AUTOMAX®
DISTRIBUTED CONTROL SYSTEM

System Power Requirements

M/N	+5V	+12V	–12V	+15V	–15V	Description
57C400	0.425	0	0	0	0	115 VAC Input 16 ch
57C402	0.525	0.045	0.045	0	0	24–115 VAC/D-C Output 16 ch
57C403	1.2	0	0	0	0	115 V High Output – 16 ch
57C404	2.5	0.053	0.0075	0	0	Network Communications
57C407	5	0.1	0.1	0	0	DCS 5000 Processor
57C409	3.05	0	0	0	0	Analog Input – 2 ch
57C410	2.75	0.055	0.055	0	0	Analog Output – 4 ch
57C411	1.7	0.095	0.095	0	0	Resolver Input
57C413	1.05	0	0	0	0	Common Memory – 64K
57C414	2.5	0.053	0.0075	0	0	Modbus Interface Module
57C415	0.625	0	0	0	0	24 VAC/D-C Input – 16 ch
57C416	2.5	0.053	0.0075	0	0	Remote I/O Communications
57C417	2.5	0.053	0.0075	0	0	AutoMate Interface Module
57C418	2.5	0.053	0.0075	0	0	A/B Interface Module
57C419	0.7	0	0	0	0	5-24 VDC Input – 32 ch
57C420	0.85	0	0	0	0	5-24 VDC Output – 32 ch
57C421	0.9	0	0	0	0	Pulse Tach Input Module
57C422	1.6	0	0	0	0	2 Axis Servo Module
57C423	1.05	0	0	0	0	Common Memory – 128K
57C424	2.40	0.053	0.008	0	0	MaxPak III Hi-Speed Link Module
57C428	2.4	0.053	0.008	0	0	Toledo Scale Interface
57C429	2.5	0.03	0	0	0	AutoMax R-Net Processor
57C430	3	0.1	0.1	0	0	AutoMax 6010 Processor
57C431	3	0.1	0.1	0	0	AutoMax 6011 Processor
57C435	3	0.1	0.1	0	0	AutoMax 7010 Processor
57C440 DISCONTINUED	5	0.5	0.1	0	0	Ethernet Interface Module
57C441	0.6	0	0	0	0	Modbus Plus Interface
57C442	0.65	0	0	0	0	Data Highway Plus Interface
57C443	0.65	0	0	0	0	A-B Remote I/O Scanner Module
0-57652	1.7	0	0	0.1	0.07	Universal Drive Controller
61C500	1.2	0	0	0	0	115 VAC Input – 16 ch
61C501	1.2	0	0	0	0	115 VAC Input – 16 ch
61C515	1.2	0	0	0	0	24 VAC/D-C Input – 16 ch
61C516	1.2	0	0	0	0	24 VAC/D-C Input – 16 ch
61C540	1.5	0.03	0	0	0	Analog Current Input – 16 ch
61C542	1.5	0.03	0	0	0	Analog Voltage Input – 16 ch
61C544	1.5	0.03	0	0	0	RTD Input – 16 ch
61C605 DISCONTINUED	1.6	0	0	0	0	Thermocouple Input – 8 ch
61C613 DISCONTINUED	1.25	0	0	0	0	Low Level Analog Input – 16 ch
N/A	2.78	0.3	0.22	0.15	0.15	Drive 4–card set

M/N	+5V	+12V	–12V	+15V	–15V	Description
57C493	50	4	4	1	1	Power Supply – 3 slot
57C494	20	1	1	0.75	.075	Power Supply – 2 slot

Note: All power requirements given in amps. Refer to selection table on page 1-8 for PC3000 power requirements.

Notes

Networks and Network Modules

Interface Modules

Selection Charts

AUTOMAX®

DISTRIBUTED CONTROL SYSTEM

DCS-Net Communication Network

DCS-Net Distributed Control Network

Control systems have evolved to the point where they make possible real-time distributed control. Some typical applications include paper machines, steel mills and film lines. The need for high performance positioning systems, interlocking systems and distributing the power of the CPU with milisecond response time in a cost-effective means had to be realized.

The DCS-NET, Reliance Electric Distributed Control System network, meets the need. DCS-NET provides a real-time (2.6 msec/node) communication scheme for Distributed Control application.

