another way. For example, Maxum EZChrom Tables cannot be edited in the Table Editor.

Add a Unit

If you create a new Group, it remains "unpopulated" unless individual Analyzers are added. To Add a Unit, follow these steps:

1. In the System View window, select the group to which you would like to add an analyzer.

2. Click the **Add Unit** button ![ADD] on the System View Toolbar.

3. The **Add unit to** dialog box appears.

4. If the analyzer is shown in the list box at the bottom of this dialog box, double click the name. This action will add the unit and close the dialog box.

OR, to add a unit that is not listed:

5. Type the unit name in the **Unit Name** field. This name can be different from the Analyzer name. If you choose a name other than the Analyzer name, this new name will be shown with the unit display in the system view.

6. Type the Internet Protocol (IP) address in the **Ip Address** field. This should be a valid IP address in TCP/IP format. The IP address should be unique among all the configured analyzers including the analyzers in the 'ALL' group. Ask you Network Administrator if you do not know the IP address.

7. Click the arrow ![arrow] in the **Unit type** field and select one of the types from the drop-down list. Maxum, NAU and Optima units can be monitored besides the regular broadcast. Optima does not broadcast. The Maxum , Optima (through HMI emulation), and the Network Access Unit (NAU) can be edited.

NOTE: The Monitoring interval can be changed for the Maxum II, Optima, and NAU.

Assign Passwords

Use the Add/Delete Users command on the System menu. This selection is visible only when an analyzer window is open and highlighted. Also, the login process should be completed and a user must have the highest authority level.

1. Select **Add/Delete Users** on the System Menu.

2. Click the **Add User** button.

3. Type the new Login and Password on the **Database User - Add** dialog box, then retype the password to verify.

4. Click the appropriate level of access.

5. Click the Add button to return to the **Users Configured in the Unit** dialog box. The new user is now shown in the list box.

6. Click the **Close** button.

7. Any user configuration can also be changed by clicking the **Update User** button on the **Users Configured in the Unit** dialog box and making the desired revisions.

This authority is available only to those with a Super level password. When a login and password are defined, there are no minimum size requirements for the password. Passwords are case sensitive for alphanumeric characters. However, only numeric passwords can be entered when using the HMI interface. If a password is used that includes other characters, then it will not be possible to login to the HMI with that user name.

Backup/Restore Analyzer

All password levels are authorized to make a backup, that is, save the analyzer database to a file. The Analyzer Frame window need not be open in order to backup the database.

Backup

1. Click the ⬛ button on the Main Toolbar to start the Backup / Restore, or select **Unit Backup / Restore** from the System drop-down menu.

2. Select the unit to be backed up or downloaded from the list in the dialog box.

3. Type or select a name for the backup file in the File name field. If you do not specify a file extension, the system will add the default extension of .amd.

4. Click the **Backup the analyzer** button.

5. The Backup/Restore Report dialog informs you of the backup progress through completion.

Restore

Fill out the **Analyzer Backup/Restore** dialog box just as for the backup function. Once all fields are complete, click the **Restore to the analyzer** button to restore the analyzer. That is, to write a file to the Maxum database. This is an action that is restricted to those with Super or Configure level passwords.

Caution: Unit Restore is a complete download, not individual applications, and it rewrites the entire flash memory. This is an irreversible task.

Change Unit Properties

The Unit Properties dialog box is the only avenue to changing the properties of an analyzer.

There is only one way to open the dialog box:

1. Select the analyzer in the System View window.

2. Click the right mouse button.

3. Select **Unit Properties**

The dialog box provides fields where you can change any of the following:

> Unit Name
>
> IP Address
>
> Unit Type
>
> Monitoring interval (or whether the unit is monitored)
>
> Show warnings on the analyzer

Clear Alarm

Alarms are identified in the System View window when the analyzer icon displays exclamation marks . An exclamation mark also appears next to the name on the Group tab when one of the analyzers in that group posts an alarm. A login with an authorized password is required to Clear Alarms.

Caution: Be certain that the alarm you wish to clear is the one that is selected. The action cannot be reversed.

If you are connected to the system, follow these steps to clear an alarm for the analyzer:

1. Double click the analyzer icon in the System View window.

2. Click the Alarm Log icon on the tree view (left side of the analyzer window).

3. Select the Alarm from the list in the right pane.

4. Press the **Delete** key on the keyboard.

5. To clear all alarms listed, place the cursor on the list of alarms in the right pane, click the right mouse button, and select **Clear all alarms** from the drop-down menu.

6. To acknowledge an alarm, place the cursor on the specific alarm shown in the right pane, click the right mouse button, and select **Acknowledge Alarm** from the drop-down menu.

Connect to an Analyzer

There are many approaches to view specific data about an analyzer. Use any of the following:

Double click the analyzer icon in the System View Window.

Place the cursor on the analyzer icon in the System View Window, click the right mouse button, and select **Connect** from the drop-down menu.

From the System Menu, select **Open Connection**.

Select an analyzer in the system view window, and click the **Open Connection** button on the Main Toolbar.

Create an Alarm

In addition to the System generated alarms, you may create your own custom alarms using the AlarmHandler table. These custom alarms are triggered according to a specific condition.

1. Click the Tables Icon in the Application Tree view .

2. Double click AlarmHandler in the right pane list of tables.*

3. Select **Add Record** from the Edit menu (or press the button on the table editor menu).

4. The **Add Record** dialog box appears, and the current application_id appears by default. Type an alarm code in the alarm_code field. (Numbers 900-996 are reserved for this purpose.)

5. Click the **OK** button on the **Add Record** dialog box.

6. On the table, click the **enable** check box to activate the alarm.

7. On the table, enter the alarm **text** that describes the alarm.

8. Select **Save Changes** from the Edit menu (or press the button on the table editor menu).

9. Exit the table.

This alarm code can be used to trigger the occurrence of a condition either through the Limit table or through a basic program.

*If you are not logged in, the Login dialog box will request user name and password.

Delete a Group

If a custom group tab is no longer needed, follow these steps to delete it:

1. Click the Delete Group button ![DEL icon] on the System View Toolbar.

2. Select the group from the list box on the **System View - Delete Group** dialog box.

3. Click the **Delete** button at the bottom of the dialog box.

NOTE: The **All** group cannot be deleted.

Delete a Record

Caution: Records are permanently deleted from the database. When you delete a record, a dialog box will remind you that this is a permanent change and ask for confirmation to continue. If you click **OK**, the record is deleted.

To delete a record in the Table Editor:

1. Select the row by moving the cursor to the leftmost column of the table called the header row. When the cursor changes to a black arrow (➡), click the left mouse button. The row will be highlighted in reverse video.

2. Select the **Delete Record** command from the Edit Menu.

3. The record is displayed with strike-through marks until you update or exit the table.

Delete Record **cannot** be restored with the Undo command. To restore a record, use the **Add Record** command and re-type the data.

Note: Some tables cannot be edited. If the Delete Record menu command is not enabled, it indicates that the action is either not permitted or must be performed in another way. For example, Maxum EZChrom Tables cannot be edited in the Table Editor.

Delete a Unit

If you wish to remove specific analyzers from a group, follow these steps:

1. Click the Delete Unit button on the System View Toolbar.

2. Select the desired unit from the list box on the **Delete unit from group** dialog box.

3. Click the **Delete** button.

NOTE: Deleting a unit from a custom group does not remove it from the **All** group. If you delete a unit from the **All** group, the unit is deleted from the All group as well as any custom groups. However, any unit removed from the All group may reappear within ten minutes -- at the next broadcast.

Edit Unit Properties

If a Unit Name, IP Address, or Unit Type changes, use the Unit Properties dialog box to edit them. Refer to the **Change Unit Properties** information described earlier in this chapter.

Move Toolbars

The Maxum System Manager toolbar appears to be a single unit, but it can be separated into the Main Toolbar, System View Toolbar, and the Table Editor Toolbar. To separate or move a toolbar, follow these steps:

1. Point to a blank area of the toolbar either between or below the buttons.

2. Click and hold the left mouse button.

3. Drag the toolbar to either side or to the top or bottom to "dock" it to that area of the window,

or (to "float" toolbar elsewhere on the screen)

4. Perform steps 1 and 2 and then position the toolbar so it "floats" in a location on the window that is convenient to your work.

5. To return a "floating" toolbar to the default position, double click the title bar.

Resize and Move System View Window

The System View window can be moved around the screen, "docked," or "floated" like a Toolbar. By default, it remains anchored or "docked" at the bottom of the window, but it can be "floated" or anchored to the sides or top of the window as well. To move the window, follow these steps:

1. Select **Float System View** from the View menu. This moves the System View window toward the top of the screen (or its last undocked location).

2. Position the cursor on the System View window title bar window, click and hold the left mouse button.

3. Drag the System View window to a desired location. If it docks in a location that is not convenient, repeat steps 1-3.

In the floating mode, the window can be re-sized to a different dimension like most other programs used in Microsoft Windows. To resize move the cursor to the edge of the system view window until the pointer changes to a double arrow. Then, click and hold the left mouse button and drag the mouse to resize the window. When the window is re-docked, it takes the largest length/width depending upon the side to which it is docked.

NOTE: If the Maxum System Manager window is not maximized, the System View, like the toolbars, can be floated outside the window on the desktop.

See Analyzer Results

The *Maxum System Manager* software provides detailed information about each analyzer. Double click the analyzer icon in the System View Window to see a ladder outline (called tree view) of the applications configured in the selected analyzer and the alarms on the analyzer. The System Tables can be viewed here as well.

Double click the Application icon to view the following sub-topics:

Tables

EZChrom

Basic Programs

SKPI

Results

Application IO

Select the Results item in the left pane. The right pane shows the results of the application along with the stream and cycle run time information. The results view is an active link in that any new results in the database are shown in the window as they are reported in the database.

Set Alarm Limits

Add a limit to place references on IO, results, and external results tables.

1. Click the Tables Icon in the Application Tree view.

2. Double click the **Limit** table in the right pane list of tables.*

3. Select Add Record from the Edit menu.

4. The current application_id appears by default.

5. Type a limit_id of your own choosing.

6. Click the desired limit field(s) to complete the row.

7. Select Save Changes from the Edit menu.

8. Exit the table.

* If you are not logged in, the Login dialog box will request user name and password.

Use Data Logger

Use the Data Logger to log the results of the methods running on any analyzer in a text file format. This text file about a specific application, stream, and unit can be used for reports or analysis.

1. Click the Maxum Utilities button on the toolbar to open Maxum Utilities. Alternatively, Maxum Utilities can be opened form the tools menu of System Manager.

2. In Maxum Utilities, select the New Log Setup on the DataLogger menu.

3. Select the IP address of the analyzer from the drop-down list in the Ip Address field, and click OK.

4. Click the check box(es) of the desired applications and streams to be logged, and click the OK button.

5. The files are saved in the Results Directory under the Maxum System Manager directory, for example: C:\MaxumSystemManager\Results. The default file name format is: [analyzer name]-[application number]-[stream number].txt

Once set up, the Data Logger starts logging the data until the user stops it. Data Logger can be run in the background even when the System Manager is closed. When the System Manager Options "Start and Stop Data Logger by default" checkbox is selected, the Data Logger starts logging data on all units previously configured as soon as the System Manager is launched.

