# User's Manual Edition 1/2007



# **DIACESS** GAS CHROMATOGRAPHY



# **SIEMENS**

# Advance Network Access Unit



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# Preface

### Audience & Purpose

This manual provides installation personnel with instructions for proper and safe installation of the Advance Network Access Unit (NAU).

### Chapter Contents

The manual provides the following information:

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Getting Help	At Siemens, we take pride in the on going support we provide our customers. This user's manual should answer most of your technical questions; however, our technical support service provides a special "hot" line as an added source of information. If you require assistance call: In the United States: (800) 448-8224 Internationally: 001-918-662-7030
Before You Call	<ul><li>Before you call one of our technical support lines, please have the following information available to help our representative answer your questions:</li><li>1. Unit Serial Number and Date of Installation</li></ul>
	2. Description of Problem
	3. LEDs Status on CAN I/O Modules

# **Safety Practices and Precautions**

Safety First	Publication Apparatus, contains inf	t has been designed and tested in accordance with IEC 1010-1, Safety Requirements for Electronic Measuring and has been supplied in a safe condition. This manual ormation and warnings which have to be followed by the user afe operation and to retain the product in a safe condition.
Terms in This Manual	personal inj CAUTION s	statements identify conditions or practices that could result in ury or loss of life. tatements identify conditions or practices that could result in 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	$\wedge$	This symbol indicates where applicable cautionary or other information is to be found.
Symbols Marked on Equipment	ייי ב) ת	DANGER - High voltage Protective ground (earth) terminal ATTENTION - Refer to Manual
Grounding the Product		g conductor should be connected to the grounding terminal other connections are made.

# Safety Practices and Precautions, Continued

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 since "live parts or connections can be exposed".
	Capacitors in the equipment can retain their charge even after the unit has been disconnected from all power supplies.

# Chapter 1

## **Advance Network Access Unit**

#### Introduction

#### **Overview**



The Advance Network Access Unit (NAU) connects to our Advance Communications System (ACS) network to access operational information from any Maxum or Advance Optichrom Gas Chromatograph that is also connected to the ACS network. The NAU provides three basic functions:

- man-machine interface (MMI) which maintenance personnel can use for remote control of chromatographs and other analyzers
- housing for electronic boards which supply input and output signals representing data in the analyzers
- serial digital connections to ASCII printers and/or to external HOST computers

These basic functions permit the NAU to be 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.

I/O Options



The NAU provides space for up to 7 input/output boards (CAN I/O Modules). With the optional CAN extension unit you can have an additional 10 more I/O boards. Three types of boards are available which may be mixed in any combination.

- 1. Analog output board (AO-8) that provides 8 channels of analog output;
- 2. Digital board (DIO-4) that provides 4 digital output and 4 digital input signals;
- 3. Combination board (AO-4), that provides 2, channels each of digital input, digital output, and analog input and analog output.

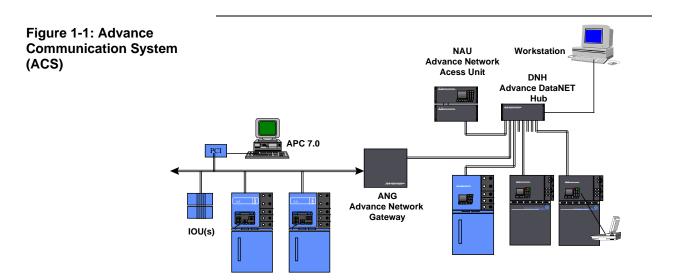
#### CEMS Software Option

The Continuous Emission Monitoring Systems (CEMS) software option for the NAU provides sample system control and general data acquisition for up to four Siemens continuous analyzers or most other analyzers or devices. When connected via our Advance Communications System (ACS) the NAU can be remotely accessed from the Maxum workstation. The CEMS option is described in Appendix 3 of this manual.

#### Introduction, Continued

Advance Communications System The Advance Communications System (ACS) is a high-speed communications system that uses TCP protocols and IP addressing to interconnect chromatographs and other process analyzers in a common network. Figure 1-1 shows the NAU and Advance Network Gateway (ANG) connected to the ACS. The ANG is used to connect Siemens' equipment residing on an Advance Data Hiway to the ACS.

The NAU communications can be configured for an Ethernet network or a DataNET network using wire or fiber optics. The type of networking hardware used in the ACS determines the option selected. The ACS and its configuration choices are fully described in the Appendix 1 of this manual.



# Specifications

Dimensions	<u>Rack Mounted Package Configuration</u> See Figure 1-2 for Outline Drawing and Dimensions <u>Wall-Mounted Package Configuration</u> See Figure 1-3 for Outline Drawing and Dimensions
Housing, Explosion Protection, Ratings and Certifications	Wall Mounted Configuration NEMA 3 (IP-54)CSA Certified for Class I, Division 2, Group A,B,C,D CENELEC non-Ex (Air purge is not required for fire protection as indicated; however, the unit may be air purged, if desired, for additional protection from environmental elements.)Rack Mounted Configuration NEMA 2 (IP-20) CSA Certified for Class I, Division 2, Group A,B,C,D CENELEC non-ExElectromagnetic and Radio Frequency Compatibility and Electrical Safety 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 1010-1Housing Materials and Colors 

Ambient Installation Conditions	Operation: -18° to +50°C (0° to 122°F)		
Conditions	0-99% relative humidity (non-condensing) maximum 0-75% relative humidity year-round average (Purge with dry air or nitrogen if required in tropical conditions.)		
	Must not be exposed to direct sunlight. Must be protected from rain.		
	Storage and	Transport: -25° to +65°C	
Power	Nominal: Tolerance:	115 VAC / 230 VAC (field switchable) 85-140 VAC or 185-250 VAC; 47-63 Hz 300 Watts	
	Power line p blow	rotection: G fuse element per IEC 127-2, 4 A rating, slow-	
	16 AWG (1.5 to local insta certified insta	g in field made to screw terminals on two part connectors; 5 mm) or smaller power wiring is accepted; must conform Illation codes and requirements. If conformance to CE allation requirements is required, power cable must be nstalled in conduit.	
Input and Output Capacity	output) 4 Digital Inp	nalog Outputs (1 can be assigned for chromatogram uts puts (1 indicates system error; 3 are user-configurable) ort	
	Digital I/O B	Boards log Output Board: 8 AOs oard: 4 DIs and 4 DOs o Board: 2 AOs; 2 AIs; 2 DOs; 2 DIs	

Input and Output Specifications

#### Digital Outputs

Floating double-throw contacts; maximum contact load rating 30 VDC at 1 A;

Field selectable to use internal or external power supply. (Internal power supply capacity is stated below.)

#### **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.

#### Analog Outputs

0 or 4-20 mA (field-adjustable); common negative pole; galvanically separated from ground (isolated), freely connectable to ground: maximum gain versus protective ground potential 50 V; maximum working resistance 750 ohms. The output signal cannot become smaller than 0 mA.

#### Analog Inputs

-20 to +20 mA into 50 ohms or -10 V to +10 V into 1 M-ohm mutually isolated up to 10 V.

#### Serial Ports

Standard RS-232 and standard RS-485.

Ports may be used for data logging printer or for connection to an external Host computer such as a DCS system. Protocols for connection to an external computer include Modbus and are described in a separate document. The RS-232 port may be used for attachment of a computer, such as a laptop computer, running Maxum workstation software.

#### Internal Power Supply Capacity

The internal power supply can source current that is switched by the Digital Output or regulated source from the Analog Outputs and intended to be absorbed externally. The total capacity of the supply available for use by all I/O channels is:

#### 24 VDC at 1.2 Amperes

This is sufficient for a maximum product capacity of 58 analog output channels or 32 digital output channels or any combination where each digital output channel sources not more than 35 mA at 24 VDC. However, since the contact capacity of the digital outputs can exceed 35 mA (as specified above) more than 35 mA of external load per digital channel can be switched by using fewer channels or by using an external power supply.

If more total output capacity is required, an external power supply should be used.

Analyzer Communication System Interface	Protocol and Addressing: Open Systems standard TCP/IP protocol and addressing (Transmission Control Protocol/Internet Protocol); Full Class A, B and C addresses and subnet masking supported.
	<ul> <li>Hardware Connections: Ethernet option:</li> <li>Cable connection by 10BaseT (twisted pair) cable</li> <li>Shielded cable or unshielded cable in conduit is required for conformance to CE certified installation</li> <li>8-pin RJ-45 connector (female) provided</li> <li>10 mbps standard Ethernet</li> </ul>
	<ul> <li>DataNET option, standard cable:</li> <li>Cable connection by Belden 9182 (single pair) or Belden SSD1743 (two pairs) or equivalent; two pairs of wires are required to support redundancy</li> <li>Shielded cable or unshielded cable in conduit is required for conformance to CE certified installation</li> <li>Two part connectors with screw-terminals provided for field connection</li> <li>Approximately 3 mbps base transmission rate; uses dedicated transmission technique that does not require collision detector to achieve high data throughput efficiency</li> </ul>
	<ul> <li>DataNET option, fiber optics:</li> <li>Fiber optics connection by 62.5 multi-mode cable corresponding to 10BaseFL Ethernet specification</li> <li>Two pairs of fibers are required to support redundancy</li> <li>Type ST mating connectors provided for field connection</li> <li>Approximately 3 mbps base transmission rate; uses dedicated transmission technique that does not require collision detection to achieve high data throughput efficiency</li> </ul>

Signal Connections	Power Connections Power wiring in field made to screw terminals on two part connectors; 16 AWG (1.5 mm) or smaller power wiring is accepted; must conform to local installation codes and requirements. If conformance to CE certified installation requirements is required, power cable must be shielded or installed in conduit.
	<u>Network Connections</u> Ethernet 10BASE-T (standard): 8-pin RJ45 plug -or- DataNET: 2 part screw-terminal connectors
	<u>Serial Digital Input and Output Connections</u> RS 232C 9-pin Sub-D plug (male provided on unit) RS 485C 9-pin Sub-D plug (female provided on unit)
	Discrete Analog and Digital Input and Output Connections Standard built-in I/O: 2 12-pin 2-part screw terminal connectors Optional plug-in I/O boards: 1 22-pin 2-part screw terminal connector per board
	<u>Note:</u> All screw terminal connectors used on DataNET or I/O field wiring accept 16 AWG (1.5mm) or smaller stranded or solid copper wire.