The network allows 56 AutoMax/DCS nodes to communicate with each other. DCS-NET, a baseband coaxial cable system, is arranged in a multidrop configuration. DCS-NET connects racks up to 3000 feet apart, easily accommodating typical applications within an industrial plant.

Utilizing a master/slave system, the master has complete control of the messages and in turn has a maximum communication time of 2.99 msec/node and a global transmit time of 2.99 msec for register data, no matter how many nodes you have on the network. This Master/Slave system makes DCS-NET a perfect solution for a single-application

distributed control network, due to the real time deterministic communication scheme and the 1.75 M baud. Multiple network cards with multiple masters can also be configured to give you even more power and flexibility.

DCS-NET has the speed that is required to handle process lines, supervisory control and program development-loading/verifiying. Both registers, contacts and coils can be used for real-time interlocking.

An IBM-compatible personal computer, through any AutoMax processor or a PC interface card, can be connected to program/monitor any AutoMax/DCS on the network. Even when utilizing multiple network cards with multiple master racks, the programming terminal can transparently communicate from network to network.

Installing the DCS-NET is as simple as plugging a Network communication card into the rack and connecting the network cable to it. The DCS-NET processor handles all network communications, thus freeing the AutoMax processor to perform other tasks. Data transfer between the processors occurs directly over Multibus – not serially. The DCS-NET system is therefore superior to networks utilizing programming ports for serial communications between the controller and the network processor.

2-2

AUTOMAX®

DISTRIBUTED CONTROL SYSTEM
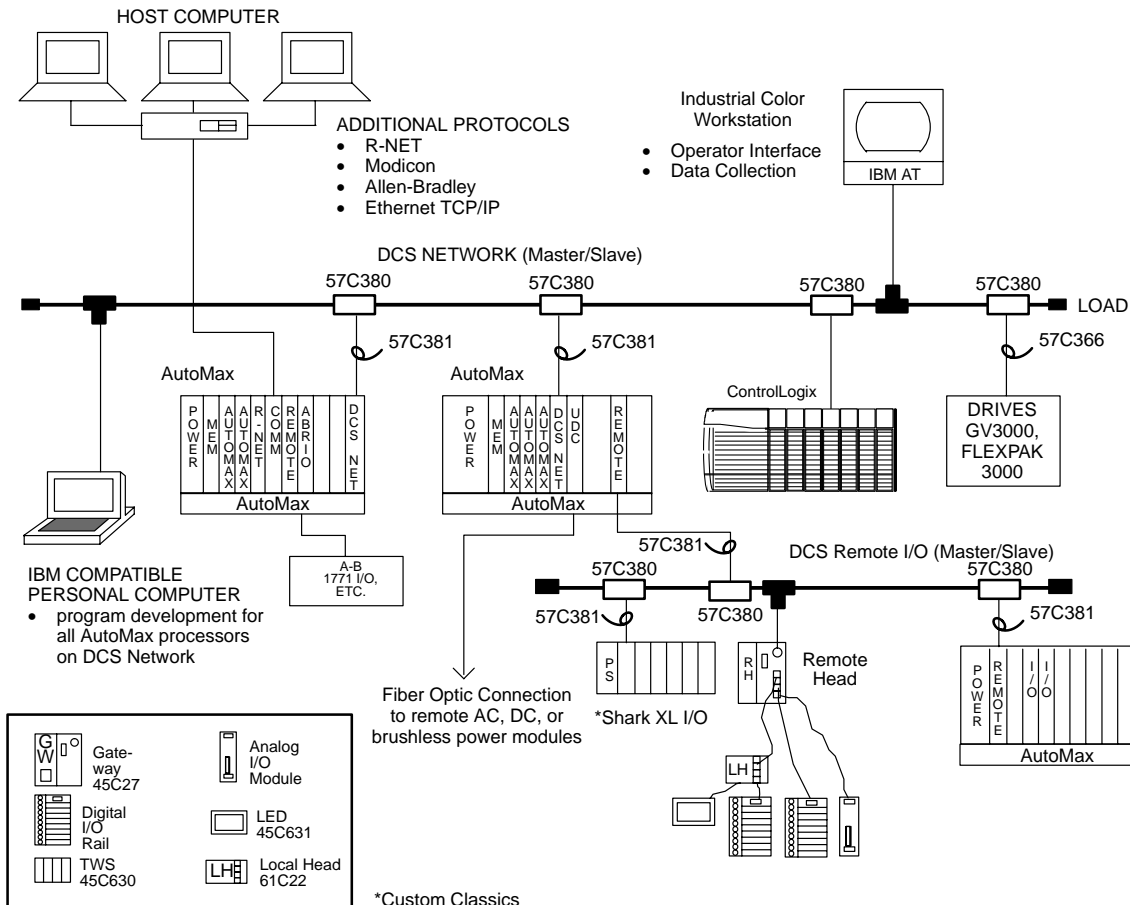
DCS Network Communications Module