To change or stop data logging of any unit, select Modify Log Setup. More detailed instructions for Data Logger are available in the Help function within Maxum Utilities.

Network Diagnosis

If there are concerns about a unit's network response, select this option from the main toolbar (or from the Tools menu) to run the Network Diagnostics. The resulting dialog box offers the following options in order to analyze and determine the statistics and reports required for a unit.

Ping Statistics

This selection performs a network Ping operation on a selected analyzer. The Ping procedure sends a request to the selected analyzer and, if a reply is received, checks the message for the correct information and calculates the round trip time taken by the message to travel to the unit and come back. This measure is an indication of how slow the network is and whether the unit is responding to the network messages. The checkbox is selected by default. Click to clear the check box if you do not want a Ping check.

Routing Table

The Routing Table procedure identifies the various routers between the selected analyzer and the host (computer running System Manager). The checkbox is selected by default. Click to clear the check box if you do not want a Routing Table.

Per Protocol Statistics

The Per Protocol Statistics checks and records details of any problems that occur in data transmission. The checkbox is selected by default. Click to clear the check box if you do not want a Protocol Statistics report.

Connection List (Including Listening Ports)

This report will show all units currently connected to the particular unit. The checkbox is selected by default. Click to clear the check box if you do not want a Connection List report.

Use the following steps to perform a Network Diagnosis.

1. Click the Network Diagnosis button on the Main Toolbar

2. Select the desired analyzer from the list

3. Select the statistics needed from the list (as described above).

4. Click **OK**. The diagnosis will be executed and the "Unit Diagnosis – Statistics Report" dialog box will be displayed.

5. Click the **Show Log** button to display the results.

Database and Tables

About the Maxum II Database

The database of the Maxum II consists of a set of tables. These tables provide storage, both temporary and permanent, for all inputs and outputs of the Analyzer. They also store the configuration of that Analyzer.

Each table contains **records** (also called occurrences or rows) of **data** (attributes or columns) and **functionality** (scripts) that are associated with the attributes. When the data (attributes) change in value, the scripts cause actions to occur. Action also occurs when the system is activated and when records are created or deleted.

Maxum System Manager Database Uses

Maxum System Manager is the workstation software tool and is used for application configuration and network monitoring. Specific uses include querying and editing certain key database tables and organizing them by table name. All supported analyzers appear in the bottom of the window as they broadcast on the network. The database can be viewed in two modes: Static and Dynamic.

Static: When the data from a database query is captured at the instant of the query and does not change, it is termed static. The table must be re-queried by some user action to see changes that may have occurred. Most of the system Manager table views are static. Static Mode is like a snapshot.

Dynamic: When the data from a database query changes automatically as changes occur in the database, it is termed dynamic. The following dynamic queries are maintained:

> Alarm Log

> Recent Results

> System view (analyzer icon list at the bottom of the window).

Data logging and HMI emulation are available but not a default. The System Manager is used primarily for configuration and high level monitoring of analyzers. It is also the site of the visual Basic program editor.

Viewing the Database Tables

A unit selected in the System View has two types of tables. System Tables apply to all applications on a unit, and Application Tables apply to a specific application.

To view or change specific information in any table, **double click** one of the listed Table Names. The system prompts for a required password to open the Table Editor.

Note: When you work in Table Editor, you have a *live* connection to the Analyzer. After you edit the table and Save it, changes are made to the database.

System Tables

Application Tables

Table Editor

The Table Editor is used to configure database tables, add rows to existing tables and similar activities. Many hardware modules, like the SNE and IO, are completely "plug and play" and will automatically configure themselves. In cases where this is not true, the Table Editor is used.

The Table Editor mode is invoked when you double click a table entry in the right panel of the main window. You are prompted for a password before the grid of the Table Editor window opens. Use the Table Editor to specify the parameters of the particular table in the database.

To view the list of tables click the Tables icon in the tree view panel that displays when connected to the network.

The Options selection on the System Menu provides a way to change the default appearance of the lower Help window in the Table Editor. To minimize the size of the Help information, go to System | Options and click the checkbox for "Minimize help information in Table Editor."

Table Operating Tips

- Many drop-down lists are linked to other tables. When certain fields are selected, click the Reference Table icon to view related tables.

- The width of table columns can be changed. Position the cursor over a dividing line in the header row. When the cursor changes to this symbol , click and drag the column either left or right.

Working with Applications

The System Manager monitors and reports the performance of Maxum applications. In many instances, applications are best monitored on the HMI or the HMI emulation of the System Manager software. Use the Results, SKPI, and Application IO entries of the System Manager to view the performance reports as described in the following topics. After these sections, you will find more detailed explanations about running and monitoring applications.

Results

Click the Results icon [12] Results in the Analyzer tree view to see the Stream ID, Result Name, Buffered Value, and Units pertaining to the Application.

SKPI

Click the System Key Performance Indicator SKPI SKPI icon in the Analyzer tree view to see a list of the Method-Stream indicators such as Peak Area, Retention Time, and Cycle Time to name a few. This is a read-only list for quick reference. This is not an active link in that the data does not reflect the changes made in the database after obtaining the data. At any time, you can update the information by re-querying the table.

Application IO

Each application has a separate set of Application IO dialog boxes which are shown below. The underlying information available to these dialogs derives from the System IO Tables, and in general the Application IO is added after the system IO. The Hardware Properties section and many of the other fields on the dialogs are read-only references to the System IO tables.

You may refer to these application dialogs to enable or disable the scan and review values. The dialogs are not considered active table queries.

Click the Application IO icon [12] Application IO in the Analyzer tree view to see the four Input or Output dialog boxes: AI, AO, DI, and DO.
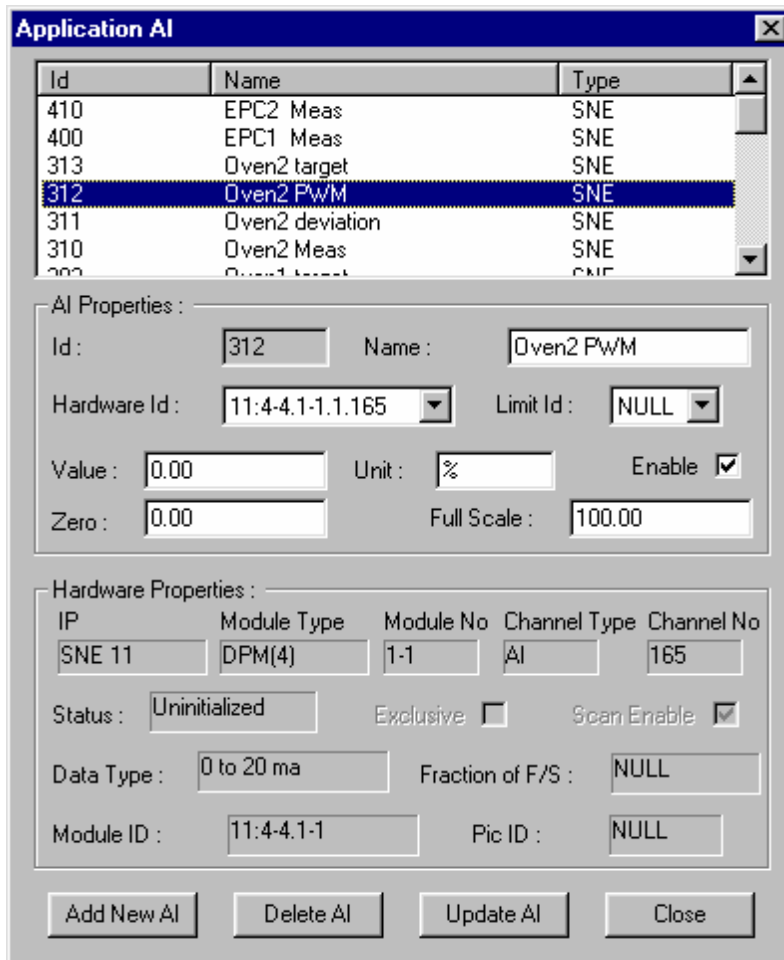
Authorized users can double click these entries to select the appropriate dialog box for the IO Type. Hardware ID, Limit ID and other appropriate hardware properties. The following fields and functions are available on the various dialog boxes.

Application IO Dialog Boxes

As stated above, there are four Application IO dialog boxes: Application AI, Application AO, Application DI, and Application DO. Examples are shown below for each of these types. Many of the fields and buttons in these dialog boxes are common to all four types. The individual fields are defined following the examples.

Application AI Dialog Box:

Use the Application AI dialog box to select the Analog Input and associated hardware properties.

Application AI Dialog Box

Application AO Dialog Box:

Use the Application AO dialog box to select the Analog Output and associated hardware properties.

Application AO Dialog Box

Application DI Dialog Box:

Use the Application DI dialog box to select the Digital Input and associated hardware properties.

Application DI Dialog Box

Application DO Dialog Box:

Use the Application DO dialog box to select the Digital Output and associated hardware properties.

Application DO Dialog Box

Application IO Devices

This first area on all the IO dialog boxes displays the ID, Name, and Type of existing IO devices. If the System IO tables are set up, all applicable settings for the analyzer become available here. Click the ID number and the related properties will be displayed in both Properties sections of the dialog.

When the list exceeds the display area, use the scroll bar. You can also click the title buttons at the top of the list to sort items forward or backward by Id number.

Enable (check box)

Click this box to instruct the system to scan the device.

If the system encounters an error, it will disable this configuration (clear the check box). If you wish to manually stop the functionality of the device, click the box to remove the check mark.

ID

This read-only field is used to display the identification number of the selected device. If the IO is shown in the list of existing devices, click the ID number in the list display area and information will be added to the appropriate fields.

To add a new number, click the Add New button at the bottom of the dialog box. A smaller dialog prompts you for the New ID and Name that will be associated with another device. When adding a new IO, scan the list of existing names and numbers that are displayed in the list of existing devices. It is advisable to use the next number in sequence. The ID number should be unique.

Hardware ID

This number is similar to an IP address and identifies the IO device. It is a combination of the Module ID, the IO Type and the Channel number of the IO. The Hardware ID number is usually displayed in the field when a device is selected from the list at the top of the dialog box. Refer to Appendix 1 at the end of this chapter for instructions on decoding the Hardware ID.

Name

This field displays the name of the selected device. The field is can be edited, but this is generally unnecessary.

To change the name of the device, click and drag across this field and type a new name, then click the Update button. The new name will appear in the list at the top of the dialog.

Limit ID

Use this field to specify a limit that applies to the particular IO. Limits must be configured in the Limit Table prior to specifying the number in the Application IO dialog box. Once established, click the down arrow in this field and select the desired value from the drop-down list.

Value

Enter the desired value by either clicking the down arrow in this field (for digital IOs) or entering the number directly (for analog IOs). This field is typically used for reading the current value in the database. This field may also be located in the lower portion of the dialog box as a read-only field.

Zero

Type a value in this field to specify the percentage value of the analog IO response which corresponds to a zero value.

Units

Specifies the unit of measurement for the selected device such as psig, degrees C, percent (%), and volts.

Full Scale

Type a value in this field to specify the value of the analog IO response which corresponds to 100%.

Minimum

This digital IO field is used to set the name displayed with the digital value is set to OFF (the minimum value). The typical input for this field is "OFF". However, other values, such as "False" may be set.