Figure 1-2: Rack Mount Dimensions

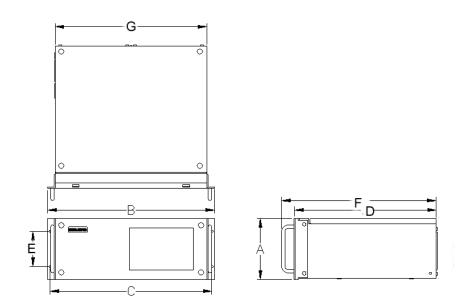
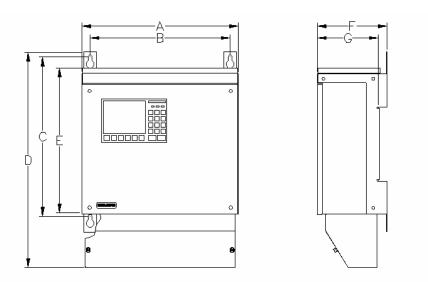


Figure 1-3	Description	U.S. Inches	Metric mm
A	Rack Height	6.97	177
В	Rack Total Width	19	483
С	Rack Mounting Holes Spacing	18.43	468
D	Rack Depth Case Only	16.26	413
E	Rack Handle	6.83	174
F	Rack Depth with Handles	17.63	448
G	Case Width	17.32	440

#### **Dimension Table**

Figure 1-3: Wall Mount Dimensions



#### **Dimension Table**

Figure 1-4	Description	U.S. Inches	Metric mm
A	Wall Width	17.48	444
В	Wall Mount Holes Horizontal Spacing	15.59	396
С	Wall Mount Holes Vertical Spacing	17.72	450
D	Wall Height Including Cable Housing	24.04	611
E	Wall Height w/o Cable Housing	16.32	415
F	Wall Mount Total Depth	7.81	199
G	Wall Mount Depth Case Only	6.91	176

# Chapter 2

# Installation

Overview			
	This chapter is intended for installation personnel.		
	After completing the procedures, within this chapter, the NAU will be ready for operation. All factory installed CAN I/O Modules have been pre- configured. To ensure a safe and trouble free installation, follow all procedures and associated advisory information.		
Installation Hint	It is highly recommended that the user thoroughly re- Chapter to establish an installation plan. Before begi and installation process refer to the wiring and illustra supporting installation procedures.	nning the unpacking	
Chapter Highlights	In this Chapter the following NAU unpacking and insitist provided.	tallation information	
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	Wall or Rack Mounting Installation	13	
	NAU SYSCON Connections	15	
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		21	
	Ethernet Connection	21	
	Ethernet Connection	24	
	Ethernet Connection RS-232C or RS-485 Connections	24 26	
	Ethernet Connection	24	

# Unpacking and Inspection

Description	This section provides the steps to follow when receiving and unpacking the Advance Network Access Unit (NAU).		
Receipt of NAU	When NAU is received, examine the shipping container for evidence of external damage. Outside damage may be an indicator of damage to the NAU. Record any external damage.		
Unpacking	Open the carton containing the NAU and remove all internal and packing material. Carefully remove the unit from the carton and inspect it for damage that may have occurred during transportation. Carefully examine shipped contents with those listed on the Bill of Lading. All items should match those on the Bill of Lading.		
	<ul> <li>Perform the following inspections:</li> <li>Inspect NAU exterior for dents, chipped paint, scratches etc.</li> <li>Open NAU hinged top cover and visually inspect interior mounted assemblies, connectors and any installed CAN boards.</li> <li>If NAU is to be rack or wall mounted, be certain the proper mounting hardware is provided.</li> <li>Inspect installed CAN board field wiring connectors and wire openings. There must not be any damage to these connectors. Damage connector(s) will impair NAU operation.</li> <li>Check internal power supply AC power connector and voltage selector switch for damage.</li> </ul>		
Reporting Damage	If there is any evidence of damage to the shipping carton or the NAU, notify your local Siemens Energy & Automation, Inc. representative. Keep all shipping materials as evidence of damage for carrier's inspection. Immediately contact your representative who will arrange for immediate repair or replacement. The Customer Service department can be contacted as follows: Inside Oklahoma: 918-662-7030 Outside Oklahoma: 800-448-8224 (toll free) Internationally: 001-918-662-7030		

# Wall or Rack Mounting Installation

Instructions	The Advance Network Access Unit (NAU) should be:		
	<ul> <li>Installed in a location that is as free from shock and vibration</li> <li>Protected from direct sunlight and extreme temperatures.</li> <li>It is recommended that the NAU be mounted within a shelter. This prevents NAU from being exposed to outside environmental conditions.</li> </ul>		
Package	The NAU is available in two models;		
Configurations	Wall mount unit		
	19-inch rack unit		
Wall Mounting	The mounting wall must be capable of supporting the weight of the <b>NAU</b> ; see Chapter 1, Specifications and Figures 1-2 through 1-3.		
	<b>Wall Mount Unit</b> : Use four, 5/16-inch (M8) or 3/8-inch (M10) lag bolts to mount the NAU to the wall. Mounting bolts must be secured to solid wall construction members such as studs and into the wall only. Allow adequate clearance on the left side to allow the door to swing open.		
Optional Conduit Connection Box	If your wall mounted NAU unit has a Conduit Connection Box, holes must be drilled into the side or bottom of the box to accommodate the moisture protected cable glands or conduit fittings.		

### Wall or Rack Mounting Installation, Continued

#### **Routing Cables**

Cable routing and entry must be done in accordance with the local safety practices and regulations.

Always use the correct sized compression fitting for the size cable being run. Alternatively, all cabling may be installed in conduit, which is fit or adapted to the safe wiring box as required in the field.

Two removable access plates provide power and I/O entry through the underside of the NAU. The plates can be punched to accommodate conduit or cable gland connectors

ACCESS PLATES



### NAU SYSCON Connections

#### Description

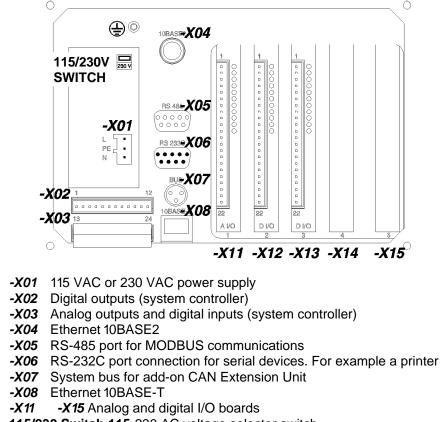




#### Figure 2-1: Electronic **Module Connections**

This section shows the connections to the NAU System Controller (SYSCON). The SYSCON connections are visible at the rear of the NAU. If you are installing a wall-mounted unit you must first remove the front or side covers to see the SYSCON connections.

#### The connections to SYSCON are shown below. Applicable I/O connection diagrams are shown on the following pages.

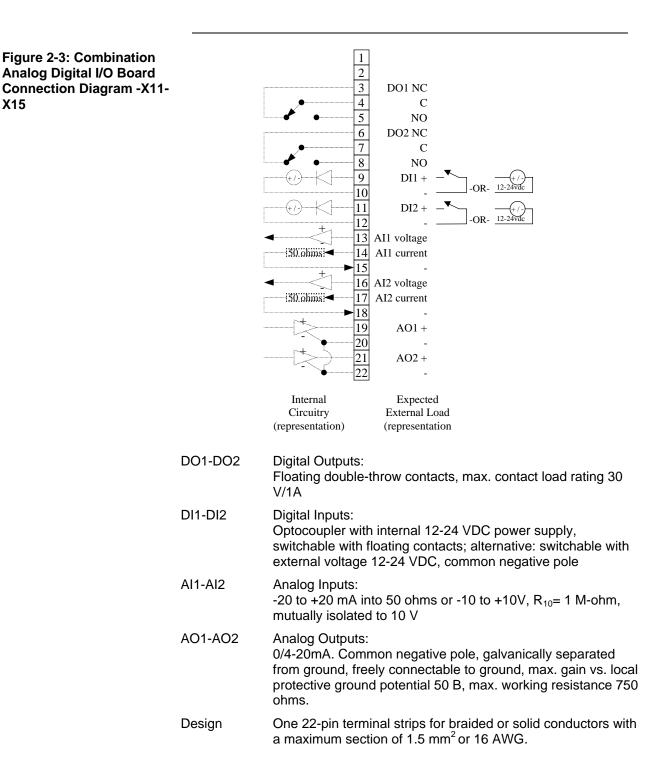


115/230 Switch 115-230 AC voltage selector switch.

#### **Connection Diagrams**

Figures 2-2 through 2-5 are connection diagrams for the NAU system controller and analog/digital boards show standard input and output pin layouts. The actual pin layouts with input and output signals in a delivered NAU will be shown in the applicable custom documentation package.