Model No. 57C404

The Network Communications Module provides the necessary hardware required to transmit control and status data between two or more AutoMax Controllers in a network.

The Network Communications Module is a printed circuit assembly with CPU, memory and communications components that plugs into the AutoMax Multibus Rack. The module consists of the printed circuit board, faceplate, and protective enclosure. The faceplate contains the network communications connector, a serial port to monitor module status, a 7-segment diagnostic display, an "OK" LED, and two thumbwheel switches used to set the network node number.

The synchronous network data is transmitted over a Belden #9259 coaxial cable. The connection of the network communications cable to each Network Communications Module on the network is made through the Reliance Passive Tap.

This tap has two fault-isolation resistors in series with the transmission line to prevent a failed Network Communications Module from affecting the remainder of the network.

Diagnostics

When each Network Communications Module is powered up or the self-test is invoked through the RS-232C port, an internal diagnostic test is performed by the module to check for hardware failures. If an error is encountered, an error code is displayed on the 7-segment LED. Also, during normal operation, if a power, system (backplane) watchdog, or communications line failure occur, an error code is displayed.

Features

- 875 K BAUD communications rate
- 3000-foot distributed network length
- On-board network diagnostic displays

LED Status Indicators

- OK – the Network Module is functioning properly
- FAULT CODE – 7-segment LED displays diagnostic error code

Thumbwheel Switches

- DROP NUMBER – sets the drop number of the Network Module. The master is set 0, subsystems are set 1 to 55.

Communication Ports

- MONITOR – 25-pin, RS-232 serial for local Network Module status and self-test
- NETWORK – 9-pin for high speed rack-to-rack network communications

Distributed Control Network

The Reliance AutoMax Distributed Industrial Control Network is a master/slave broadcast configuration. The Master Network Communications Module, defined as "Drop 0", controls all transmissions over the network to the Slave Network Communications Modules, numbered from 1 to 55. The network control and status data are transmitted in packets. Each data packet is transmitted to all active drops on the distributed network. Encoded in each packet is an address which specifies which drop is to respond to the message packet. This continues until all active drops have exchanged data with the master. All messages are checked for correctness by the addressed receiving drop; incorrect messages are retransmitted up to three times. Drops unable to correctly transmit and receive data will go off line. Status information is maintained in each drop and can be interrogated through the serial port on the Network Communications Module or in the user application program.

Each Network Communications Module contains a dual-port memory that can be accessed by its on-board processor as well as over Multibus from the application program on the Processor Module. The dual-port memory contains the data that are transmitted throughout the distributed network. The dual-port memory in each Network Communications Module is partitioned for 56 drops; each drop is assigned 64 16-bit registers (for a total of 3584 registers). Drop 0 registers are used for status and control throughout the Network. To provide for increased register capacity in a Network Module, the Module can be software-configured to function as more than one drop (up to the total network limit of 55).

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DCS Network Communications Module

Model Nos. 57C404, 57C490, 57C498

V2 Programming

A network definition statement, NETDEF or GBLDEF, is used in the system configuration tasks of each of the drops on the network to define variables as network data. The NETDEF statement assigns a name to the network variable and defines on which network (1 to 15) and drop (0 to 55) the data is located.

Any drop can read information from any other drop on the network simply by specifying the name of the data to be read and the proper drop number in the NETDEF statement. Any reference to the network data within the application program is then made simply by using the defined name.