Maximum

This digital IO field is used to set the name displayed with the digital value is set to ON (the maximum value). The typical input for this field is "ON". However, other values, such as "True" may be set.

Injection Valve (check box)

This checkbox indicates whether a DO controls a sample injection valve. This is not usually required for injection valves. It is most commonly used when using baseline correction. During a baseline run, DO's with **Injection valve** checked will not be utilized.

Averaging

This function allows averaging of AI values. The following options are available:

> non-cycle - usually set to average from a MaxBasic program. Values are sent to the specific result as indicated which is updated each time a value is read.

> cycle/current stream - averaging done during a cycle using the current stream using the result_index as indicated(updated at end of cycle only)

> cycle/specific stream - averaging done during a cycle using the specific result and stream specified(updated at the end of the cycle only)

The **Rate** field is used to indicate 5, 10, or 15 second averaging (10 seconds is default). Other fields for this function are **Result Output** (App && Stream && Result) and **Run Manual Averaging**. Clicking the **Apply/Refresh** button on the Averaging dialog box will update the read only fields at the top of the dialog box which indicate the current averaging values.

Location

This read-only field displays hardware device location for the IO (e.g. SNE 11)

Type

This read-only field displays the type of device, for example, SVCM. The information comes from the System IO tables.

Module

This read-only field displays the corresponding number of the selected device as determined in the System IO tables.

I/O Type

This read-only field verifies the type of channel, such as AO and DO. The information comes from the System IO tables.

Channel

This read-only field displays the channel number of the selected device. The information comes from the System IO tables.

Module ID

This read-only field displays the first three fields of the Hardware Id which are designated as the Module ID. It is a combination of the module location in the Electronics Enclosure and the PIC Index.

Pic ID

This read-only field displays the PIC (Programmable Integrated Circuit) setting selected in the System IO tables.

Status

This read-only field displays the status of the device, such as Normal.

Scan Rate

This read-only field displays the rate at which the database scans this IO device.

Data Type

This read-only field displays a range of values that an AI or AO will read..

Exclusive (check box)

If this device is used exclusively for this application, a check mark is displayed. If the device is shared by other applications, the check box should be clear. The determination of Exclusive status is made in the System IO tables.

Pulse

This read only field indicates whether a DO is pulsed and, if yes, the duration of the pulse. A pulsed DO is turned on only for a specified period of time and is then turned back off. The **Pulse** field is changeable in the system table **Sys_DO**.

Negative Pulse (checkbox)

This read only checkbox is associated with the Pulse field for Digital Outputs. A negative pulsed DO is normally **on** and is turned **off** only for a specified period of time and is then turned back **on**. The **Negative Pulse** field is changeable in the system table **Sys_DO**.

Scan Enable (check box)

This box is checked if the System IO tables are configured to scan the unit on a regular basis.

Rampable (check box)

This read-only check box is for information only. It is set when you configure the method in Maxum EZChrom and is used for ramping a temperature controller in the Maxum GC. Click the check box in the System IO tables to instruct the system to ramp the temperature. Ramping temperature is used on program temperature GC or simulated distillation applications.

Add New

Click this button on any of the four AppIO dialog boxes when you wish to add information about a new IO device. New devices added here apply to this application only.

When you click the Add New button, a small dialog box prompts you for the New ID and New Name. Type the required information and click the Add button.

The new device is added to the list at the top of the dialog and to the Id and Name fields, but no hardware is attached to this new IO, and the hardware ID value will be set to NULL. You will have to select an available hardware from the list or add a new hardware IO in the SYSIO tables.

Delete

Click the Delete button on any of the four AppIO dialog boxes to delete an existing IO displayed in the list box at the top of the Application IO dialog. First, select the Id number in the list box, then click the Delete IO button. If the device is not bound by a referential integrity constraint, it can be deleted.

The device listing is deleted from this application only.

Update

Click this button on any of the four Application IO dialog boxes to preserve the changes made to any of the fields that can be edited.

If, for instance, you change the Value field, and Close or exit the dialog without first clicking the Update button, the system will prompt you that "All changes will be discarded." To save the changes, click the No button on the message box and click the Update button. Then close the dialog.

Close

This button is located on all four of the Application IO dialog boxes. Click the Close button to exit the dialog box. If changes have been made and not updated, a message box prompts you that "All changes will be discarded." You have an option to return to the dialog before exiting.

Maxum Utilities

Maxum Utilities can be run independently from the Maxum System Manager and gives you the opportunity to continue running the utilities in the background even when System Manager is not opened and running. Use Maxum Utilities for all the functions of Data Logger and Loader.
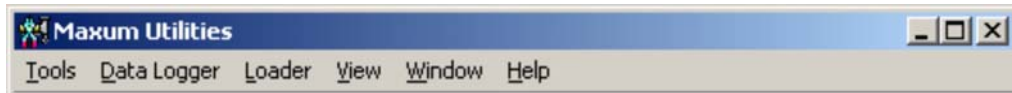
Maxum Utilities Main Menu

Data Logger

About Data Logger

Use the Data Logger to log the Stream cycle results of any analyzer -- recorded in text format. These text files about specific applications, stream, and units can be printed and used for reports or analysis.

You can open the Maxum Utilities to use the Data Logger in any of the following ways:

• Click the Maxum Utilities button on the System Manager Main Toolbar.

• Select Maxum Utilities from the System Manager Tools Menu.

• In Windows, click the Start Button | Programs | Maxum System Tools | Maxum Utilities.

Once Maxum Utilities is open, click Data Logger on the menu and select from the drop-down options. For information about the options, click on the item in the menu below:

New Log Setup

Select this option to set up a new log. The Log Setup dialog box (shown below) displays a list of the existing analyzers on the network. This analyzer list is composed of the list of Maxum units in the System View of the System Manager. Select the desired analyzer, and click OK. If the desired analyzer is not available in the list, use the Add Unit feature of the Maxum System Manager. Units that are added while Maxum Utilities is open are immediately available in this dialog.

The Log Setup dialog is color coded. Files can be selected for logging here, but active or preset files cannot be disabled from this dialog (see Modify Log Setup). If a row is gray, it indicates that the file is set up for logging.
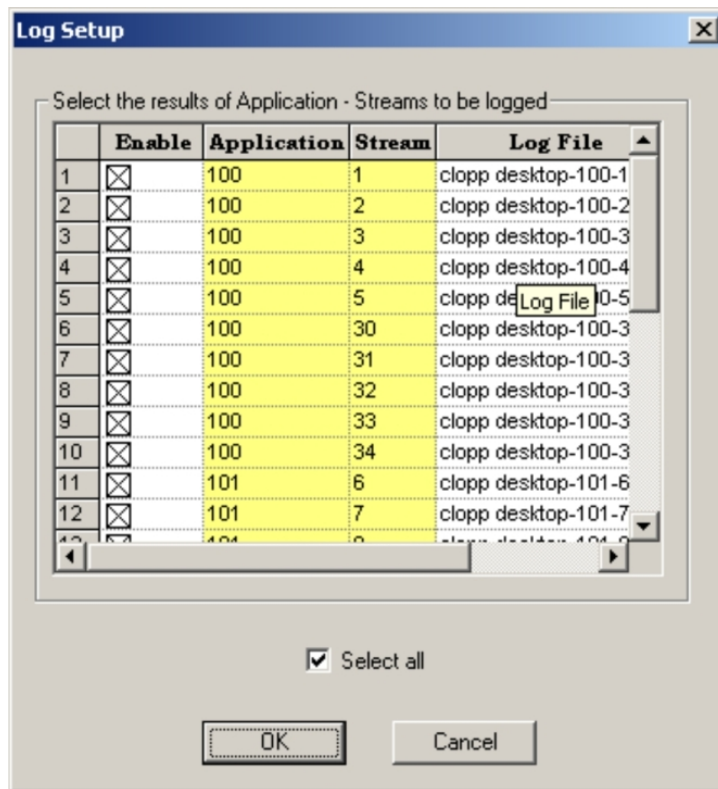
New Log Setup Dialog Box

The dialog shows the following columns:
- **Enable**: click this check box if you want to log results for this stream
- **Application and Stream**: these two columns are color coded and cannot be edited.
- **Log File**: The file name indicates the name of the log file and can be changed by the user. The default name has the format: AnalyzerName_ApplicationID_StreamID.txt. Note that all the files will be saved by default in the Results directory of the Maxum System Manager.

Modify Log Setup

The DataLogger Modify Settings dialog (shown below) shows the list of previously Configured Logs that were selected using New Log Setup. Click one of the entries in this field to modify any of the properties associated with that log.
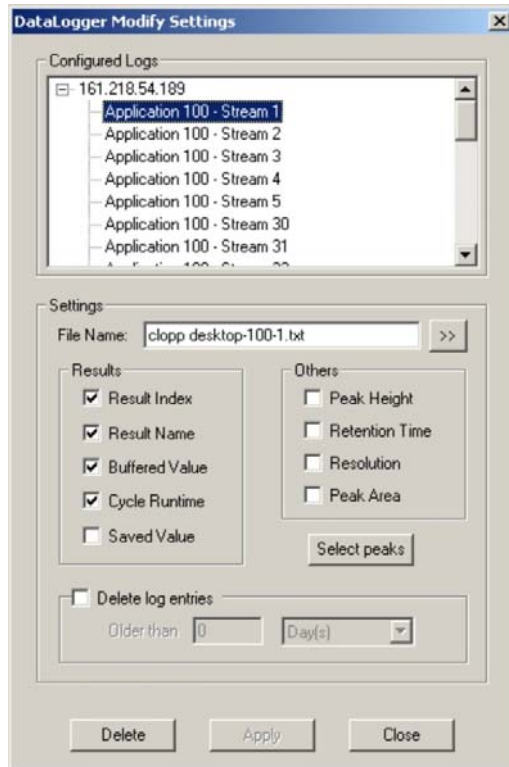
New Log Setup Dialog Box

The name of the selected log file is displayed in the file name box. Note that all the files will be saved by default in the Results directory of the Maxum System Manager.

By default the first four check boxes in the Results section are checked. Click to enable or disable these options as well as those listed in the Others section with the exception of the Result Index. This box must remain checked. Once you have made your selections, click the **Apply** button to store these changes.

You can also specify the range of peaks that needs to be logged. By default, all peaks associated with that stream and application are logged. You can enable or disable any of them for logging purposes.

Delete will allow you to delete log entries in order to purge the DataLogger of old items continually. To remove a log file from the list of Configured Logs, click the desired application in the Configured Logs field, and click the **Delete** button.

Open Log Data File

When Open Log Data File is selected, the Open dialog appears. The default directory for these .txt files is the Results directory. Select the file name, and click the Open button.

This action opens the text file in a grid form where you can view, modify, or print the file. All columns can be sorted in ascending or descending order by clicking on the columns. The data can also be saved to another file after necessary modifications.