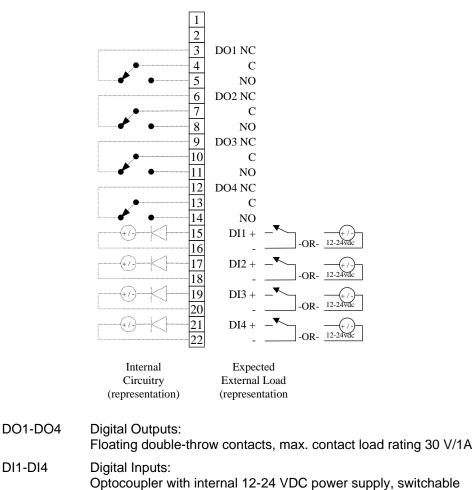
Digital Outputs (DO) Figure 2-2: System **Controller Connection** DO1 NC max. 30 V / 1 A 1 Diagram -X02,XO3 2 С  $\square_7$ 3 NO DO2 NC max. 30 V / 1 A 4 5 С  $\square_7$ 6 NO 7 DO3 NC max. 30 V / 1 A 8 С  $\square_7$ 9 NO 10 DO4 NC max. 30 V / 1 A 11 С  $\square_{\mathcal{I}}$ 12 NO Analog Outputs (AO), Digital Inputs (DI) 13 AO1 + 0 - 20 mA, max. 750 Ω 14 15 AO2 + 0 - 20 mA, max, 750  $\Omega$ 16 + 12 - 24 VDC - (D) + 17 DI1 18 \* 19 DI2 12 - 24 VDC 20 \* 21 DI3 12 - 24 VDC 22 \* 23 12 - 24 VDC DI4 24 DO1-DO4 **Digital Outputs:** Floating double-throw contacts, max. contact load rating 30 V/1A. AO1-AO2 Analog Outputs: 0/4-20mA. Common negative pole, galvanically separated from ground, freely connectable to ground, max. gain vs. local protective ground potential 50 B, max. working resistance 75 ohms. 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 Two 12-pin terminal strips for braided or solid conductors Design with a maximum section of  $1.5 \text{ mm}^2$  or 16 AWG.



X15

DI1-DI4

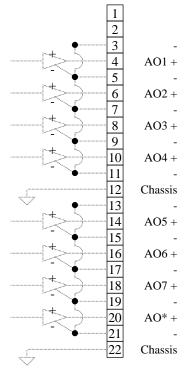
Figure 2-4: Digital I/O **Board Connection** Diagram -X11- X15



with floating contacts; alternative: switchable with external voltage 12-24 VDC, common negative pole.

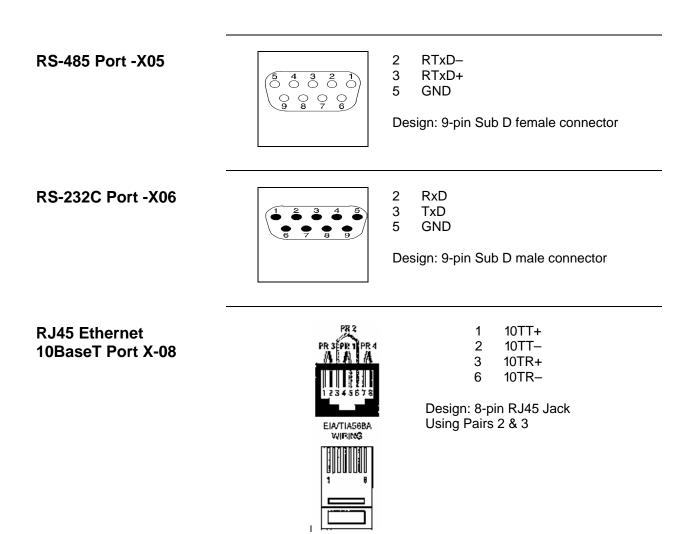
One 22-pin terminal strips for braided or solid conductors with a Design maximum section of 1.5 mm<sup>2</sup> or 16 AWG.

Figure 2-5: 8 Analog Output Board Connection Diagram X11-X15



Internal	Expected
Circuitry	External Load
(representation)	(representation)

A01-A08	Analog Outputs: 0/4-20mA. Common negative pole, galvanically separated from ground, freely connectable to ground, max. gain vs. local protective ground potential 50 B, max. working resistance 750 ohms.
Design	One 22-pin terminal strips for braided or solid conductors with a maximum section of 1.5 mm <sup>2</sup> or 16 AWG.



Description	The NAU power supply requires an input voltage of 115 VAC or 230 VAC.		
Specifications	Input Voltage	85-115-140 VAC or 185-230-250 VAC 47-63 Hz	
	Output Voltage	24VDC + - 5%	
	Input Current	max. 1.9A at 115 VAC, max. 1.1 at 230 VAC	
	Power Consumption	approximately 200 VA	
	Fuse	G fuse element per IED 127 2, 4A rating, slow-blow for both 115 VAC and 230 VAC	
	Line Power connection	3-pin grounded instrument connector per IEC 320	
	Follow all applicable national installation and operation of	l, state and local safety regulations for the the NAU.	
Connecting AC Power	It is not necessary for the customer to provide external primary AC power and a circuit breaker for the NAU. Primary AC power can be directly connected to the internal NAU power supply connector from an AC wall outlet in close proximity to the NAU. However, it is recommended that the AC power source be protected by a circuit breaker.		
Circuit Breaker		rated for 117 VAC (100 to 130 VAC) and 230 o 63 Hz, Single phase, grounded neutral. A ed in the circuit breaker.	
Wall Mounted Unit With Conduit Connection Box	or side of the Conduit Connectightened, it will secure the c from its SYSCON connector.	compression fittings installed in the bottom action Box. When the compression fitting is able and prevent it from being pulled out The compression fitting openings that are suitable for the size cables being routed.	

# AC Power (Mains) Connections, Continued

Step	Procedure
1.	Turn off primary AC power to this location.
2.	If unit is equipped with conduit connection box go to step 3. If not perform this step and go to step 5.
	Remove wiring access plate. Punch holes as required for either conduit or cable gland connectors. Install connectors and replace the plate.
3.	Wall Mounted Units With Conduit Connection Box. Remove the Conduit Connection Box cover by loosening th 2 fastening screws.
4.	Wall Mounted Units With Conduit Connection Box. Drill holes in side of box to accommodate conduit or cable gland connectors. If desired, entry can be made from underside o Conduit Connection Box. Simply remove the desired knock out.
5.	Install a 15-Ampere circuit breaker, disconnect switch or a receptacle in the power supply line or a switched receptacle near the NAU unit to make sure the unit can be completely separated from the power source. Label the breaker or receptacle box to make sure that the circuit is clearly identifiable.
6.	Route input power cord, in accordance with pertinent electrical codes and regulations to the NAU power supply.
7.	Loosen upper right corner mounting screw located on the power supply. Connect ground wire to this location.
	After connecting ground wire, securely tighten mounting screw.

#### **Installing AC Power**

Procedures

The following procedures should be followed for connecting primary AC wiring to the NAU.

# AC Power (Mains) Connections, Continued

Step	Procedure
7.	Set the 115/230 VAC voltage selector switch to be compatible with the primary AC voltage; see Figure 2-1.
8.	Connect the power cord to the power supply receptacle and secure it with the clip; see Figure 2-1.
9.	Wall Mounted Unit With Conduit Connection Box. Open the front Conduit Connection Box cover, and ensure that the internal ground strap is securely tightened. This ground strap grounds the cover to the Box which is then grounded to the NAU. This strap MUST NOT be disconnected.
10.	Primary AC power can now be applied to the NAU.

# **Ethernet Connections**

Description	This section provides information for connecting Ethernet RJ-45 wiring to the NAU installed SYSCON. Refer to Figure 2-1 for connector location.		
10BaseT Connector	Refer to Figure 2-1, X04 and locate the 10BaseT connector. To access the wall mounted units, the safety wiring box cover must be removed to see the connector.		
10BaseT Data Cable	The 10BaseT data cable requires a minimum of two twisted pair. One pair is for transmission and the other pair for receiving. The cable should conform to the following specifications:		
	Function	Specifications	
	Data Rate	10Mbits/sec.	
	Maximum Cable Length	Per Ethernet Specifications	
	Maximum Length to Adapter Concentrator/Hub	328 feet (100 meters)	
	Cable Type (minimum required)	AT&T D-Inside wire (DIW & PDS, IBM Type 3, Category 3 or 5 Data Grade Cabling).	
NOTE	The maximum length of 10BaseT data cable can not exceed 328 feet (100 meters). To increase this distance, the cable must be connected to a hub or other type of repeater/medium converter.		
Data Cable	A 10BaseT male RJ-45 terminator o	connector is required on the end of	

Terminator

A 10BaseT male RJ-45 terminator connector is required on the end of the 10BaseT data cable. The following table shows the RJ-45 wiring connections.

Pin No.	Function
1	10TT+
2	10TT-
3	10TR+
4	NC
5	NC
6	10TR-
7	NC
8	NC

# Ethernet Connections, Continued

Wall Mounted Unit With Conduit Connection Box	Cables must be run through compression fittings installed in the bottom or side of the Conduit Connection Box. When the compression fitting is tightened, it will secure the cable and prevent it from being pulled out from its SYSCON connector. The compression fitting openings that are drilled into the box must be suitable for the size cables being routed.	
Cable Installation	The following procedures should be followed when installing Ethernet data cable:	
Procedures	Step	Procedure
	1.	Before installing cable, turn NAU AC power OFF.
NOTE	Refer to above section, Data Cable Terminator for RJ-45 wiring configuration.	
	2.	Feed cable through the compression fitting see page 22, leaving sufficient cable length within the Conduit Connection. Leave enough cable to allow connection of cable connector and to remove cable tension; tighten fitting.
	3.	Plug connector in correct SYSCON connector.
	4.	Turn NAU AC power ON.