Communication Module

Model Number	Description
57C404	DCS–Net Communications Module

Coaxial Cable System

Model Number	Description
57C380	Communications Passive Tap – Coaxial
57C381	Cable – Communications Module to Passive Tap – 3 Feet
45C70	Coax BNC TEE Connector (2)
45C71	Coax BNC 75 OHM Terminating Load (2)
45C72	Coax BNC Male Connector (5)
45C73	Coax Connector Crimp Tool

The Passive Tap is required at each network or remote drop for connection to the coaxial cabling. All coaxial systems require a terminating load at both ends of the cable. A coax tee is required for a remote I/O head. The 45C72 requires the use of the 45C73 crimp tool.

Twinaxial Cable System

Model Number	Description
57C366	Cable – AutoMax module to Twinaxial Tap – 3 feet

When Twinax cable is used, an Allen-Bradley 1770-SC Station Connector replaces the 57C380 Passive Tap. A Station Connector is required at each network or remote I/O drop for connecting to the Belden 9463 twinaxial cable. A 150 ohm, 1 watt, terminating resistor is required at each end of the cable network. It is connected across terminals 1 and 3 of the Station Connector.

The 57C366 Drop Cable is used to connect the Station Connector to the AutoMax 57C416 Remote I/O Module or the 57C404 Network Communications Module.

An Amp 555053-1 balun, supplied by others, is used to connect the Station Connector to the 57C328, 57C329 or 57C330 Remote Head.

AutoMax Upgrade Program

Model Number	Description	Replaced By
57C490	AutoMax Network Module Exchange	N/A
57C498	AutoMax Network Module Upgrade.	57C404
The AutoMax Upgrade program provides credit to Reliance customers who wish to upgrade their equipment. Customers will be invoiced the normal user price for the equipment ordered and will receive a credit when the exchanged hardware is returned to the Digital Products Service Center (RWO) in good working order. Return authorization paperwork is shipped with the new modules.		

UL ® CSA C E **Certifications**

AUTOMAX®

DISTRIBUTED CONTROL SYSTEM

PC Link Interface Module

Model No. 57C445

The AutoMax PC Link Interface Module allows an IBM® computer to function as a drop on the AutoMax DCS-NET and Remote I/O networks. These network connections allow a personal computer to directly exchange data with an AutoMax control system. This high-speed link operates at the AutoMax network transmission speed of 1.75 megabaud, avoiding the bottleneck of RS232 serial connections.

The AutoMax PC Link Interface Module provides an ideal real-time connection between an AutoMax DCS-controlled process and an IBM PC compatible personal computer.

Typical applications include:

- System programming functions
- Data collection
- Statistical process control (SPC/SQC)
- Process monitoring
- Man/machine interface
- Diagnostics
- System start-up and commissioning

The AutoMax PC Link Interface Module is a half-slot (XT) card which plugs directly into the IBM PC XT/AT bus, and provides a direct connection, via rear-mounted coaxial (BNC) connectors to the AutoMax DCS network. No other system connections are required. A maximum of two modules may be used concurrently in the same computer.

Functional Description

The AutoMax PC Link Interface module is a microprocessor-based module which is designed to be installed into an IBM XT® or AT® computer. Upon the installation of appropriate interface software, the computer will function as a drop on either the AutoMax DCS-NET or Remote I/O communications networks.

Upon the installation of Network Communication Software (provided) this module becomes functionally similar to the Network Communications Module (M/N 57C404B). In this mode, the AutoMax PC Link Interface Module will function as a valid drop on the network, except as the Master (drop 0), and can be assigned any valid drop depth.

Downloading the Remote I/O Software (provided) to this module will configure it for operation on the AutoMax Remote I/O Network. Once loaded with Remote I/O Software, this module will function like an AutoMax Remote I/O Communications Module. It provides the ability to monitor all drops on the Remote I/O Network, access the output data sent from the master to the slave drops, as well as monitor the data sent to the master by each slave drop.

Using AutoMax programming executive software (V3.3 or later), the user can directly connect an IBM PC through the PC Link module to the DCS Network and perform all on-line programming terminal functions at full network speeds.

Software drivers are available to connect the PC link module to several popular operator interface software packages in the DCS-NET configuration. Reliance will provide a sample software driver and technical assistance to software companies who wish to write drivers for the AutoMax PC link.