Settings

The Datalogger Settings dialog box is used to customize several important performance parameters and to enable the Auto-start feature
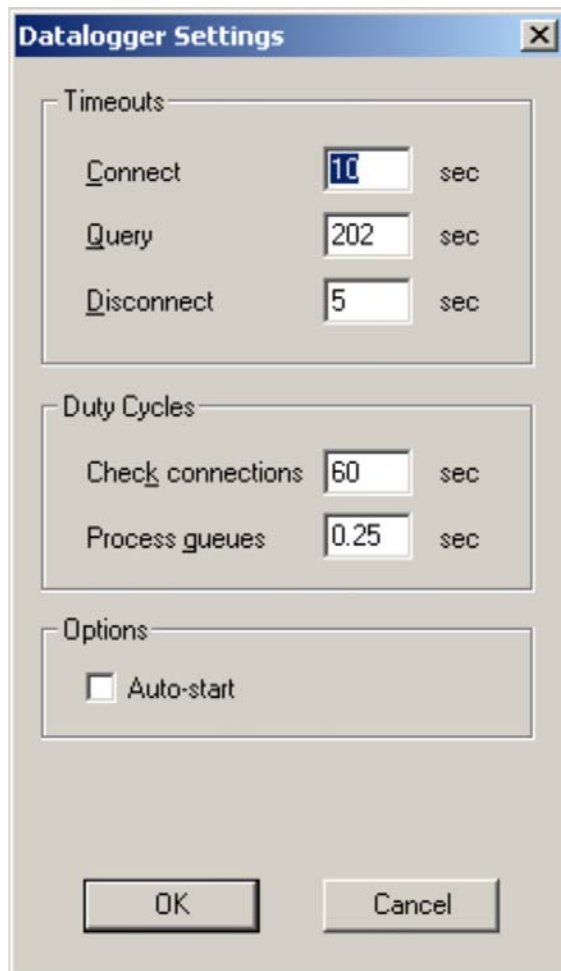
DataLogger Settings Dialog Box

The available options are described below.

Timeouts

> **Connect:** The Connect value is the maximum time DataLogger waits for a response when attempting to connect to a device for the first time. The default value is 10 seconds.

> **Query:** The Query value is the maximum time DataLogger waits for a response to a database query before returning an error. The default value is 202 seconds.

> **Disconnect:** The Disconnect value is the maximum time DataLogger waits for a response when closing an open connection. The default value is 5 seconds.

Duty Cycles

> **Check Connections:** The Check Connections value determines the frequency that open connections are tested to determine if the connection is still valid. The default value is 60 seconds.

> **Process Queues:** The Process Queues value determines the frequency that the message queues are processed. The default value is .25 seconds (250 milliseconds). A smaller value results in the queues being processed more frequently.

Options - Auto Start:

The Auto-start check box is used to enable/disable the DataLogger auto-start feature. The Auto-start feature automatically starts Maxum Utilities \ DataLogger on Windows startup immediately after logon. When combined with an automated logon procedure DataLogger will automatically recover from a power outage or system reboot without user intervention. However, Windows automated logon may violate your company's network security rules. For more information concerning automatic logon refer to the topic in the Maxum Utilities help file, "How to Automate the Logon Process".

When Auto-start is enabled DataLogger automatically modifies the Windows Registry to start Maxum Utilities after logon. When the feature is disabled the modifications are removed from the registry.

Specifically, when the feature is enabled a value is added to the HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Run key named SAAMaxumUtilities. The value data field points to the MaxumUtilities.exe file. When the feature is disabled the value is deleted from under the \Run key.

If DataLogger is running please note the message above the OK button. You must stop and restart Data Logger for the changes to take affect. Any changes you make on the Datalogger Settings dialog box will be stored after clicking the OK button. If DataLogger is currently running the changes will not take affect until the next time DataLogger is stopped and re-started.

Start DataLogger

Once a Log File is set up and modified (if needed), select Start DataLogger from the menu to begin logging the data. This action starts the Server and logs all the data from all configured application-stream sets. If you want to start a single analyzer-application-stream log, do a right mouse click on the analyzer-application-stream icon in the data logger view and select the "Start Logging" from the drop-down menu. The icon turns from gray to green to indicate that logging is performed on that analyzer-application-stream set.

The server makes a request to each analyzer database to inform the end of cycle event of that application-stream set. On receiving a report from the database, the server queries the database about the results and logs them to a file using a tab de-limited format. You can stop the action by selecting Stop DataLogger from the menu.

Stop DataLogger

Select this option to shut down the logger. Note that all the logs currently enabled will be stopped. If you want to stop a single analyzer-application-stream log, do a right mouse click on the analyzer-application-stream icon in the data logger view and select the "Stop Logging" from the drop-down menu. The icon turns from green back to gray. This indicates that logging is no longer performed on that analyzer-application-stream set.

To run the data logger in the background, close the application without stopping the data logger. The application displays a prompt that asks if you want to run DataLogger in the background.   Select 'Yes' and the data logger will run in the background. The icon is minimized and can be seen in the bottom right hand corner of the screen on the Windows task bar. To restore the application, click the icon, and the application returns to the foreground.

Show Server Log

Select this option to view the start and end DataLogging date and times as well as any other server activity. This is not the Data Log, rather it documents server action and any problems.

Any problems in logging and network will be entered in the server log file with information on the problem and time at which it occurred. This file gives a good indication of the analyzer access to the network.

Loader

About Loader

The Loader utility is designed to facilitate data transfer or edit some configurations of data.

You can copy configuration data from one analyzer to another as well as copy data from one version of the Maxum II database to another (version 1.0, 1.01, and 2.0).

Click Loader on the menu and select from the drop-down options.

Database Load

This option normally loads data from a text file to an empty database. If the database is not empty and any conflict in the primary key information of the tables involved will result in errors, the data will not be copied over. The function is best used for data transfer between two analyzers and/or during upgrades of database versions. For example, use it to copy configuration data from one analyzer to another analyzer or to copy from one database version to another (1.0, 1.01, or 2.0).

Although the message box has a Cancel option, it isn't advisable to stop this action. If you need to use the Database Load function, it is advisable to call Siemens for assistance before you begin the process. All relational database requirements must be satisfied for a successful Load or Unload.

Once the database is transferred, a message box appears that provides an opportunity to view the log file.

Options for Loading Database Text (Dialog Box)

This dialog box is found by selecting Database Load from the Loader menu. A caution note reminds you to make sure that all SNEs are in hold before proceeding. Click the Yes button, and select the IP address of the analyzer on the Database Load dialog.

Next, click the arrow button (to the right of the File name field) to locate the .txt file. Login with your name and password before you click OK.

The Load DB Options dialog box provides the following:

> **Delete existing applications first**: Click this box if you want to delete any existing applications in the analyzer database before loading the text file.

> **IDs for application to be loaded**: If you wish to select only specific applications from the text file to be loaded, specify the application ID's of the applications you want to load separated by a comma. This will load specific applications rather than All (represented by a zero), which is the default.

> **New application IDs to assign**: If you want to have a new numbering sequence for the application ID's rather than the default ones in the text file, type the new numbers in the field. If you want the default numbers in the text file, enter 0.

> **Skip all SYS_IO and SYS_HARDWARE**: Click this box if you want to skip loading of all IO information.
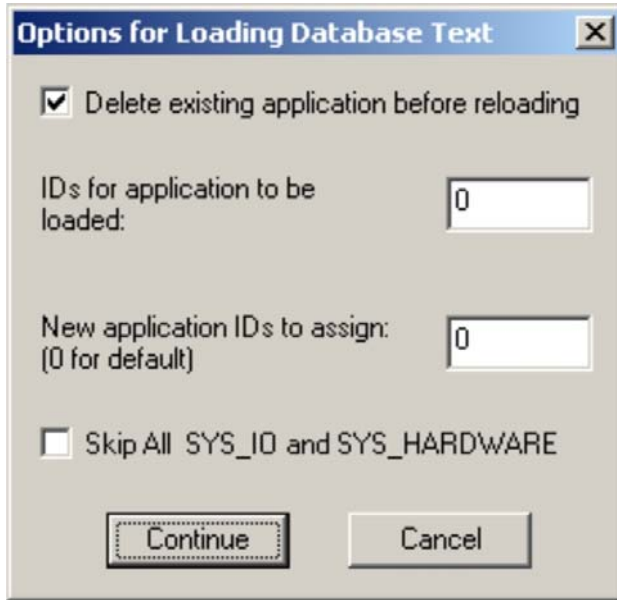
Options for Loading Database Text Dialog Box

Database Unload

This option "unloads" data to a text file that can be edited. It gets configuration data including hardware configuration and application configurations, but it does not get EZChrom methods or sequences. Errors are not common in the Unload option.

Although the message box has a Cancel option, it isn't advisable to stop this action. This utility is useful when you copy the configuration information from one analyzer to another analyzer, assuming the hardware matches from one to another. Once the database is transferred, a message box appears that provides an opportunity to view the log file which shows you any errors encountered in the process.

The unloaded text file has complete information pertaining to the hardware configuration. You can edit the information to match the new analyzer database required, (for example, change all instances of run1 to run2), but it is strongly advised that you contact Siemens Support before doing so. All relational database requirements must be satisfied for a successful Load or Unload.

Modbus Load

This option loads the Modbus address maps from a text file into the analyzer database. **This text file must be a comma separated value (.CSV) file.** If the database is not empty and any conflict in the primary key information of the modbus_addressmap table is involved, then errors will result and the data will not be copied over.

Modbus Unload

This option "unloads" modbus address map data to a text file that can be edited. Errors are not common in the Unload option.

Load HMI language files

This function helps you dynamically change the database text that is used for HMI and alarms to a different language and/or load any new alarm text changes. When you select this option and specify the IP address, this function displays the "Browse for Folder" dialog to locate specific files for language support. Select the directory that contains the file from the "tree" view. The location will typically be **/Maxum System Manager/Upgrade x.xx/language** where x.xx is the latest version of Maxum System Tools (for example 4.20).

As the text is loading, the message box has a Cancel option, but it isn't advisable to stop this action.

The View Menu

The options on this menu are similar to those of Maxum System Manager.

Toolbar: Select this option to hide or display the Maxum Utilities toolbar.

Status Bar: Select this option to hide or display the Maxum Utilities Status Bar at the bottom of the window.

Datalogger Bar: This command is similar to the System View command in Maxum System Manager. The default check mark assures that units attached to the network are displayed in this section of Maxum Utilities. If unchecked, the Datalogger View is hidden.

Float Datalogger View: Like the Float System View command, when this option is selected the Datalogger Bar is no longer anchored to the Maxum Utilities window and can be moved around the screen, resized, or docked in another section of the window. The DataLogger View can be floated outside the Maxum Utilities window.

Tools

About Tools

The Tools Menu gives you access to a number of Maxum and MicroSAM control commands, including upgrading a unit. Except for the Print related selections, all commands are described in the following sections.

The selections from the tools menu that are related to printing (Print, Print Preview, and Print Setup) are used for the printing of information from DataLogger windows.

SYSCON Menu Commands (on Tools Menu)

The options for this Tools Menu command have different results but common procedures. When you select any of the following options on the sub-menu, you receive:

- A caution message to assure that SNEs are on hold or to remind you that unsaved data may be lost.
- The IP Address Selection dialog box with a list of units.
- The Login dialog box.

Software Upgrade

Use this option to replace the SYSCON software with a newer version. This command activates the same System Software Upgrade dialog box as the **Upgrade Unit** command on the main Tools Menu (see below)

Path: Tools | Syscon | Software Upgrade

Reset

Restart the Maxum SYSCON with one of the following options:

Reset: Equivalent to a power dip. Database may be restarted from SRAM memory or loaded from FlashRAM.

Cold boot: Restart the analyzer and load the database from FlashRAM.