# RS-232C or RS-485 Connections

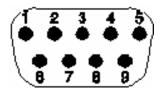
Description	This section provides information for making connections to the NAU installed SYSCON RS-232C and RS-485 serial port connectors. Refer to Figure 2-1 for connector location.	
Wall Mounted Unit Cable Compression Fittings	Cables must be run through compression fittings installed in the bottom or side of the Conduit Connection Box. When the compression fitting is tightened, it will secure the cable and prevent it from being pulled out from its SYSCON connector. The compression fitting openings that are drilled into the box must be suitable for the size cables being run. The maximum line length is 3937 feet (1200 meters) for RS-485 and 49 feet (15 meters) for RS-232.	
Serial Port Cable Installation	The follow data cable	ving procedures should be followed when installing serial port
Procedures	Step	Procedure
	1.	Before installing RS-232 and/or RS-485 connector(s), turn NAU AC power OFF.
	2.	Feed serial cable through the compression fitting, leaving sufficient cable length within the Conduit Connection Box, leave enough cable to allow connecting of RS-232C and/or RS-485 connector and to remove cable tension; tighten fitting.
	5.	Identify which cable is the RS-232C and which is the RS-485.
	6.	Plug RS-232-C and/or RS-485 connector in appropriate SYSCON serial port connectors.
	7.	Turn NAU AC power ON.

## RS-232C or RS-485 Connections, Continued

### **Cable Connections**

Refer to the following Tables for RS-232C and/or RS-485 connector wiring configurations if making a cable.			
	RS-485 Serial Connections		
	Pin No.	Function	

1	NC
2	RTxD-
3	RTxD+
4	NC
5	GND
6	NC
7	NC
8	NC



RS-232 Serial Connections		
Pin No.	Function	
1	DCD	
2	RxD	
3	TxD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8 CTS		
9 RI		

## **CAN I/O Connections**

Description	This section is intended for installation personnel and contains instructions for making external connections to the CAN I/O Modules.	
CAUTION	Follow local regulations on installing and connecting electrical wiring.	
$\triangle$	Locate the signal control and interface lines separately from the power supply line.	
	Route the analog and digital leads separately.	
	Wall Mount Units. Carefully plan the arrangement of the signal lines in the cables as well as the use of safety box connector openings.	
Motorial Paguirad	Selection of the required wire gauge depends on:	
Material Required	Line Length	
	Planned Current Load	
	The maximum conductor section is 1.5 mm <sup>2</sup> , or 16 AWG.	
	The matching plug-in field wiring connectors for each I/O board are supplied with the unit. All wiring connections are made to these connectors, which plug into each I/O board.	
CE Installations	Required for all CE (Conformite Europeean) installations.	
	The user must determine if the heavy industrial conducted immunity requirements are pertinent to the installation and application. If the requirements are pertinent then:	
	<ul> <li>All Digital Output (DO) lines with inductive loads must have transient suppression at the inductive load.</li> </ul>	
	• All Analog Output (AO) lines must be terminated in a load that is CE/EMC certified to meet the heavy industrial conducted immunity requirements. All other CE requirements are met with standard/normal termination.	

## CAN I/O Connections, Continued

### Wiring Connections

Proceed as follows to connect the signal, control and interface wiring to the NAU installed I/O boards.

#### Wall Mount Units

Step	Procedure
1.	Before installing cable, turn NAU AC power switch OFF.
2.	Feed cable through the compression fitting, leaving sufficient cable length within the Conduit Connection Box. Leave enough cable to allow connection of cable connector and to remove cable tension; tighten fitting.
3.	Make all wiring connections to the I/O board plug-in field wiring connector in accordance with the applicable wiring diagram; see Chapter 2. Installation, NAU SYSCON Connections, page 15. Ensure that the screw lug for each connection is securely tightened.
4.	Plug the field wiring connector into correct I/O board.
5.	Turn NAU AC power ON

#### **Rack Mount Units**

Step	Procedure
1.	Before installing cable, turn NAU AC power OFF.
2.	Make the wiring connections to the I/O board plug-in field wiring connector in accordance with the applicable wiring diagram; see Chapter 2. Installation, NAU SYSCON Connections, page 15. Ensure that the screw lug for each connection is securely tightened.
3.	Plug the field plug-in connector into correct I/O board.
4.	Turn NAU AC power ON.

# Removing or Replacing CAN I/O Boards

Description	This section should only be used by maintenance personnel when adding, removing or replacing a CAN I/O module. All factory installed CAN I/O Modules have been pre-configured at the factory.
IMPORTANT	This procedure configures the analyzer software to recognize the addition, deletion, or change-out of a CAN Module within an analyzer system. It does not assign it to an application. All CAN I/Os must be configured for use within an application from the Advance System Manager software; see Advance System Manager, online Application I/O help file.
Serial Number	A serial number label affixed to each CAN I/O Board. This 14-digit serial number is used in the following procedure when adding or replacing a module. The serial number contains the following information. <u>002 0000012301</u> Module Serial Number Module Type 002 Analog I/O Board 003 Digital I/O Board 007 AO8 Board
Node Number	A node number is assigned to each CAN I/O Board when it is installed in a Maxum, CAN Extension Unit, or Network Access Unit. Because of the assigned node number, a CAN Module can be placed in any board slot within these units. Node numbers cannot be duplicated within any analyzer system. The node number can be any 1 to 3-digit number but cannot be or start with a '0'.
SYSCON Can Module Slots	There are only four slots available on the SYSCON module for CAN cards. The fifth slot does not have a CAN card connector.

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## Removing or Replacing CAN I/O Boards, Continued

### Instructions

The **ADD** and **DELETE** softkeys are password protected screens. After pressing the keys a prompt will request that you enter your password.

Step	Descri	ption	
1.		Ensure that the MMI is connected to the analyzer system to which the CAN Module was added or removed.	
	Menu→Select Analyzer		
2.	Go to the CAN Module screen.		
	Menu $\rightarrow$ I/O $\rightarrow$ SYSTEM I/O $\rightarrow$	CAN I/O $\rightarrow$ CAN MODULES	
	CAN Module • RUN ( 02/18/99 11:24:48		
	Node Serial Number 0 0 4 00200000056301	Status 0 0	
	Choose item: II. ENTER: or:		
	Press number of item on keypad           ^         v         ADD	DELETE	
3.	Make a selection from the follow	ving Table.	
	T.		
	То	THEN	
	ADD a CAN Module	Go To Step 4.	
	Delete a CAN Module	Use to select the Module	
		and press DELETE.	

# Removing or Replacing CAN I/O Boards, Continued

Step	Description
4.	Press ADD Softkey.
	The CAN entry dialogue screen will appear.
	CAN Module RUN (R): 7 > 180 sec App 1, stream 2 07/08/38 14:54:27 an1z: 130 jimM
	NODE NEW
	Serial Number <mark>Jackadadaakkkada</mark> Node 6
	Edit next list item: NEXT ITEM Move cursor: <> Confirm changes: DONE" BACK NEXT NEXT DONE BACK FIELD NEXT DONE
5.	Enter the 14-digit Module serial number of the added CAN Module.
	Learning Hint
	The Serial number field has all of the 0's for the serial number already entered and shows question marks (?) for the remaining integer fields. You can use the $\leftarrow \rightarrow$ softkeys to move the cursor to the right of the question marks, backspace to remove question marks and enter the number(s) to complete the corresponding portion of the serial number.
6.	Press <b>Next Field</b> softkey to highlight <b>Node</b> field and enter a node number for the module.
	Check Your Node Number
	You can return to the CAN Module screen and verify that the number you selected is not already in use; simply press BACK softkey.
7.	Press DONE softkey.
	The CAN Module screen will appear with the added CAN Module. The added CAN I/Os must now be added to an application using the Advance System Manager software; see Advance System Manager, online Application I/O help file.

Steps 4 through 7 adds a CAN Module to the system.

# Chapter 3

# Troubleshooting

Overview		
Description	This Chapter is intended for maintenance personnel.	
	This Chapter provides troubleshooting procedures for the Analyzer Unit (NAU).	Network
Read This	If a circuit board is found to be faulty and needs to be repla Chapter 4 for Siemens Energy & Automation, Inc. return p	
Chapter Highlights	This Chapter covers the following topics:	
	Торіс	Page
	Analog Output (AO8) Board	34
	Digital I/O Board	37
	Combination Analog/Digital I/O Board	41
Location of Fault LEDs	Observing the installed board(s) from rear of NAU, status numbered sequentially starting with #1 LED being at the u board. LED's are located behind installed board field wiring see Figure 3-1 for LEDs description.	pper edge of

Figure 3-1: NAU LED Status Light Location



FAULT LEDs AO8 Board provides 3-LED troubleshooting status lights. The status lights provide information on what functions occur when a status light is illuminated. Status lights illuminate orange, red or green.

#### **A/O Functions**

**Clear:** Analog outputs are reset to 0-m/A during Gas Chromatograph start-up. This also occurs for bus-disruption.

**Error Detect:** Each output cable carries low micro-amps of minimum current. Two outputs share a common error signal such as AO1 with AO2, AO3 with AO4 etc.

Table 3-1: AO8 Status LEDs The ON color state of the LED's indicate status of function.

LED Board Position	Light Color	Signal	LED Function
1	Orange		Maintenance Request
2	Red		Failure
3	Green	Power	Power Supply to Microprocessor is Correct

#### Table 3-2: AO8 Board Terminations

Field Termination connector pin orientation is on the left side when viewing the pins. Pin 1 is at top.