Technical Specifications

Ambient Conditions

Storage Temperature: 40º–85ºC
Operating Temperature: 5º–50ºC
Humidity: . . . . 5–90% non-condensing

Communications

Remote I/O: . . . . Master/slave, 1.75 megabaud, 3000 ft total per master communications module, 15 modules per processor rack, and 7 remote racks per module.
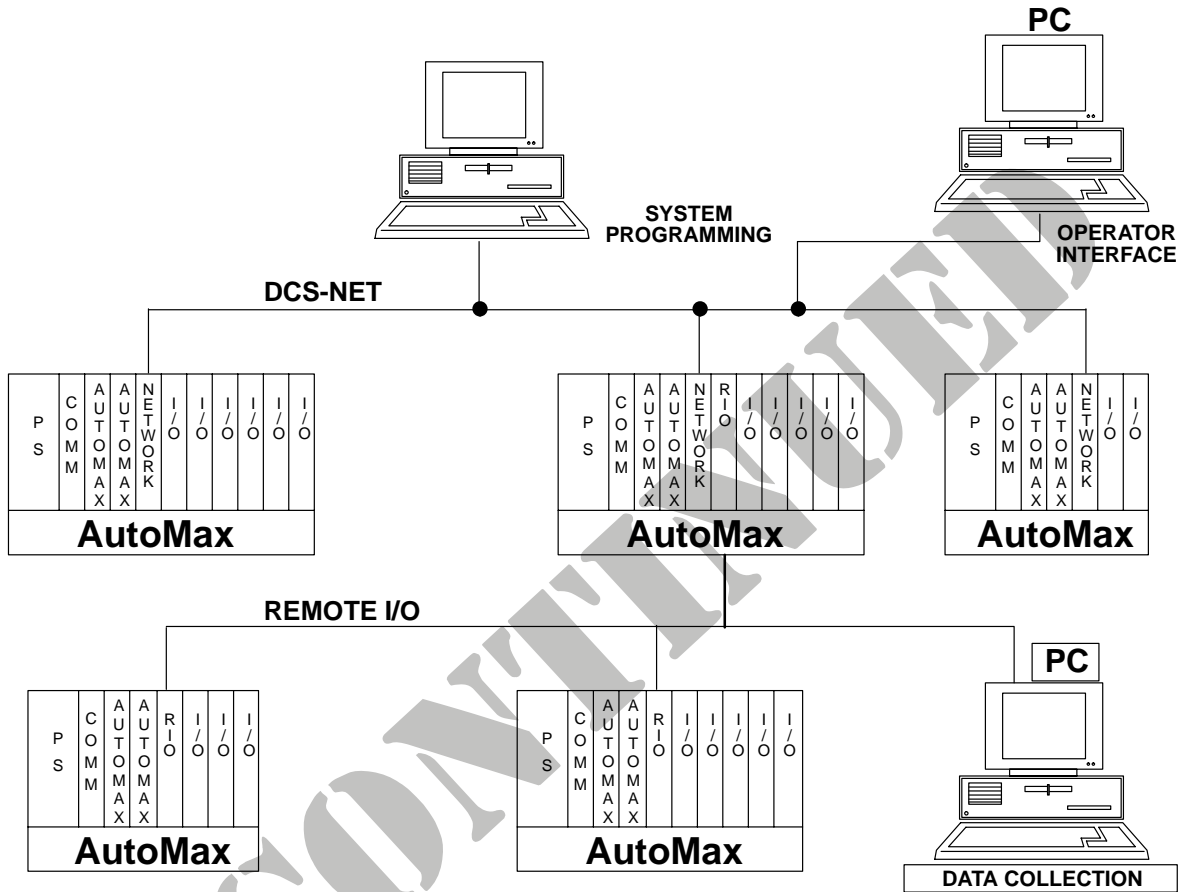
DCS-Network: . . . . Master/slave, 1.75 megabaud, 3000 ft total network, 56 nodes (1 master, 55 slaves).

This module has been discontinued. SST has a module that is a direct replacement. See page 6-4 for more details.