Warm boot: Restart the analyzer and restart the database from SRAM memory, if possible.

In addition, the database may be saved to FlashRAM before performing a reset to ensure that the current database table content is preserved. Note that for analyzers equipped with Compact Flash, all reboots are cold boots (loaded from Compact Flash)

Get Debug Log

Maxum Compact Flash can be set up to continuously write debug output to permanent flash storage, which allows easier trouble shooting after unexpected failures. Select this option to display the debug logs for Maxum analyzers that are equipped with compact flash cards. (NOTE: Maxum must be configured to save this data in order to have debug files.)

Maxum systems that have Compact Flash can be configured to save the debug text file to a file using the steps below. The file can be viewed from the workstation.

In the System_Info table, set the Syslog attribute to 255.0.1.1

Using Maxum Utilities go to Tools->Syscon->Get Debug Log

The files(bootcf.log and debugcf.log) are built in the System manager\System directory. These can be viewed with Notepad or Wordpad.

SNE OS Upgrade

STOP! The recommended procedure for upgrading the SNE is to use the Software Upgrade Tool on the Tools menu. Do not use the SNE OS Upgrade Function.

1. Select the **Tools | Syscon | Software Upgrade** menu path

2. Select the **Show Details** button on the **System Software Upgrade** dialog box.

3. Check the SNE component boxes that are to be upgraded on the right hand side of the screen.

4. Uncheck all other boxes on the right hand side.

5. Select the **OK** button.

SNE Application Upgrade

STOP! The recommended procedure for upgrading the SNE is to use the Software Upgrade Tool on the Tools menu. Do not use the SNE Application Upgrade Function.

1. Select the **Tools | Syscon | Software Upgrade** menu path

2. Select the **Show Details** button on the **System Software Upgrade** dialog box.

3. Check the SNE component boxes that are to be upgraded on the right hand side of the screen.

4. Uncheck all other boxes on the right hand side.

5. Select the **OK** button.

MicroSAM Menu Commands (on Tools Menu)

The MicroSAM Menu (on the Maxum Utilities Tools Menu) only appears if a MicroSAM analyzer has been added to the System View of the System Manager.

Software Upgrade

Use this option to replace the software on the MicroSAM with a newer version. This command activates the same System Software Upgrade dialog box as the **Upgrade Unit** command on the main Tools Menu (see below)

 Path: Tools | MicroSAM | Software Upgrade

Reset

This selection is used to reset the MicroSAM unit.

After selecting the unit, you will be prompted to select one of the following

Save and Restart Database – Saves database to flash before restarting (this is a software only reset)

Restart Database without saving – restart the database (all recent changes will be lost) (this is a software only reset)

Reset MicroSAM – Both a software and hardware reset.
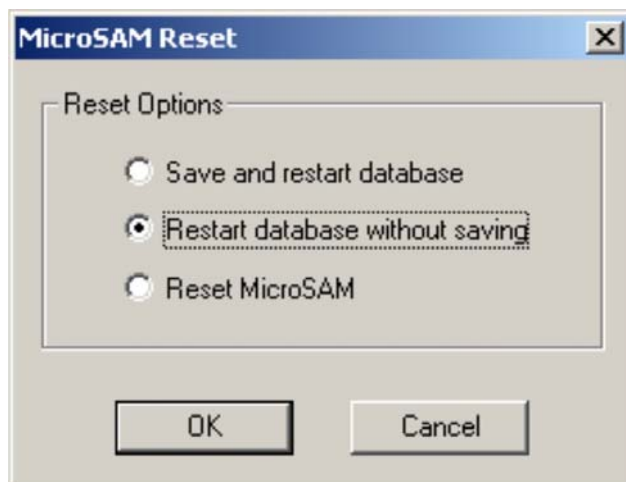
MicroSAM Reset Dialog Box

Path: Tools | MicroSAM | Reset

Update Registry

This selection sends a new registry file to a MicroSAM analyzer. This feature is used for activating special procedures on the MicroSAM system. These may be required for system diagnostic applications like LogMonitor or Healthmon.

Path: Tools | MicroSAM | Update Registry

System Software Upgrade (Upgrade Unit on Tools Menu)

There are three ways to access the System Software Upgrade dialog box. It is possible to choose the **Software Upgrade** option from either the Tools>SYSCON menu or the Tools>MicroSAM menu. You may also choose **Upgrade Unit** from the Tools menu. Regardless of the method, in order to access the Software Upgrade dialog box, it is first necessary to select a unit from the **IP Address Selection** dialog box and then logon to that unit with a Super level password.
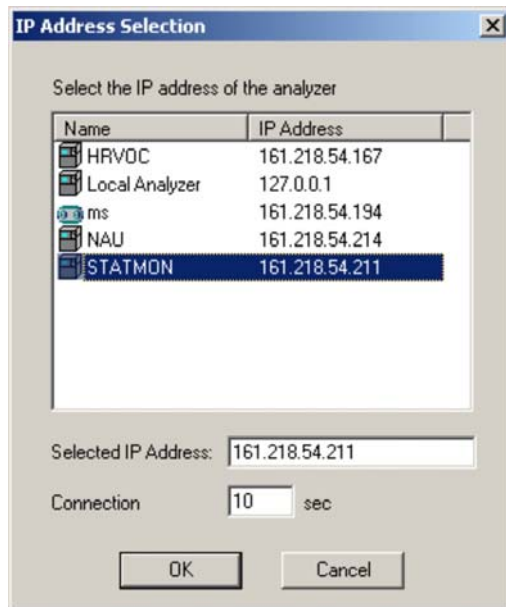
After logging on to the selected unit, the System Software Upgrade Dialog box is displayed.
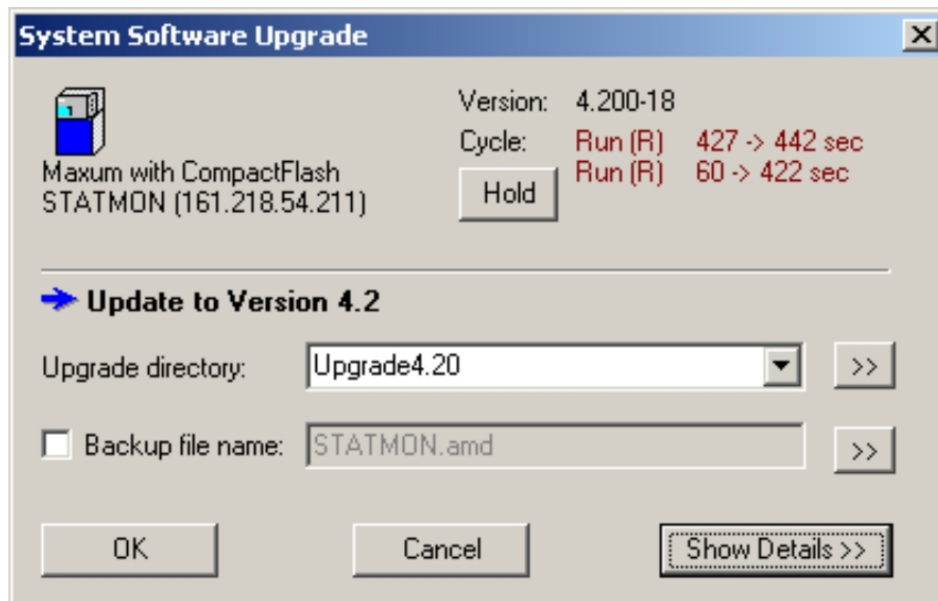
All Maxum and MicroSAM chromatographs can be upgraded to the most recent software or downgraded to any of the currently installed firmware versions. Maxum Utilities will automatically read the installed version numbers on the selected analyzer, compare them with the most recent version numbers, and suggest one of the following courses of action.

1. **Upgrade** to the most recent database schema (analyzer database schema version is lower than the currently selected version)

2. **Update** the analyzer (analyzer database schema version is the same as the currently selected version)

3. **Do nothing** (all version numbers match)

4. **Downgrade** the analyzer (analyzer database schema version is higher than the currently selected version)

If the course of action is Upgrade or Downgrade, it is still necessary to first import and save all methods to file using Maxum EZChrom, and after the up- or downgrade is complete, re-export all methods from Maxum EZChrom to the new database schema version. All other steps are automatic and may include one or more of the following, depending on what is carried out.

Save database to flash before loading any updates

Back up database to AMD file

Unload tables and Modbus maps to text files

Reset the analyzer and/or SNE

Load database with text files and Modbus maps

Save database to flash at the end of the update procedure

Select components whose version number changes.

Click on the **Show Details** button within the dialog box to view and manually change all settings suggested by the upgrade tool. Refer to the **Show Details** topic later in this chapter for more information.

System Type – The upgrade tool will detect whether a Maxum with SRAM/Flash, a MicroSAM, or a Maxum with Compact Flash is to be upgraded and select all appropriate files accordingly. A system change from Maxum SRAM/Flash to Maxum Compact Flash is possible, too, but several manual steps have to be taken (see below).

Version – The current database schema version and revision are displayed here. If no database connection could be established, this field will be empty.

Cycle – The hold/run status of all applications and SNEs along with their cycle clocks are displayed here. When all applications and SNEs are in hold mode, this information appears in blue, otherwise it is displayed in brown.

A HOLD button appears at the top of the dialog if any of the applications are running, and the status and cycle time of up to three applications can be viewed simultaneously at the top right of the dialog (if there are more than three applications, click in the display of the application clocks and move the cursor down). Click on HOLD to put all applications in hold mode and wait until all cycles have ended before commencing with the upgrade process.

Upgrade Directory – The upgrade directory containing the highest available version number is selected by default and labeled with its commonly known version number (e.g., "4.0b Patch 2") above this field. Based on the selected version and the currently installed version, a colored arrow will be located next to the version label indicate what type of change will be implemented.

Upgrade

Update (or nothing, if all version numbers match)

Downgrade

Backup File Name – By default, the analyzer name with an appended ".amd" is put in this field, and the file is saved in the TempUpgrade subdirectory of the Maxum System Manager directory. Click on the >> button next to the backup file name to manually specify a directory and file name.

SNE Upgrades – The upgrade tool will automatically launch the external TFTP server, if no TFTP server is already active on the PC. Due to inherent routing limitations, SNE upgrades are not possible across network segments, but the upgrade tool will warn you if it has detected this limitation.

If the upgrade tool must launch the external TFTP server, it will also terminate it again after the upgrade is complete.

Incompatibilities – Maxum OS versions 2.0 and earlier do not support maintenance with this upgrade tool and have to be upgraded via the debug port, a TFTP server, and CMD files.

Resuming Failed Upgrades – Each successfully completed upgrade step is recorded by the upgrade tool to support resuming failed or interrupted upgrades. For example, if the network connection between the analyzer and Maxum Utilities fails after a successful SNE OS upgrade and during an SNE application upgrade, or if the PC loses power at that point, another invocation of the upgrade tool will offer to restart the upgrade beginning with an SNE application upgrade, and continuing with all steps that have not been successfully concluded. See details regarding failed upgrades in the topic below, **Resume Incomplete Upgrade**.