Connector Pin	Signal	Output
1	Not Used	
2	Not Used	
3	Output, Analog #1 to #4	Common
4	Output, Analog #1	Low Current, + Signal
5	Output, Analog #1 to #4	Common
6	Output, Analog #2	Low Current, + Signal
7	Output, Analog #1 to #4	Common

# AO8 Board, Continued

Table 3-2: AO8 Board	
Terminations, Continued	ł

Connector Pin	Signal	Output
8	Output, Analog #3	Low Current, + Signal
9	Output, Analog #1 to #4	Common
10	Output, Analog #4	Low Current, + Signal
11	Output, Analog #1 to #4	Common
12		Chassis Ground
13	Output, Analog #5 to #8	Common
14	Output, Analog #5	Low Current, + Signal
15	Output, Analog #5 to #8	Common
16	Output, Analog #6	Low Current, + Signal
17	Output, Analog #5	Common
18	Output, Analog #7	Low Current, + Signal
19	Output, Analog #5 to #8	Common
20	Output, Analog #8	Low Current, + Signal
21	Output, Analog #1 to #8	Common
22		Chassis Ground

## AO8 Board, Continued

Power Supply/CAN (4-Pin Orange Edge Connector) The following is signal and voltage information for the Power Supply/CAN.

Connector Pin	Signal	
1	CAN High	
2	CAN Low	
3	Ground	
4	+24 VDC	

**Edge Connector** 

The following is signal and voltage information pertaining to the Edge Connector.

Connector Pin	Signal
1&2	CAN High
3	CAN Low
4	Reserved
5&6	Common Ground
7&8	+24 VDC
9	Reserved
10	Reserved

Description	DIO Board provides 11 active LED troubleshooting status lights. The status lights provide information on what functions occur when a status light is illuminated. Status lights illuminate orange, red or green.
Optocoupler Inputs	Optocoupler inputs are driven either passive or active. Plus 24 VDC simple or external switches are connected to the inputs. All inputs are isolated and have a ground.

Table 3-3: DIO Status LEDs The ON color state of the LED's indicate status of function.

LED Board Position	Light Color	Signal	LED Function
1	Orange		Maintenance Request
2	Red		Failure
3	Green	Power	Power Supply to Microprocessor is Correct
4			No Function
5	Orange	Relay Output #1	Relay is Active
6	Orange	Relay Output #1	Relay is Active
7	Orange	Relay Output #1	Relay is Active
8	Orange	Relay Output #1	Relay is Active
9			No Function
10	Orange	Optocoupler Input #1	Input is Active
11	Orange	Optocoupler Input #2	Input is Active
12	Orange	Optocoupler Input #3	Input is Active
13	Orange	Optocoupler Input #4	Input is Active

# DIO Board, Continued

#### Table 3-4: Digital I/O Board Terminations

Field Termination connector pin orientation is on the left side when viewing the pins. Pin 1 is at top.

Connector Pin	Signal	Output
1	Reserved	
2	Reserved	
3	Output Relay #1	Normally Closed
4	Output Relay #1	Common
5	Output Relay #1	Normally Open
6	Output Relay #2	Normally Closed
7	Output Relay, #2	Common
8	Output Relay #2	Normally Open
9	Output Relay #3	Normally Closed
10	Output Relay #3	Common
11	Output Relay #3	Normally Closed
12	Output Relay #4	Normally Open
13	Output Relay #4	Common
14	Output Relay #4	Normally Closed
15	Input, Optocoupler #1	+ Signal
16	Input, Optocoupler	Common

## DIO Board, Continued

Table 3-4: Digital I/O Board Terminations, Continued

Connector Pin	Signal	Output
17	Input, Optocoupler #2	+ Signal
18	Input, Optocoupler	Common
19	Input, Optocoupler #3	+ Signal
20	Input, Optocoupler	Common
21	Input, Optocoupler #4	+ Signal
22	Input, Optocoupler	Common

Power Supply/CAN Bus Interface (4-Pin Orange Edge Connector) The following is signal and voltage information pertaining to the Power Supply/CAN.

Connector Pin	Signal
1	CAN High
2	CAN Low
3	Ground
4	+24 VDC

## DIO Board, Continued

## Edge Connector

The following is signal and voltage information pertaining to the Edge Connector.

Connector Pin	Signal
1&2	CAN High
3	CAN Low
4	Reserved
5&6	Common Ground
7&8	+24 VDC
9	Reserved
10	Reserved

# Combination Analog/Digital I/O Board

Description	Analog/Digital I/O Board provides 8-LED troubleshooting status lights. The status lights provide maintenance personnel with the information on what functions occur when a status light is illuminated. Status lights illuminate red, green or orange.			
Relay Outputs	Each board mounted relay requires 24 VDC @ 1 amp to energize. All relays are isolated against NAU chassis and each other.			
Analog Optocoupler Inputs Table 3-5: Combination	Optocoupler inputs activate on current flow and become active when current is more that 4-mA's. Inputs contain internal voltage supply so that passive switches can easily be connected. Although Optocoupler inputs have a common ground, they are isolated against NAU chassis.			
Analog/Digital Board I/O LEDs				
	Board Position	Light Color	Signal	LED Function
	1	Orange	Maintenance Request	S.U.
	2	Red	Failure	S.U.
	3	Green	Power	Power Supply to Microprocessor is correct
	4	None		Reserved

LED Board Position	Light Color	Signal	LED Function
1	Orange	Maintenance Request	S.U.
2	Red	Failure	S.U.
3	Green	Power	Power Supply to Microprocessor is correct
4	None		Reserved
5	Orange	Relay Output #1	Relay is Active
6	Orange	Relay Output #2	Relay is Active
7	Orange	Optocoupler Input #1	Input is Active
8	Orange	Optocoupler Input #2	Input is Active

# Combination Analog/Digital I/O Board, Continued

Table 3-6: Combination Analog/Digital Board Terminations Field Termination connector pin orientation is on the left side when viewing the pins.

Connector Pin	Signal	Output
1		Not Used
2		Not Used
3	Output Relay #1	Normally Closed
4	Output Relay #1	Ground
5	Output Relay #1	Normally Open
6	Output Relay #2	Normally Closed
7	Output Relay #2	Ground
8	Output Relay #2	Normally Open
9	Input, Optocoupler # 1 DI	+ Signal
10	Input, Optocoupler # 1 and 2	Common Ground
11	Input Optocoupler # 2	+ Signal
12	Input, Optocoupler #1 and #2	Common Ground
13	Input, Analog #1	+ Voltage
14	Input, Analog #1	Current
15	Input, Analog #1	Ground
16	Input, Analog #2	+Voltage
17	Input, Analog #2	Current
18	Input, Analog #2	Ground

### Combination Analog/Digital I/O Board, Continued

Table 3-6: CombinationAnalog/Digital BoardTerminations, Continued

Connector Pin	Signal	Output
19	Output, Analog #1	Current, +Signal
20	Output, Analog #1 and #2	Common Ground
21	Output, Analog #2	Current, +Signal
22	Output, Analog #1 and #2	Common Ground

### Power Supply/CAN Bus Interface (4-Pin Orange Edge Connector)

The following table provides signal and voltage information for the Power Supply/CAN connector .

Connector Pin	Signal
1	CAN High
2	CAN Low
3	Ground
4	+24 VDC

### **Edge Connector**

Table 3-7: Edge Connector

The following table provides signal and voltage information for the edge connector.

Connector Pin	Signal
1&2	CAN High
3&4	CAN Low
5&6	Common Ground
7&8	+24 VDC
9&10	Reserved

# Chapter 4

# **Parts Catalog**

Overview	This chapter is intended for maintenance personnel.
	The Chapter provides a list of replaceable parts and assemblies for the Advance Network Access Unit (NAU). Subsequent information includes how to remove and replace the replacement part or assemblies.
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.
	Part numbers as listed.
	Quantity needed of each part.
	<ul> <li>Equipment Serial number or project number of the system (especially for warranty related orders).</li> </ul>
	Preferred method of shipment.

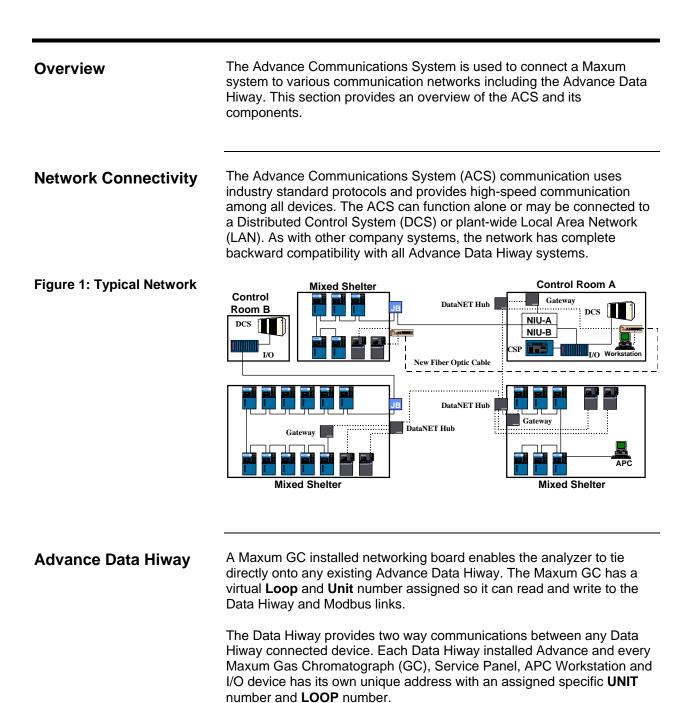
## Description

The available NAU assemblies and parts, with their applicable part number are shown below.