AutoMax®

DISTRIBUTED CONTROL SYSTEM

PC Link Interface Module

Model No. 57C445

AutoMax PC Link Network Configuration

AUTOMAX®
DISTRIBUTED CONTROL SYSTEM

DCS-Net Fiber-Optic Network
Model Nos. 57C365, 57C366, 57C367, 57C368

These fiber-optic tranceivers have been discontinued from our supplier. Weed Fiber Optic has several products that are a direct replacement.

Fiber Optic Cable System

Model Number	Description	
57C365	Stand-Alone Fiber Optic Transceiver, 24V dc or 14–18 VAC	**Discontinued**
57C366	Drop cable from AutoMax Module to Fiber Optic Transceiver, 3-feet	**Discontinued**
57C367	Fiber Optic Transceiver for rack mounting	**Discontinued**
57C368	Hub Assembly: 10-slot rack with power supply, 115/230 VAC	**Discontinued**

A‑B Data Highway Plus Network

The Reliance Electric Data Highway Plus Interface Module provides a direct network connection between the Reliance AutoMax Distributed Control System and the Allen-Bradley Data Highway Plus™ Local Area Network. This peer-to-peer network allows each station to communicate to any other station on the network. Up to 64 stations can reside on the network at one time. Typical applications include AutoMax-to-PLC interface, operator interface, supervisory control and data acquisition.

The Data Highway Plus Interface Module contains a dual-port memory image of an Allen-Bradley PLC-5. Messages can be both received and initiated from the card using the standard PLC-5 register and file designations. The GATEWAY_CMD_OK@ function in AutoMax Basic is used to initiate messages from the module. The module can be configured using AutoMax Executive Software V3.3F or later.

Physical transmission is through a twisted coax cable (blue hose) terminated on the face of the module. Along with the PLC-5 image registers, the module contains registers for status and control, diagnostics and global register data.

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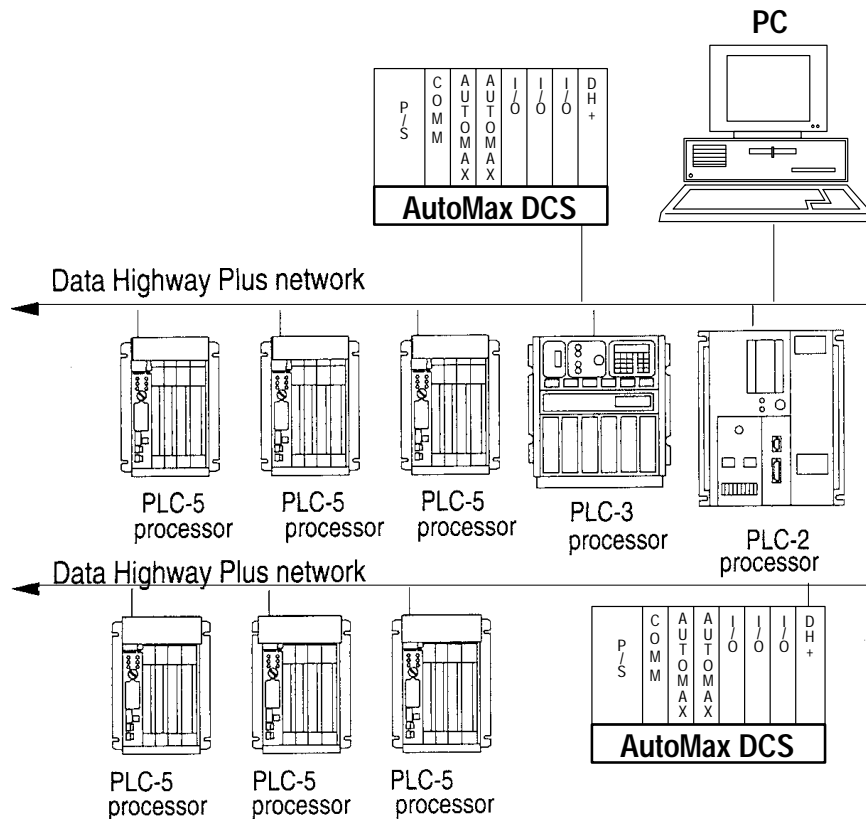
A-B Data Highway Plus Module

Model No. 57C442

The Data Highway Plus module can reside on the network as any valid octal station number (0–77). The station number is set by two thumbwheel switches on the face of the card and is read by the AutoMax processor upon power up.