Resume Incomplete Upgrade

An upgrade may be interrupted by a variety of circumstances, such as

>   Loss of power

>   Software crashes

>   Network failures

>   Time-outs

To facilitate easier recovery from these interruptions, Maxum Utilities records the completion of each successfully completed upgrade step in an external file (System\CurrUpgrade.txt). If, after an interruption, the user again selects to upgrade an analyzer, or if the Maxum Utilities program is restarted and a previous upgrade has not been completed, the **Resume Incomplete Upgrade** dialog box offers to resume an incomplete upgrade. The user is given the following three options.

>   **Resume –** Continue the incomplete upgrade at the point it was interrupted.

>   **Discard –** Discard the information about the incomplete upgrade and continue with a new upgrade setup.

>   **Cancel –** Close this dialog box without further action.

Show Details
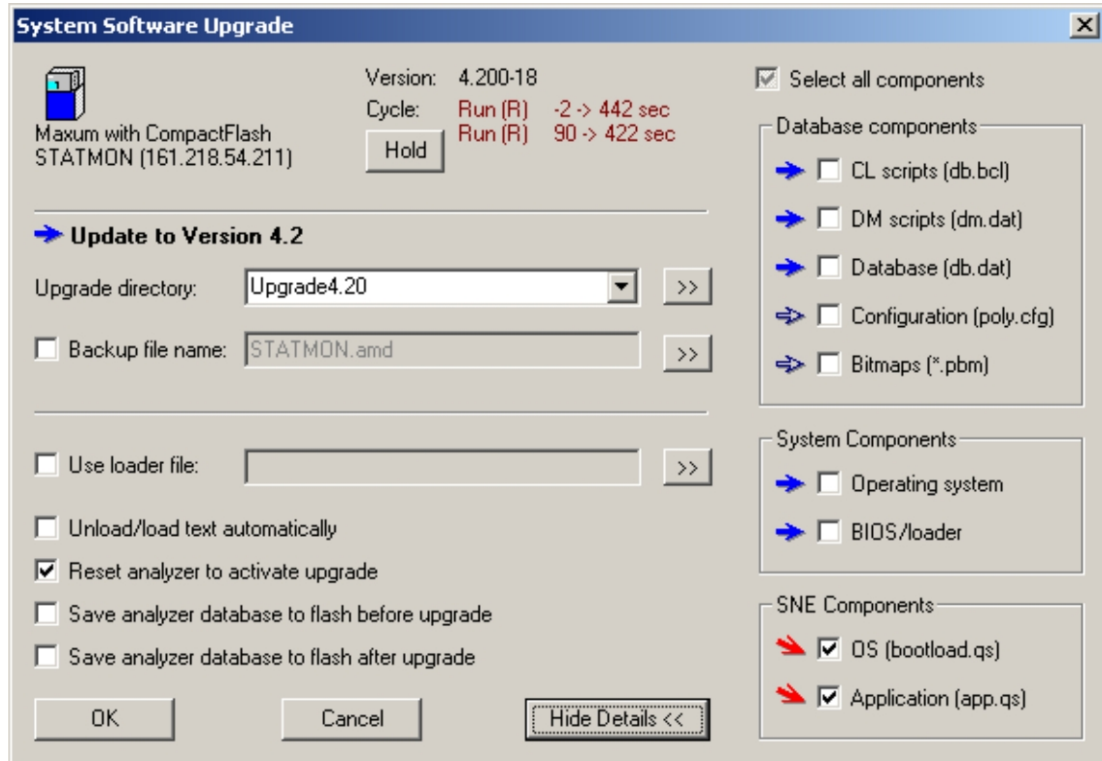
On the right-hand side, all files are presented that the upgrade tool has selected for the upgrade step. Each file is also accompanied by an arrow indicating the status of the version change:

     Upgrade

     Version numbers are the same

     Downgrade

     One or both version numbers cannot be determined.

Let the mouse pointer hover over these arrows to display the actual version number change.

Use loader file – (Not available for MicroSAMs.) Old-style loading of SRAM/Flash Maxum analyzers with CMD files is still possible with this option. Check this checkbox or select the >> button to specify a CMD file.

Unload/Load Text Automatically – Database data and Modbus maps are stored as text files ({Name}_Db.txt and {Name}_Mod.txt) in the TempUpgrade subdirectory of Maxum System Manager prior to loading any new software into the analyzer, and the contents of these text files is loaded into the analyzer after all software updates have been concluded.

Reset Analyzer to Activate Update – Some upgrade/downgrade paths include an automatic analyzer reset to proceed, but some updates (e.g., CL scripts) require an explicit reset before the update is active. Leave this checkbox checked unless there is a good reason not to reset the analyzer.

Save Analyzer Database to Flash Before Upgrade – If a database backup is suggested, this option is checked as well. Uncheck this box if you want to discard the current database contents and have the analyzer revert to the data that was saved into flash previously.

Save Analyzer Database to Flash After Upgrade – If this is an upgrade or downgrade (dictated by a database schema version change), this option is checked to save all data loaded through text files into flash.

DataLogger View Styles (on Tools Menu)

This function selects the type of icons to display in the DataLogger View window. The following selections are available.

List Style
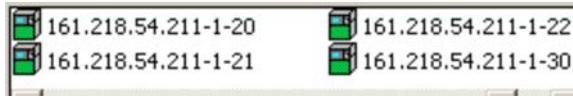
 Path: Tools | DataLogger View Style | List Style

Small Icon Style
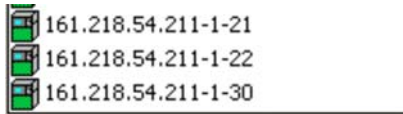
Path: Tools | DataLogger View Style | Small Icon Style

Large Icon Style

Path: Tools | DataLogger View Style | Large Icon Style

StatMon Utility

The StatMon utility is the interface to the StatMon table in System Manager, found for an analyzer under System Tables.

Starting in version 4.2, the Statmon table in the database can be configured to store key database values over time. These historical archives are available on the workstation with the StatMon (formerly MaxCems) utility under System Manager Tools. Timestamp and status information are also available for access from the workstation. At the workstation, the data may be easily imported into Excel or printed.

Configuring the StatMon Table

Required Attributes

ID – This is a unique identification number for the StatMon table entry.

SourceAttribute – This is the type of data being archived. The available types of data are listed in the source attribute list (see the Attribute List later in this section).

Sourcekey – This identifies which specific data to archive. For example, which Application, stream, method, channel, and group to collect the data from. The applicable Source Key is dependent on the Source Attribute that is chosen. Refer to the Attribute List later in this section. The SourceKey is a space separated list of primary key values referenced by the SourceAttribute.

Max_values – Number of values to store in circular binaries (in general, max_values*cycle length = length(in time of the archive))

Optional Attributes

Scan_option – default is zero(values stored at end of cycle). Greater than 0 indicates the rate for polling (5,10,15,30,60 seconds)

Status_option – default is zero – use HCI-H status codes
1 = uses whatever is in the Current_status attribute(Set from a MaxBasic program)

Action – default is zero (nothing happens), statistics are done every point collected
-1 = empty out buffer and start collecting new archive.
Any value greater than zero sets the rate of statistics computation. For example, 3 means to compute the mean, stdev, rangehi, rangelo every 3 values collected.

Name – This is the name for displaying results (defaults to a system generated name, but may be changed). This name must be unique in the StatMon table.

Informational Attributes

Current_value – last value stored in binvalues

Current_time – last value stored in bintimes

Current_status – last value stored in binstatus

Counter – position in the archive of the last collected value

Num_values – number of values currently in the archive

Mean – arithmetic average of the values in the archive

Stdev – standard deviation of the values in the archive

Rangehi – largest value in the archive

Rangelo – smallest value in the archive

Streamapp, Streamref – Application and Stream that are indicated by the SourceKey. These are generally the first two fields of the SourceKey.

Other attributes:

Report – Reports can be requested by setting the Report attribute. This attribute is automatically reset. Reports will be directed to any printer designated to receive results. The following reports are available:

Last x values – Enter "L 100" for the last 100 values

Daily reports at different intervals for the current and previous days. Enter C then an increment then a day indicator(3 values)

- o "C 15 –1" means print a daily report at 15 * cyclelength intervals for yesterday

- o "C -15 1" means print a daily report at 15*cyclelength intervals for today, with a detail line for every value

Paramoffset – Used to designate locations (that must be configured) in the parameter table to store daily averages that can then be reported on for the month. Used with Report.

- ▪ Report "D" stores the current day's summary in the appropriate parameter

- ▪ Report "M" prints the summary lines from the parameter table.

Example:

It is desired to archive the Concentration values for a specific peak. The desired information is peak number 3 on Application 1, Stream 2, Method 1, and Channel 17. You wish to keep the last 500 values for this peak.

1. The setup is done in the StatMon system table (System Tables in the Analyzer Tree View). Open the table and click the add record button on the Table Editor toolbar or select **Add Record** from the Edit menu.

2. From the attribute list, the necessary Source Attribute is **11** (Peak Concentration). The attribute list indicates that the following data are necessary for the Source key

    "Application stream method channel peak"
          (1)   **(2)**   **(1)**   **(17)** **(3)**

    Therefore, the applicable Source Key is – **1 2 1 17 3**

3. The Max_Values attribute should be set at **500** to indicate that you wish to keep the last 500 values. Once the 500 values have been stored, the next value measured will be saved and the oldest archived value will drop off.

4. You may also wish to set the Name for this stored value. In this case, if the peak is Propane, then you may choose the name **Propane Concentration**.

5. Once the table has been saved, any new data will be archived per the settings in StatMon. After data has been collected, it will be possible to open the StatMon utility and view the results.