Part Description	Ordering Number
NAU Cable/Connector Kit	2020100-001
Optima Enclosure Hardware Kit	2020101-001
PCBA, NAU Back Plane	2015803-801
NAU SYSCON Board	2020110-001
Maintenance Panel Kit	2020153-001
Fuse Kit	2020151-001
Power Supply Module	1700490-001
3-COM Ethernet Board	1161000-010
Advance Network Communication Board	2017568-801
Digital I/O Board	1700096-001
Combination CAN I/O (A/D 4)	1700095-001
Analog Output 8 (AO8)	1700605-001

# **Appendix 1**

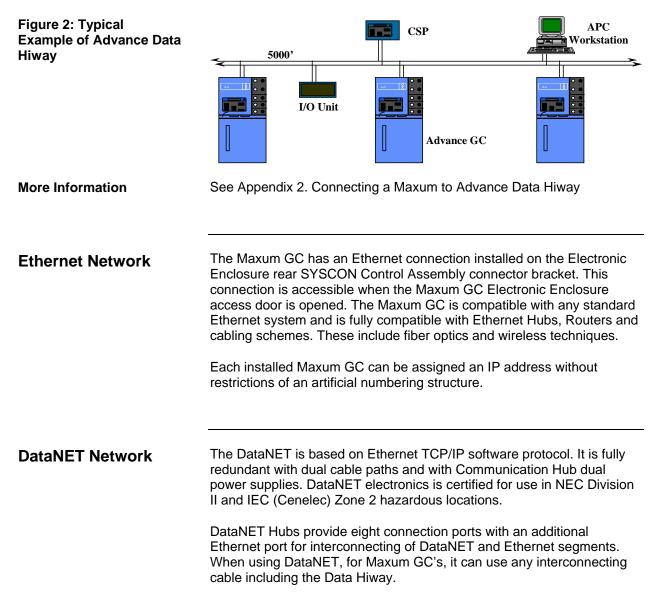
## **Advance Communications System**



The Data Hiway provides input and output communications from any location on the Data Hiway as well as multiple locations. It provides a direct serial Modbus link to the plant DCS System.

## Advance Communication Systems, Continued

With a Data Hiway network, communication occurs over a pair of twisted shielded pair cables which allows up to 31 devices to be connected into one network loop. This allowed for redundant communications. One cable is for channel A and one for channel B. Each loop can be up to 5,000 feet. Refer to Figure 2.



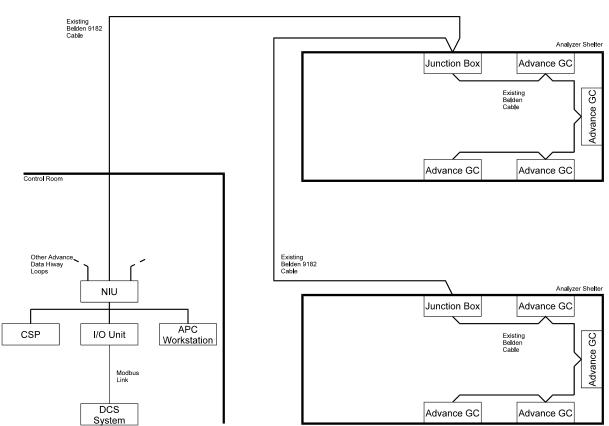
# Advance Communication Systems, Continued

What is Gateway	The Advance Network Gateway Unit (ANG) provides the connection point between existing Advance Data Hiway and the Maxum GC Ethernet and DataNET networks. The unit is a translator for converting signal and communication protocols. This conversion allows Maxum GC's and Advance GC's to communicate with each other in addition to using each other's Distributed Control System (DCS) I/O links. Advance Optichrom Service Panels and older APC workstations can display GC information over the Gateway link. They are, however, limited to only accessing and changing basic operational status. This data includes alarms, run/hold/calibrate, view, analysis results etc.
What is	The Network Access Unit (NAU) has the capability for controlling Advance and Maxum GC's from its MMI and to provide CAN I/O board expansion slots. The unit serves as the controller to receive messages on the Ethernet or DataNET and perform the following functions.
	<ul> <li>Convert information to the appropriate messages for the local I/O boards on the CAN bus and</li> <li>Convey the information to the installed I/O boards over the CAN Bus.</li> </ul>
Typical NAU	The two typical NAU configurations are as follows:
Configuration	Complete Conversion to Ethernet with the installed Advance Plus Door and uses the NAU as the Link to the DCS System.
	Complete Conversion to DataNET with the installed Advance Installation Plus Door and uses the NAU as the Link to the DCS System
Existing Configuration	Advance GC's in an Analyzer Shelter Communicating to Control Room DCS System.
	This is a basic Analyzer Shelter Advance GC installation. All Advance GC's are daisy-chained together using standard existing Advance Data Hiway Belden cable and Junction Box. Refer to Figure 2.
	The terminating cable from the last Advance GC is terminated in the Junction Box. If additional Analyzer Shelters are installed, they are parallel connected to the last Analyzer Shelter Junction Box using standard Belden cable.

## Advance Communication Systems, Continued

Analyzer Shelters are connected to the Control Room using standard existing Belden cable. The Control Room installed NIU connects the Advance GC's information to the I/O Unit and to the DCS System via the Modbus Link.

This configuration does not use DataNET or Ethernet Hubs.



# Figure 3: Existing Installation

Advance GC's in Analyzer Shelter Communicating to DCS System in Control Room

# Appendix 2

# Connecting a Maxum to Advance Data Hiway

Overview	Maxum syste Advance Dat various ways	e Communications System (ACS) is used to connect the em to various communication networks including the ca Hiway. This section provides users with information on to connect a Maxum to their existing Data Hiway The Maxum Communication System provides the user with compatibility.
Configuration Options	<ul><li>Size of p</li><li>Preferen</li><li>Future e:</li></ul>	ating each configuration, consider the following: resent system. ce for keeping present wiring configuration and xpansion requirements for interconnecting the entire omatograph system into plant LAN and DCS Systems
	Option	Function
	1	Connect New Maxum GC's Directly to Existing ADH Using Installed ADH Card.
	2	Two Separate Parallel Networks Merged in the Control Room via Installed Gateway.
	3	Merge Existing Advance GC's into DataNET Inside Shelters and Use Existing Belden Cable to Control Room.
	4	Conversion to DataNET with Advance Plus Door using existing link to DCS.
	5	Conversion to Ethernet with Advance Plus Door using existing link to DCS.
	6	Complete conversion to Ethernet with Advance Plus Door using NAU to link to DCS.
	7	Complete conversion to DataNET with Advance Plus Door using NAU to link to DCS.
	8	Blended system with the old Advance Data Hiway (via NIU) as well as both DataNET and Ethernet.

Option 1	Connect New Maxum GC's Directly to Existing ADH Using Installed ADH Card
Advantages	This is the simplest means for connecting a Maxum to the Advance Data Hiway (ADH). To use this option, the Maxum must have an ADH card installed in the SYSCON motherboard. Refer to Figure 1.
	Maxum Analyzers are wired exactly like Advance and can transmit analysis results over the existing link to the facilities DCS. Other devices on the network, such as CSPs and APCs are able to observe installed Maxum analyzers. This enables the user to view analysis results, start and stop analyzer functions and initiate calibration. The user can view and acknowledge Maxum alarms over the Data Hiway.
Limitations	The Maxum uses a different software format for program application development, chromatogram processing and viewing. This inhibits information from being transmitted over the Data Hiway. To make any application changes, the user must connect a laptop PC with Maxum workstation software loaded.
	To make backup copies of the Maxum software, the laptop PC must be connected. Chromatograms from remote locations can not be seen.

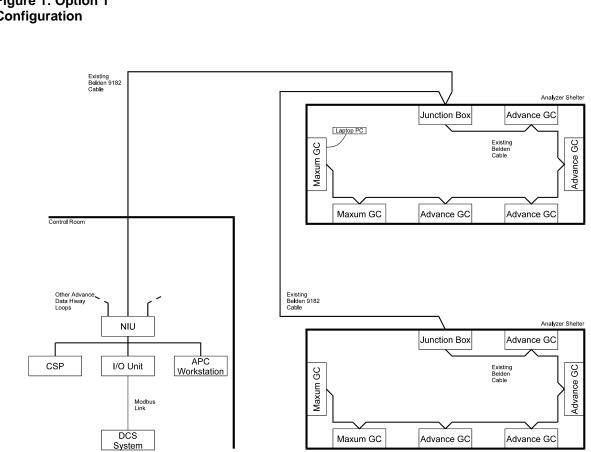


Figure 1: Option 1 Configuration

Connect New Maxums Directly to Existing ADH Using Installed ADH Card

Option 2	Two Separate Parallel Networks Merged in the Control Room via Installed Gateway
	This is for adding a new Maxum to existing installed Advance GC's. With this option, the existing Data Hiway is retained. A parallel Maxum network based on an Ethernet network link, is routed back to the Control Room. Refer to Figure 2.
	In the Control Room, the Ethernet network is connected to existing Data Hiway via the Gateway. This provides the Maxum with full access to devices installed on the Data Hiway. This can be an existing link to the DCS that is able to communicate with the installed Maxum the same way it talks to installed Advance GC's.
	To provide a Maxum with communication access, an Ethernet network is established by adding an Ethernet Hub in the analyzer shelter. 10BaseT wiring is used to interface the installed Maxum to the Ethernet Hub.
	Fiber optic wiring can be used to connect the analyzer shelter installed Ethernet Hub to the Control Room. This wiring can be run long distances and is immune to generated electronic noise.
	Fiber optic cable, from the analyzer shelter, must be terminated in a control room installed Ethernet Hub. This Ethernet Hub connects all Ethernet loops together and provides access to the installed Gateway. The Gateway allows a Maxum to communicate with the DCS over the existing Modbus link.
	To the DCS, a Maxum appears identical to the Advance GC's to which are already communicating.
	The APC Workstation can be upgraded to the Maxum workstation. The Maxum workstation provides real-time chromatogram displays of all installed Maxum GC's as well as EZChrom Methods Development software.
	Older APC functions are integrated into the Maxum workstation and all previous APC functions are retained. This allows Maxum workstation to communicate with older Advance GC's via the Gateway. In addition, it provides PSP Emulation, Chromatogram displays and Table Editing etc.