The card must be initialized by an AutoMax Basic task in order to configure the correct baud rate and enable global data. The module supports 57.6, 115.2 and 230 Kbaud transmission speeds. The first 64 registers on the module are dedicated to status, control, and diagnostics for serial port transmission errors. The remaining memory on the card is divided into three binary (B3, 4, 5) and twelve integer (N7–N18) file areas with read/write access from both Multibus and Data Highway Plus. When addressing any of the file areas, up to 1000 registers can be accessed in one transaction. The following commands can be initiated by the module:

Command Code	Description
1	Unprotected Read
2	Unprotected Write
3	Word–Range–Read
4	Word–Range–Write
5	Read–Modify–Write

The module will also handle unsolicited messages being generated by other network devices. The following commands are supported this way.

- Typed Read/Read Block
- Typed Write/Write Block
- Diagnostic Counters Reset
- Diagnostic Read
- Diagnostic STATUS
- Protected Bit Write
- Protected Write
- Unprotected Bit Write
- Unprotected Read
- Unprotected Write

The module also supports message transfers between Data Highway Plus networks using intermediate network devices from Data Highway™ or Data Highway II™ when external bridges are used. This is accomplished with the standard variable definitions within the GATEWAY_CMD_OK@ function.

Diagnostic registers on the card contain serial transmission errors received at the card from another device. Errors incurred from AutoMax initiated messages are returned in the status% variable in the GATEWAY_CMD_OK_@ function. A memory area has been reserved to allow transmission of network statistic data as well. Statistic and diagnostic counter data are available to any node that requests them.

 Certifications

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DISTRIBUTED CONTROL SYSTEM

Remote Input/Output Communications Network

Remote I/O Network

The AutoMax Remote I/O Communications Network is a master/slave configuration. The Remote I/O Communications Module functions as the master module when inserted in the Processor Module Rack and as a slave module when in a remote AutoMax rack. One Processor Module can direct a maximum of 15 Master Remote I/O Modules in the master rack and one Master Remote I/O Module can control a maximum of seven remote AutoMax or Shark XL racks or remote heads connected to its remote network.

The Master Remote I/O Communications Module initiates all communications on the remote network, transmitting packets of data addressed to a specific slave drop. The Master Module collects and stores input and output data from all slave modules connected to the remote I/O network. This I/O data is stored in dual-port memory of the master module and is accessible to the Processor Module in the Master Rack as directed by the user's application program.
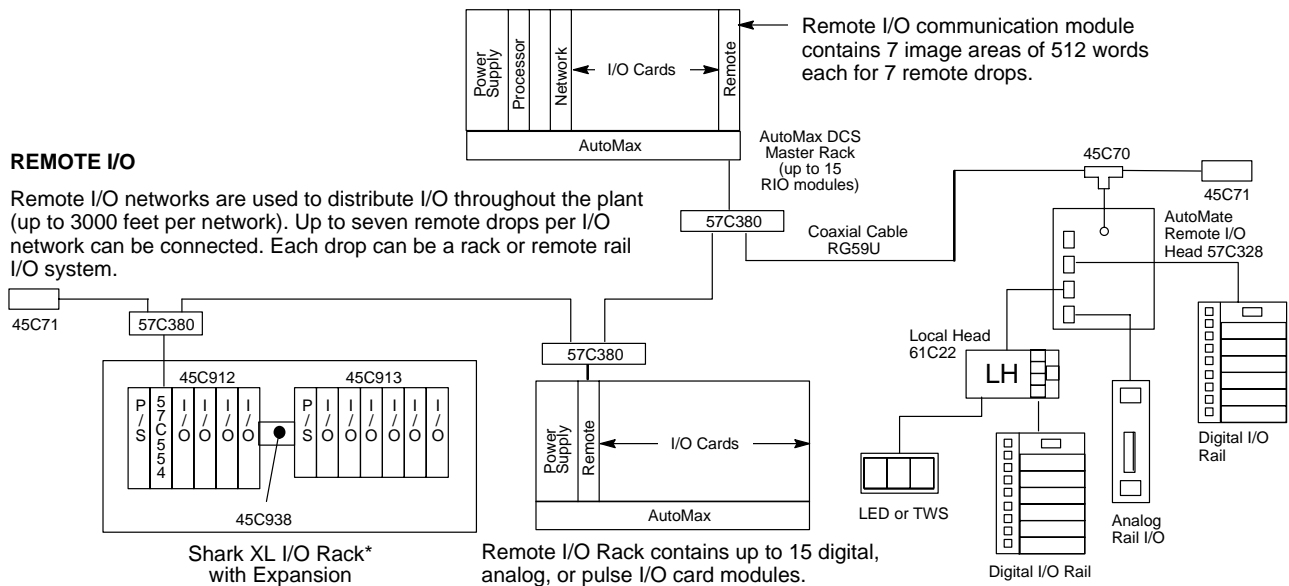
The Slave Remote I/O Communications Module collects and stores input and output data for a maximum of 15 general purpose I/O modules contained in the same remote AutoMax rack. This data is sent on request to the Master Module.