Accessing the StatMon Data Archive from the Workstation

The StatMon utility runs under System Manager Tools. Run the StatMon utility by selecting "Statmon" from the Tools menu. The following dialog box appears.
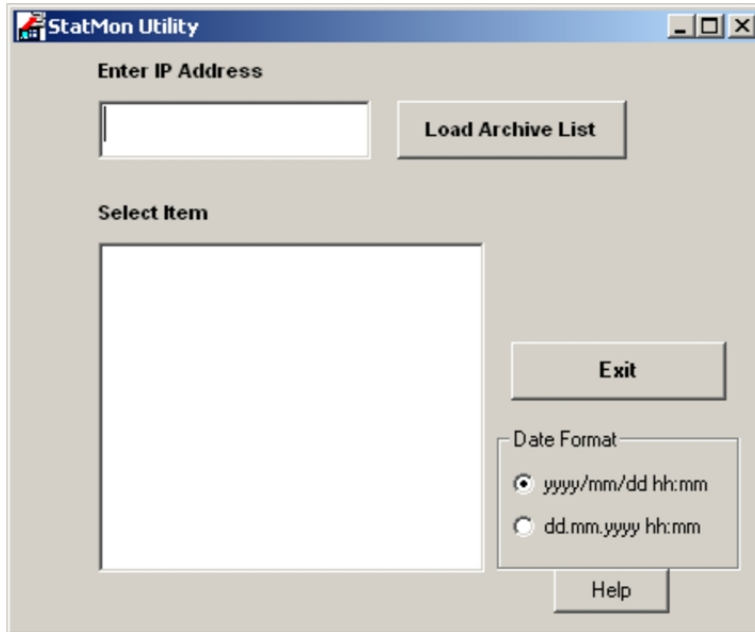
Enter the IP address in the window as shown in the example below and press the **Load Archive List** button.
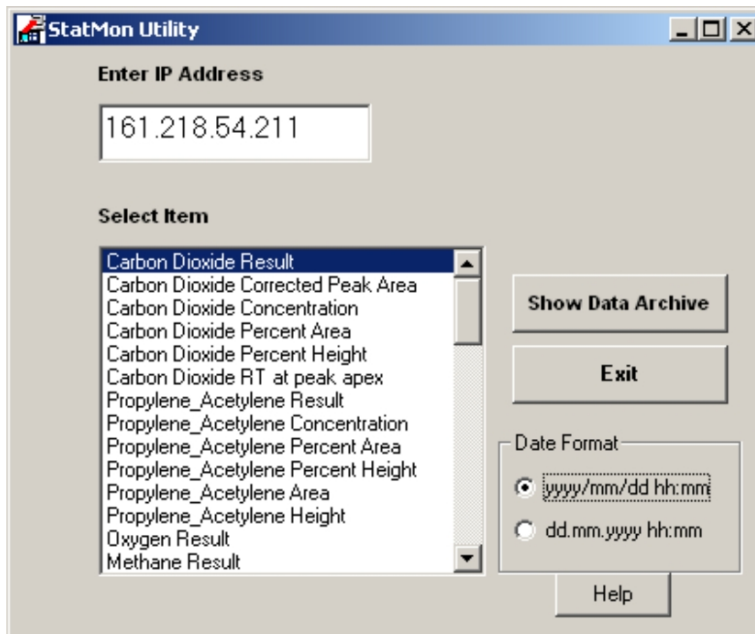
To show data for an item in the list, first select the item, then press the **Show Data Archive** button. A window similar to the one below should be displayed.
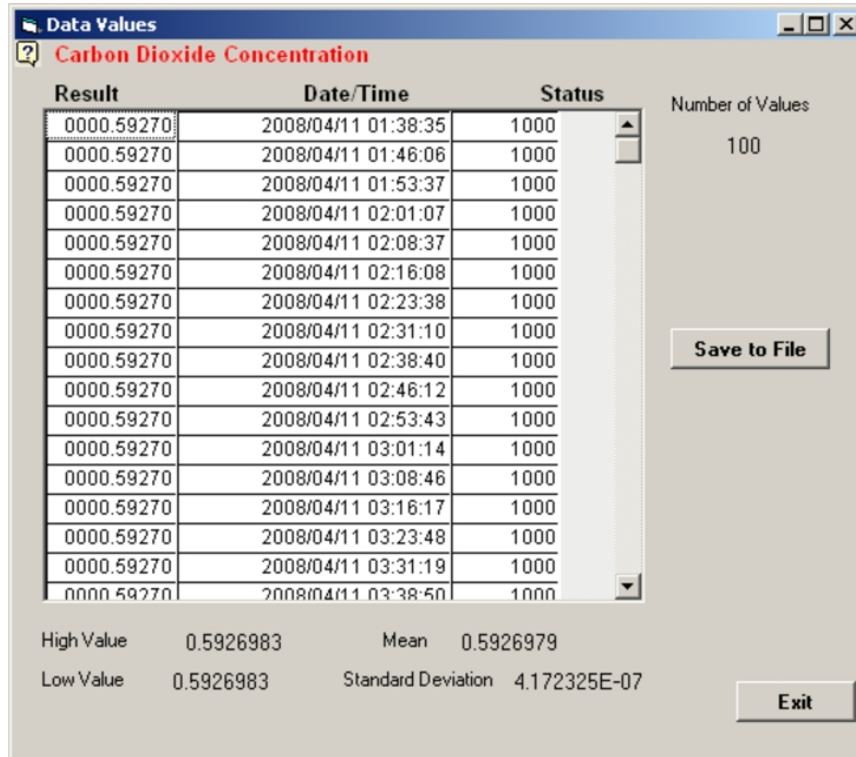
To extract the data values to a .CSV file (comma separated values), select the **Save to File** button. The file name can be selected or entered manually.. The CSV type file can be easily imported into Excel. Note: The save function does not save the Mean, Standard Deviation, High Value, or Low Value.

Sample file:

0003.82513 , 2004/03/03 09:45:41 , 1000

0003.82513 , 2004/03/03 09:38:37 , 1000

0003.82513 , 2004/03/03 09:39:24 , 1000

0003.82513 , 2004/03/03 09:40:11 , 1000

0003.82513 , 2004/03/03 09:40:59 , 1000

0003.82513 , 2004/03/03 09:41:46 , 1000

0003.82513 , 2004/03/03 09:42:34 , 1000

0003.82513 , 2004/03/03 09:43:21 , 1000

0003.82513 , 2004/03/03 09:44:08 , 1000

0003.82513 , 2004/03/03 09:44:54 , 1000

Attribute List

Source Attribute	Attribute #	Source Key
EZCHROM_RESULT_CHROMPEAK.QUANTIZE	1	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK..PEAK_WIDTH5	2	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.PEAK_WIDTH10	3	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.PEAK_WIDTH50	4	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.USP_PEAK_WIDTH	5	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.RELATIVE_RET_TIME	6	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.THEOR_PLATES	7	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.THEOR_PLATES_METER	8	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.CAPACITY_FACTOR	9	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.RESOLUTION	10	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.CONCENTRATION	11	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.NORM_CONC	12	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.X_INT_AT_UP	13	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.Y_INT_AT_UP	14	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.X_INT_AT_DWN	15	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.Y_INT_AT_DWN	16	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.X_SECT_INFL	17	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.Y_SECT_INFL	18	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.FIT_ERROR	19	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.CONC_ERROR	20	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.ASYM10	21	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.AREA_PERCENT	22	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.HEIGHT_PERCENT	23	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.FRONT_TIME	24	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.BACK_TIME	25	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.RETENTION_TIME	26	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.BASELINE_START	27	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.BASELINE_START_HEIGH	28	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.BASELINE_STOP	29	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.BASELINE_STOP_HEIGHT	30	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.RAW_AREA	31	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.CORRECTED_AREA	32	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.ASYMMETRY	33	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.PEAK_HEIGH	34	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.PEAK_BASE_WIDTH	35	Application stream method channel peak

Source Attribute	Attribute #	Source Key
EZCHROM_RESULT_CHROMPEAK.STRINDX_FRONT_INF	36	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.STRINDX_BACK_INFL	37	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.PEAK_NOISE	38	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.PEAK_SIGNAL_TO_NOISE	39	Application stream method channel peak
EZCHROM_RESULT_CHROMPEAK.CURRENT_RF	40	Application stream method channel peak
EZCHROM_RESULT_GROUP.QUANTIZE	50	Application stream method channel group
EZCHROM_RESULT_GROUP.CONCENTRATION	51	Application stream method channel group
EZCHROM_RESULT_GROUP.NORM_CONC	52	Application stream method channel group
EZCHROM_RESULT_GROUP.GROUP_QVALUE	53	Application stream method channel group
EZCHROM_RESULT_GROUP.FIT_ERROR	54	Application stream method channel group
EZCHROM_RESULT_GROUP.CONC_ERROR	55	Application stream method channel group
EZCHROM_RESULT_GROUP.AREA_PERCENT	56	Application stream method channel group
EZCHROM_RESULT_GROUP.HEIGHT_PERCENT	57	Application stream method channel group
EZCHROM_RESULT_GROUP.CORRECTED_AREA	58	Application stream method channel group
EZCHROM_RESULT_GROUP.GROUP_HEIGHT	59	Application stream method channel group
EZCHROM_RESULT_GROUP.CURRENT_RF	60	Application stream method channel group
RESULT.BUFFERED_VALUE	80	Application stream result_index
RESULT.SAVED_VALUE	81	Application stream result_index
STREAM.CURR_ERROR	100	Application stream
STREAM.CURR_WARNING	101	Application stream
ALARM.COUNT	300	Appcontext Streamcontext alarm_code
CALIBRATION_LEVEL.KNOWN_CONC	310	Application method channel ref_type cal_id level
CALIBRATION_LEVEL.MEASURED_VALUE	311	Application method channel ref_type cal_id level
CALIBRATION_LEVEL.NEW_RESPONSE_FACTOR	312	Application method channel ref_type cal_id level
CALIBRATION_LEVEL.RESPONSE_FACTOR	313	Application method channel ref_type cal_id level
CALIBRATION_LEVEL.RESIDUAL	314	Application method channel ref_type cal_id level
APPAI.VALUE	400	Application Id
APPAI.AVERAGE	401	Application Id
APPDI.VALUE	410	Application Id
APPAO.READBACK	420	Application Id
APPDO.READBACK	430	Application Id

Glossary

Analyzer Icons

The following icons may be displayed in the System View Window:

 Analyzer connected to the network and functioning with no alarms.

 Analyzer not connected. No response from the unit.

 Analyzer connected, with alarms

 MicroSAM

 NAU (Network Access Unit)

 Quantra Unit

 CGA (Continuous Gas Analyzer

Application

This term refers to the supporting hardware and software required to perform an analysis. An application can be compared with a single Advance Optichrom® analyzer. The flexibility of the Maxum II analyzer gives it the ability to run multiple applications. Each application has the following:

- Streams

- I/O

- Active Stream Sequence

- Multiple Methods

- Basic Events

- Chromatograms

- Temperature and Pressure Control

- Results

Applications on a Maxum II Analyzer share hardware and a sample system.

Basic Programs

Click the Basic Programs icon in the Analyzer tree view to view the Maxum II Basic calculation routines that have been created. MaxBasic is a powerful programming language that is used to change and customize different programs that involve decisions,

calculations, alarm generation, and custom printing. MaxBasic is a separately purchased workstation product that may not be licensed for every workstation.

Broadcast

All units on the system are monitored, and every ten to fifteen minutes the system sends (broadcasts) a status report to all units connected to the network. Changes in unit status are displayed in the System View Window each time a new report is broadcast.

Dynamic View

When the data from a database query changes automatically as changes occur in the database, it is termed **dynamic**. Most of the HMI screens and the Alarm Log and Results view in the System Manager are dynamic.

HMI

The Human-Machine Interface (HMI) (previously Man Machine Interface, or MMI) for application monitoring and control is the display software for the Maxum that runs on the Maxum, MicroSAM, or the workstation. Like the System Manager, it gives a view of certain key database tables. It differs from the System Manager by organizing the views by function, rather than table name, and by using mostly dynamic queries.

The HMI is the most powerful operations and monitoring tool for the Analyzer, although it has only minimal editing and configuration capability. An HMI can directly connect to all Ethernet-connected Maxum Analyzers. It also supports a subset of Advance Data Hiway panel messages.

Insertion Point

The blinking vertical bar that appears in a field waiting for information to be typed. The insertion point can be moved by clicking in a different field.

Limits

Automatic limit processing can be placed on I/O, results, and external results by adding a limit then placing a reference to it in the required table. The standard alarms for limits are:

hihi alarm   => 673 ! Database:value >limit: %3

lolo alarm   => 674 ! Database value < limit: %3

hi alarm   => 694 ? Database:value > limit: %3

lo alarm   => 695 ? Database value < limit: %3

These are used when no *alarmhandler* alarm reference is placed in the limit table.

MaxBasic

MaxBasic is a powerful programming language that is used to change and customize different programs that involve decisions, calculations, alarm generation, and custom printing. MaxBasic is a separately purchased workstation product that may not be licensed for every workstation.