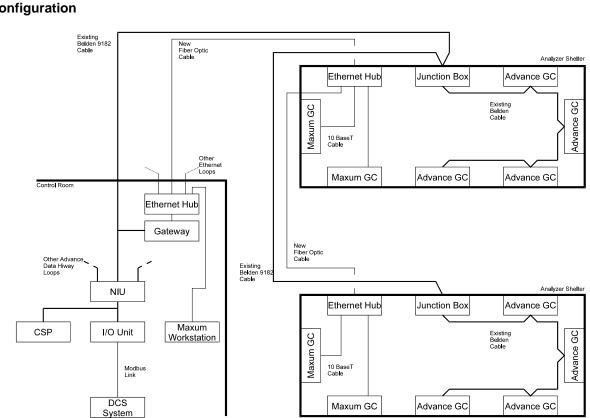


Figure 2: Option 2 Configuration

Two Separate Parallel Networks Merged in the Control Room via Installed Gateway

Option 3	Merge Existing Advance GC's into DataNET Inside Shelters and use Existing Belden Cable to Control Room
	This option allows DataNET to be used in place of Ethernet for connecting all installed Maxum and Advance GC's. This provided a higher speed network and minimizes installation of new field wiring. Refer to Figure 3.
	The DataNET can use any cable type. This includes the Belden cable used by Advance GC's. To interface Maxum GC's to the control room, a DataNET Hub must be installed in each analyzer shelter. Communication between analyzer shelter(s) and the control room is via existing Belden cable. To achieve communication, a DataNET Hub must also be installed in the control room.
	To integrate Advance GC's into this option and prevent them from being isolated from the control room, a Gateway device is installed within each analyzer shelter. The Gateway takes the "mini Data Hiway" used by the analyzer shelter installed Advance GC's and coverts the signals into the DataNET Hub. The Gateway output is tied into the DataNET Hub used by installed Advance GC's.
	The control room installed DataNET Hub also requires a Gateway be installed. The Gateway connects the DataNET to the I/O Unit to maintain the link to the DCS.
	Because the DataNET uses different signal electronics, it is not directly compatible with the Ethernet. To compensate for this, each DataNET Hub provides a pure Ethernet port. This enables DataNET systems to be connected to Ethernet devices, such as Maxum workstations.
	The DataNET Ethernet port can be used to connect in-plant LAN networks and provide direct Ethernet connection to DCS that support this capability. To maintain installed Maxum and Advance GC's outputs, connected to the Gateway, new Maxum workstation software is upgraded.

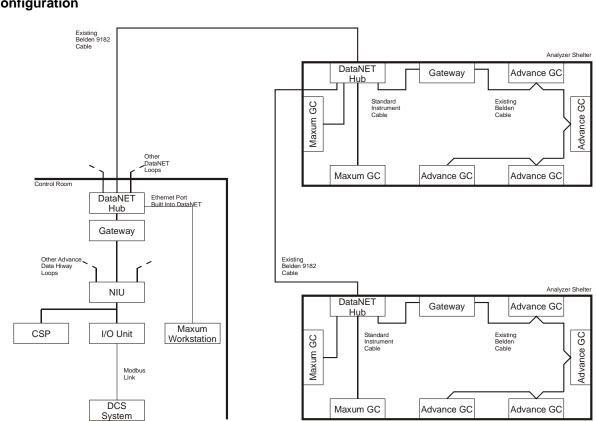


Figure 3: Option 3 Configuration

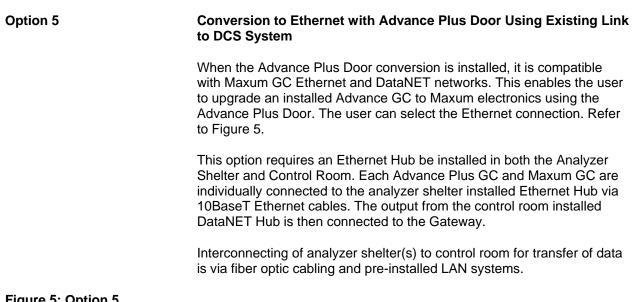
Merge Existing Advance GC's into DataNET Inside Shelters and Use Existing Belden Cable to Control Room

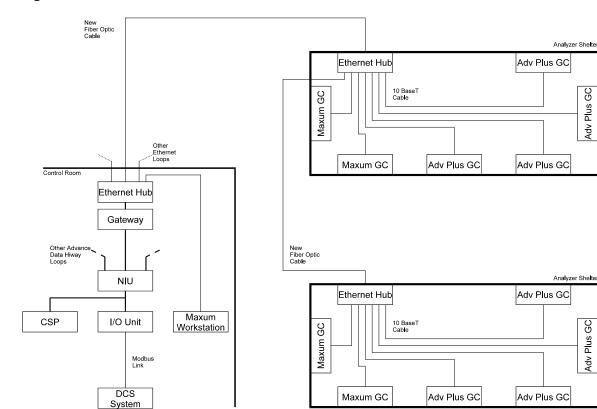
Option 4	Conversion to DataNET with Advance Plus Door Using Existing Link to the DCS System
	To integrate existing Advance GC's into the DataNET network, each Advance GC is upgraded with Maxum GC electronics. This is achieved by Advance GC installation of Advance Plus Door. Refer to Figure 4.
	If there are only a few Advance and Maxum Gas Chromatographs installed in the analyzer shelter, this option is the most workable method for merging them together.
	The Advance Plus Door conversion provides the installed Advance GC's electronics and software, with the capabilities of the Maxum. A DataNET Hub must be installed in both the Analyzer Shelter and the control room. The output from the control room DataNET Hub is connected to the Gateway. Both Advance and Maxum GC's are individually connected to the analyzer shelter installed DataNET Hub.
	The Advance Plus Door electronics provides upgraded Advance GC's with the following functions:
	<ul> <li>Real-time chromatograms anywhere on the network.</li> <li>EZChrom method development</li> <li>More powerful calculations and</li> <li>Data storage capability</li> </ul>

#### Figure 4: Option 4 Configuration Existing Belden 9182 Cable Analyzer Shelter DataNET Adv Plus GC Hub Standard Instrument Cable Adv Plus GC Maxum GC Other DataNET Loops Maxum GC Adv Plus GC Adv Plus GC Control Room Ethernet Port Built Into DataNET DataNET Hub Gateway Other Advance, Data Hiway Loops Existing Belden 9182 Cable Analyzer Shelter NIU DataNET Adv Plus GC Standard Instrument Cable Maxum CSP I/O Unit Adv Plus GC Maxum GC Workstation Modbus Link DCS Maxum GC Adv Plus GC Adv Plus GC System

## Connecting a Maxum to Advance Data Hiway, Continued

Conversion to DataNET with Advance Plus Door Using Existing Link to DCS System

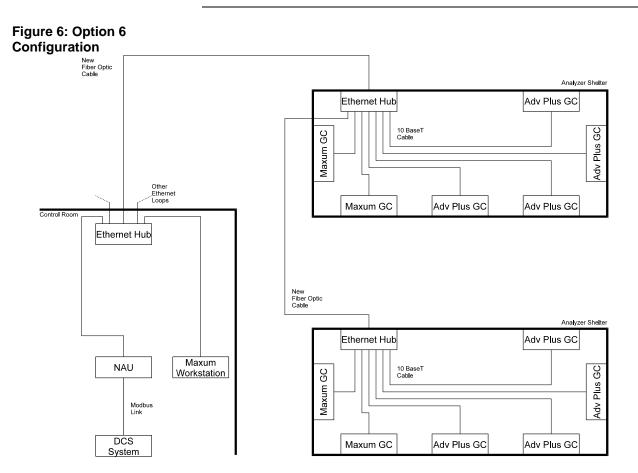




#### Figure 5: Option 5 Configuration

Conversion to Ethernet with Advance Plus Door Using Existing Link to DCS System

Option 6 and	Complete Conversion to <u>Ethernet</u> with the Advance Plus Door Using <u>NAU</u> to Link to the DCS System
Option 7	Complete Conversion to <u>DataNET</u> with the Advance Plus Door Using <u>NAU</u> to Link to the DCS System
	Both these Options are similar to Options 4 and 5 except that these latter options use the existing link to the DCS. With Options 6 and 7, the Input/ Output Unit (I/OU) and Modbus link network use the Advance Network Access Unit (NAU). These two options allow the user to upgrade the Advance GC systems to a Maxum GC using the NAU. Refer to Figures 6 and 7.
	The NAU is the Maxum GC equivalent of the Advance GC Central Service Panel (CSP) and I/OU. With the NAU installed in the Control Room it creates a new custom link. The NAU built-in RS-232 serial port provides the same Modbus output as the Advance GC system. The NAU has a built-in LCD display that is used by Maxum GC's. This presents the user with access to the same maintenance functions and provides real-time chromatograms.
	For Option 6, each analyzer shelter installed Advance GC and Maxum GC is individually connected to the installed Ethernet Hub using 10BaseT cable. For Option 7, each analyzer shelter installed Advance GC and Maxum GC is individually connected to the installed DataNET Hub using standard instrument cable.