Method

A method is the set of information needed to perform a component analysis on a stream. It is the part of an application that contains the parameters for controlling the hardware. In other words, the method tells the hardware what to do. The method includes instrument setup (detectors, valves, etc.), peaks/groups, data collection events, and integration events. Methods are developed in Maxum EZChrom and exported to the database. They are transmitted to the SNECON at the beginning of each cycle specified in the stream/method sequence.

Monitoring interval

A time setting, between 1 and 9 minutes, that specifies that the specific analyzer be checked more frequently than the default ten minute broadcast. The default is recommended except for short performance checks (for example, when a new physical unit is added to the network). If the Monitoring interval is set to 0, it reverts to the default. A time interval above ten minutes should not be used, because, with broadcasts coming every ten minutes, it does not provide any information.

The Monitoring Interval field is found on the **Add unit to** and the **Unit Properties** dialog boxes.

NAU

NAU (Network Access Unit) is used for centralized maintenance access to a large number of chromatographs or other analyzers in a single process network and for centralized data input and output facilities, which are shared by many analyzers on a common network.

Primary Key

The Primary Key is unique identifier or set of identifiers in a record. Each table has at least one column designated as primary key. For ready identification, the primary key column(s) are gray. When more than one column is designated as primary, the full combination of information is considered a primary key.

Multiple ampersands (&& or &&&) in the table header identify primary key combinations.

rarg

Real (floating point number) arguments for MaxBasic program events. Arguments are numbers that are passed to a program event and used to identify a parameter.

iarg

Integer arguments for MaxBasic program events. Arguments are numbers that are passed to a program event and used to identify a parameter.

Sequence

A Sequence, called an Online Sequence in Maxum EZChrom, is an ordered list of stream/Method pairs. Each application has at least a normal process sequence, and a calibration sequence. Additional sequences, such as validation, are allowed. Only one sequence is active, or being used, at a time.

Calibration and Validation sequences have special actions associated with them and return to the process sequence when they are completed.

SNECON

The SNECON, or Sensor Near Electronics Controller, manages and controls chromatography functions to perform the compositional analysis of the input stream. The SNECON is the IO interface to system hardware such as detectors and temperature controllers.

Static View

When the data from a database query is captured at the instant of the query and does not change, it is termed **static**. The table must be re-queried by some user action to see changes that may have occurred. Most of the system Manager table views are static. A Static View is like a snapshot.

Status Bar

The lowest part of the Maxum System Manager screen is called the **Status Bar**, and extends horizontally across the bottom of the window.   The default text on the left side of the Status Bar is a reminder to press the F1 key for help. When the cursor moves across the various commands in the toolbars and drop-down menus, a short description of the command function appears on the status bar.

The right side of the status bar indicates whether the alpha characters are locked in upper case (CAP), whether the numeric key pad is in the number locked position (NUM), or whether the Scroll Lock has been pressed (SCRL).

For Help, press F1   NUM

Maxum System Manager Status Bar

SYSCON

The SYSCON, or System Controller, is the primary processor for the Maxum II. It contains the control system for the analyzer. It controls all internal communications to the SNECON and all external communications

System View Window

This is the lower section of the Maxum System Manager window. It is identified by a tab labeled "**All**" and any custom group tabs you add after installation. Analyzers that are available for connection are shown in the System View Window.

Table Editor

The Table Editor Mode is active when a table is opened for viewing or editing. When editing a table, the Edit menu is available and buttons on the Table Editor Toolbar are active.

Toolbar

When you move the cursor across a toolbar a popup label indicates the function. At the same time, a more complete description is shown in the Status Bar at the bottom of the System Manager window. Note that when a function is not available, it is colored gray.

Toolbars can also be moved and "floated" anywhere on the screen. Position the cursor on a blank area of the toolbar (not on a button), click and drag the toolbar across the screen to a different location. To restore it to the original position, double click the title bar.

Title Bar

The colored band at the top of any type of window including dialog boxes and detached toolbars is called a **title bar**. The title bar may, or may not, display the title of the window, but it will always include the Exit button ⊠ used to close a window.

Tree View
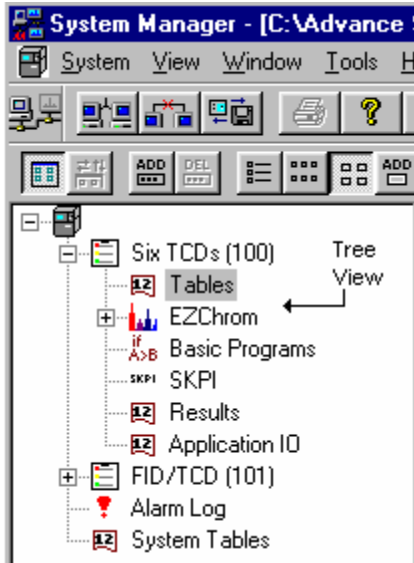
A hierarchical structure of objects in the database that appears in the left pane of the Analyzer window. The tree includes objects that are used to organize both Analyzer and application information.

Appendix 1. Hardware IDs

SNE Hardware ID

The Hardware ID is similar to an IP address and identifies a particular IO device. It is included in fields for IO dialog boxes as well as in table entries for Inputs and Outputs.

The syntax of the SNE Hardware ID string is as follows:

Hardware ID String Example: 11:4-5.1-1.4.1

"SNE ID": "Mod Type" - "Sub Mod Type" . "Loc ID" - "PIC Index" . "Chan Type" . "Chan Num"
  11   4   5   1   1   4   1

SNE ID:

The SNE ID is the hardware address of the Sensor Near Electronics Controller. This number is identified by the following equation:

 SNE ID = Box ID * 10 + SNE Location

The SNE ID is generally "11" if a single SNECON is equipped. If more than one SNECON is equipped then the values "21", "22", and "23", are generally used instead of "11". When multiple SNECONs are equipped, the SNE ID ("21", "22", or "23") is dependent on the location of the SNECON as shown in the diagram below.
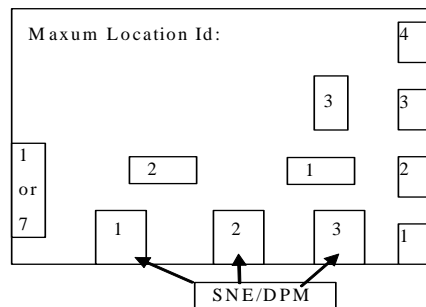
Some exceptions to the above described SNE ID numbering exist (especially for old analyzers). If you wish to modify IO assignments and notice a different numbering pattern for the SNE ID on your analyzer, then contact customer support.

Module Type and Sub-Module Type:

The Module Type is the type of physical module to which the IO is assigned. The Sub-Module Type refers to the specific kind of controller on the module. The table below shows available Module Types and associated available Sub-Module Types.

Module Type	ID	Sub-Module Names	Sub-Module IDs
HOST I/O	0	Generic	0
SVCM	1	Solenoid Controller	1
EPC	2	Pressure Controller	2
PECM	3	Power Entry Controller	3
DPM	4	Temperature Controller	4
		FID Controller	5
		TCD Controller	6
		FIL Controller	9
		FPD Controller	10
		UNIV Controller	11
SNE	5	On-Board I/O	7
		Monitor I/O	8
SIB	6	I2C Can Bridge	1
MAC-IOC	63	Generic MAC-IOC	1
SAM	64	Temp controller	64
		TCD controller	65
		Press controller	66
		Valve controller	67
		SAM Digital I/O	68
Advance I/O	128	Adv Ad. Temp control	33 (21 hexadecimal)
		AO Card	128 + 1 = **129**
		Isolated AO Card	128 + 20 = **148**
		DO Card	128 + 18 = **146**
		FID Card	128 + 19 = **147**
		DI Card	128 + 21 = **149**
		Detector Interface Board	128 + 22 = **150**
		AI Card	128 + 23 = **151**
		TC3	128 + 27 = **155**
		TC4	128 + 28 = **156**
		Adapter	128 + 32 = **160**
		Configured	128 + 127 = **255**
Quantra	192	Hardware Status	192

Location ID:

The Location ID represents the physical location of the module (Module Type) within the Maxum II electronics enclosure. These locations can be referenced in the diagram below.

M axum Location Id:
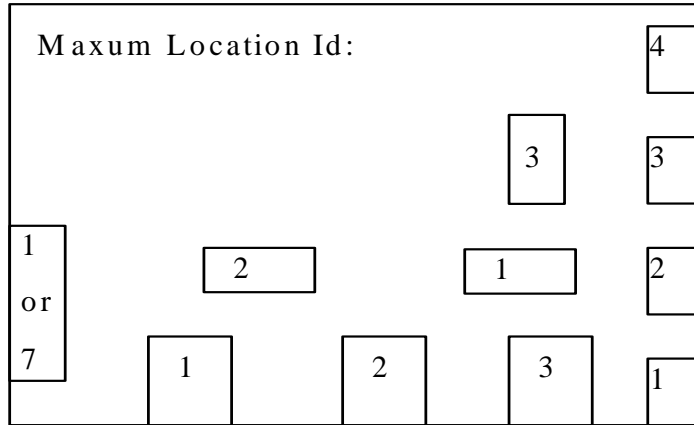
In the diagram above the boxes in the bottom center are DPMs. Boxes on the right are EPCs. Boxes near the center are SVCMs (old style). The box on the left is the PECM.

Note: The SVCM locations are for SVCM modules with the SVCM electronics located on the SVCM module. For new Maxum II analyzers the SVCM electronics are located on the PECM. In this case, the Module Type will generally be PECM (value=3) and the Location ID will be 1.

Note: Note that the PECM is listed as having a Location ID of either 1 or 7. In some cases, when temperature controllers are configured on the PECM, the PECM shows up as a DPM in hardware ID addressing. In this case the PECM becomes DPM-7 (with a location ID to match). If this is the case, then the Module Type and Sub-Module Type will appear as a DPM Temperature Controller (value = 4-4 from the table on the previous page)

PIC Index:

The PIC Index refers to the Programmable Integrated Circuit which controls the IO. DPM modules have multiple IC circuits that are used for controlling IOs. The following rules apply for PIC indexes.

For all Module Types except DPM the PIC Index equals "1".

For DPM temperature controllers the PIC Index equals "1".

PIC Index for FID, FPD, and Filament Detector Inputs and Outputs equals "2".

PIC Indexes for DPM TCD Inputs and Outputs are assigned per the table below.

PIC #	TCD Detector Channels	
2	R1	L1
3	R2	L2
4	R3	L3

Channel Type:

The Channel Type indicates the type of Input or Output to which the Hardware ID refers. The following channel types are available.

Channel Type	Type Number	Virtual*
Analog Input	1	33
Analog Output	2	34
Digital Input	3	35
Digital Output	4	36
EEPROM Channel	5	37
Temp Controller	6	38
Detector	7	39
Pressure Controller	8	40

* "Virtual" refers to values for virtual IO types. Virtual IOs are used in some situations depending on configuration (for example, to read a detector balance value.) Virtual IOs may be viewed in the System IO Tables.

Channel Number:

The Channel number is the physical channel that is assigned for the IO. The channel number is dependent on the type of hardware and type of signal.

CAN Hardware ID

When a CAN IO Module is used, the associated Hardware IDs have a different format

Syntax: **0:0.a.b.c   (0:0 indicates CAN module)**

a = CAN module node #

b = channel type:

1 = AI
2 = AO
3 = DI
4 = DO

c = channel #