Complete Conversion to Ethernet with Advance Plus Door Using NAU to Link to DCS System

# Connecting a Maxum to Advance Data Hiway, Continued

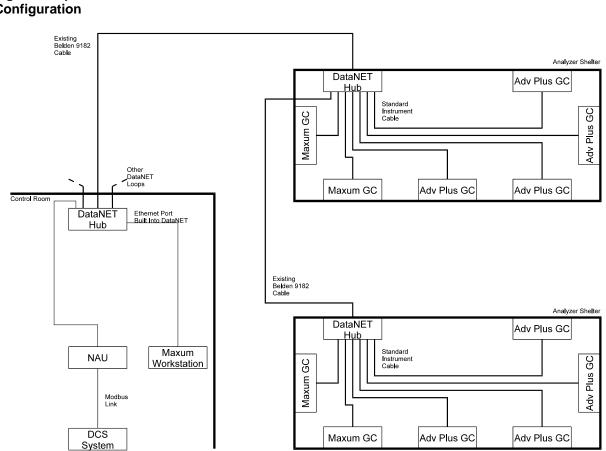


Figure 7: Option 7 Configuration

Complete Conversion to DataNET with Advance Plus Door Using NAU to Link to DCS System

# Connecting a Maxum to Advance Data Hiway, Continued

Option 8	Blended System with the Old Advance Data Hiway (via NAU) as well as Both DataNET and Ethernet
	Enables an Advance GC system not to be locked into selecting one option over another. When connected simultaneously, the Maxum GC network is compatible with all of the previously described options. Refer to Figure 8.
	If other techniques are to be used for merging Advance GC's to Maxum GC's connected together, existing Belden interconnecting cable and a DataNET Hub can be used. For this configuration, the Analyzer shelter and Control Room must have DataNET Hubs installed. Analyzer shelter installed Advance GC's are daisy chained together and connected to DataNET Hub via standard instrument cable. Maxum GC's are individually connected to the DataNET Hub using standard instrument cable.
	If Advance Plus GC's and Maxum GC's are installed in an additional analyzer shelter, fiber optic cable and Ethernet Hub network can be used to connect them to the control room. Analyzer shelter Advance and Maxum GC outputs are connected to the control room via their respective DataNET and Ethernet Hubs. Connectivity to the DataNET Hub is via the built-in Ethernet port.
	Advance GC's can be left as is and continue to be connected to the DCS via the control room DataNET Hub and Gateway.

#### Figure 8: Option 8 Configuration Existing Belden 9182 Cable Analyzer Shelter DataNET Gateway Advance GC Hub Standard Instrument Cable Existing Belden Cable Advance GC Maxum GC Other DataNET Loops Other Ethernet Loops Maxum GC Advance GC Advance GC Control Room DataNET Ethernet Hub Hub Gateway Other Advance Data Hiway Loops New Fiber Optic Cable Analyzer Shelter NIU Ethernet Hub Adv Plus GC Maxum I/O Unit CSP 10 BaseT Cable Plus GC Maxum GC Workstation Modbus Link Adv DCS Maxum GC Adv Plus GC Adv Plus GC System

## Connecting a Maxum to Advance Data Hiway, Continued

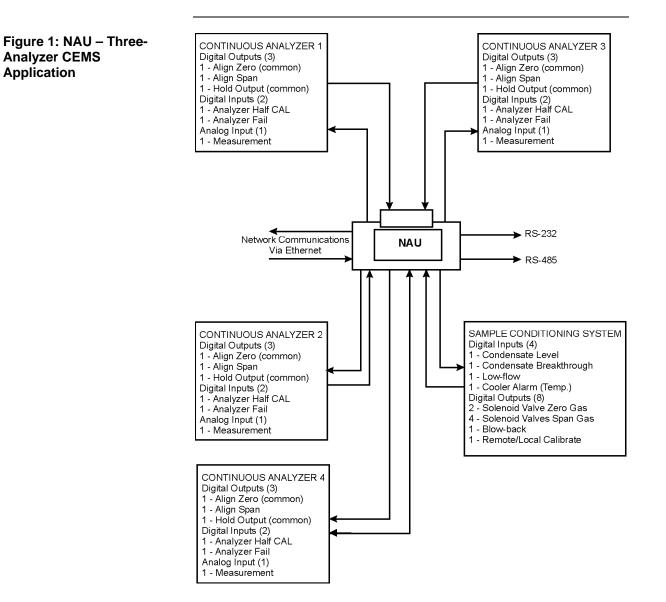
Blended System with the Old Advance Data Hiway (via NAU) as well as Both DataNET and Ethernet

# Appendix 3

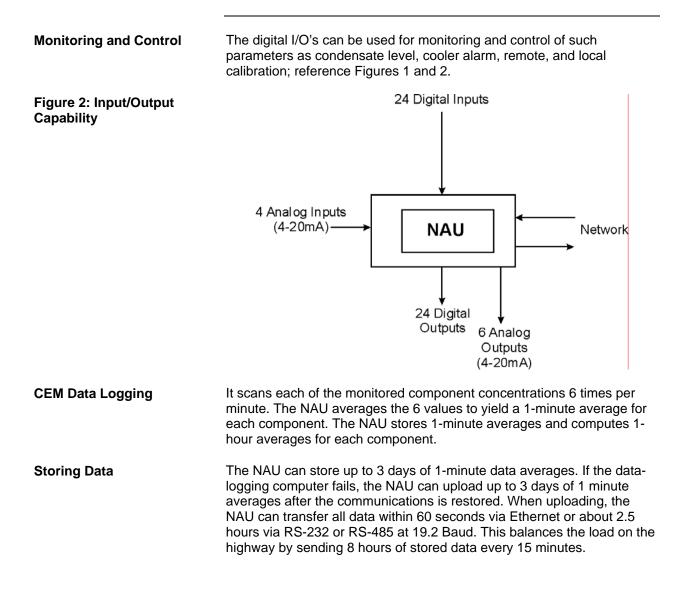
# **CEMS** Option

Overview	
Description	The NAU Continuous Emission Monitoring System (CEMS) software option provides sample system control and general data acquisition for up to four Siemens continuous analyzers or most other analyzers or devices. When connected via our Advance Communications System (ACS) the NAU can be remotely accessed from the Maxum workstation.
I/O Summary	2 combination I/O boards 4 digital I/O boards
	DO channels 20 DI channels 12 8 spares
	AO channels 4 spares AI channels 4
	Built-in Standard
	DO channels 4 spares CI channels 4 spares AO channels 2 spares
	RS-232 serial channel 1 RS-485 serial channel 1

#### Overview, Continued



### Overview, Continued



Introduction	Each NAU unit is programmed with a standard database unless a custom application was purchased. This database provides pre-defined tables and programs that handle the requirements of a basic single process Continuous Emission Monitoring (CEM) application. Two (2) zero gas stream and four (4) span gas streams are designed into the NAUs standard Table Set. As with our Maxum Chromatographs, the standard application can be configured to meet individual customer requirements; see your custom documentation that was shipped with the equipment if a custom application was purchased.
Standard Applications	<ul> <li>Blow back</li> <li>Calibration Control</li> <li>Data Averaging</li> <li>Data Collection</li> <li>Data Storage</li> <li>Data Transmission</li> <li>Sample Control</li> </ul>
Learning Hint	The NAU performs functions in real-time. These functions are called events; refer to Application Documentation.
Blow Back	The software provides sample probe blow back control and is designed for maximum flexibility. Three factor entries allow you to easily modify the number of pulses and the width of each pulse. The blowback is typically scheduled once per day, but can be initiated on demand through a local or remote user provided interface.
Calibration Control	Software provides necessary timing and logic to initiate an external calibration of a Continuous Analyzer. This event is typically scheduled once per day, but can be initiated on demand through a local or remote user provided interface. The amount of time allowed to purge the sample line when switching between processes and calibrate gases is easily customized by modifying the appropriate factor. The Continuous Analyzer is notified via a relay output when to self-calibrate for zero or span. Percent drift is calculated and stored in the NAU along with the calibration values. A calibration alarm is initiated if the drift is outside of acceptable limits.

### NAU CEMS Programming, Continued

#### Data Averaging

Data averaging occurs at 1 minute, 15 minute, hourly and daily intervals. The 1-minute averages are automatically status, time, and date stamped as they are written to the data table. A circular queue is used for storage of all the 1-minute averages taken in the last 3 days. The status is stored in the database prior to writing a value in the data table.

Averages	Description
1-Minute	Six measurements are taken each minute for the analog inputs and are averaged together for a 1-minute average.
15-Minute	15-minute averages are generated and stored for verification of the hourly averages in the daily log.
Hourly	Hourly averages are generated and stored for use in the daily log.
Daily	Daily averages are generated and stored for use in the monthly log.

**Data Collection** 

Both Analog and digital inputs are scanned every 10 seconds.

Analog Values

Analog inputs are scanned every 10 seconds. Values are added to each scan and the counters are incremented which are used by the averaging events. Continuous Analyzer status, at the time of the scan, is checked and the highest priority status is stored.

### NAU CEMS Programming, Continued

#### **Digital Status**

Event 4 scans the digital inputs. The digital input information is used for status and alarm generating purposes. The information is also evaluated based on the priority list shown below along with the Continuous Analyzer status; the highest priority status is stored for stamping 1-minute averages.

Status Number	Description
250	Calibrate in progress
249	Blow Back in Progress
248	Continues Analyzer Failure
247	Condensate Alarm
246	Low Flow Alarm
245	Cooler Temperature Alarm
244	Sample Line/Probe Temperature Alarm
120	Half-Cal Alarm

Highest priority = 255

Status = 0 means Continuous Analyzer running normally with no alarm Status above 127 indicates a Fault problem.

#### **Data Storage**

The data averages are stored in SYSCON memory in the data table as shown below.

Data	Quantity Stored
1 Minute Averages	Last 3 days
15 Minute Averages	Current days information since midnight
Hourly Averages	Current days information since midnight
Daily Averages	Current months information since start of month

# NAU CEMS Programming, Continued

Data Transmissions	The workstation provides for three forms of Data Transmission via a printer, Maxum Data Logger or Host Computer or via Ethernet.
Printer	Three printout Logs are available. All can be scheduled to print automatically or on request.
Hourly Log	Prints a log of the 1-minute averages taken during the current hour.
Daily	Prints a log of the 1- hour averages taken during the current day. The 15 minutes averages are also printed in order to validate the hourly averages.
Monthly	Prints a log of the daily averages taken during the current month.
Sample Control	Sample Control is provided by stream switching between process, zero calibration gas and span calibration gas as well as blow back control.

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