V2 Programming

The Remote I/O definition statement (RIODEF) is used in a system configuration task in the Master Processor Module to define any input or output used in a remote rack or remote head on the remote I/O network. The RIODEF statement assigns a name or tag to the I/O point and defines on which network (1 to 15), which drop (1 to 7), and the specific I/O card module in the remote rack that the I/O point is located. Once the I/O point has been so defined, any reference to it anywhere within the AutoMax system is made simply by using its defined name.

Features

- 875 K baud communications rate

- 3000-foot total remote network length

- Seven remote stations per Remote Communications Module

- 15 Communications Modules per AutoMax Master Rack

Remote I/O communication module contains 7 image areas of 512 words each for 7 remote drops.

REMOTE I/O

Remote I/O networks are used to distribute I/O throughout the plant (up to 3000 feet per network). Up to seven remote drops per I/O network can be connected. Each drop can be a rack or remote rail I/O system.

Shark XL I/O Rack*
with Expansion

Remote I/O Rack contains up to 15 digital, analog, or pulse I/O card modules.

*Custom Classics

AUTOMAX®

DISTRIBUTED CONTROL SYSTEM

Remote I/O Communications Module

Model No. 57C416

The Remote I/O Communications Module is the basis for the AutoMax remote I/O system. This Module provides the necessary hardware to allow extended communication and control between the Processor Module Master Rack and remote racks containing general purpose analog and digital I/O card modules and/or remote heads with digital and analog I/O rail modules.

The Remote Communications Module is a printed circuit assembly in a protective enclosure that plugs into the Multibus backplane of the AutoMax Rack. The module has on its faceplate a 7-segment LED for diagnostic displays, an "OK" status light, the remote communications connector, and a serial port to locally monitor or modify I/O status. The remote drop or station number is set using two thumbwheel switches, also on the faceplate.

The remote communications synchronous data is transferred through a Belden 9259 or equivalent coaxial cable. The connection of the coaxial cable to each of the Remote Communications Modules is made through a Reliance Passive Tap which contains two fault-isolation resistors in series with the transmission line. This prevents a failed module from bringing down the entire remote I/O network.

The RS-232C communications port can be used with a serial device to invoke a self-test of the Remote I/O Communications Module, display the status of all parameters associated with the Module and the network, and to locally monitor and modify I/O points on I/O modules within the associated remote rack.

Diagnostics

When the Remote I/O Communications Module is powered up or a self-test is invoked through the RS-232C port, an internal diagnostics test is executed in the module to check for hardware failures. If an error is encountered, an error code is displayed on the faceplate 7-segment LED. Additionally, during normal operation of the module, if a power failure, system (backplane), or communications line failure occurs, an error code will also be displayed.

Features

LED Status Indicators

- OK – the Remote I/O Module is functioning properly

- FAULT CODE – 7-segment LED displays diagnostic error code

Thumbwheel Switches

- DROP NUMBER – sets drop number on the remote network. Master is set 0, remote drops set 1 to 7 on the 2nd switch
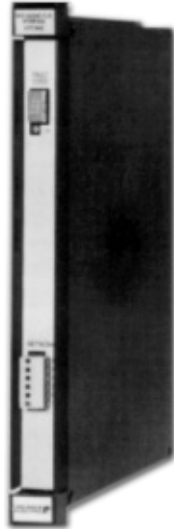
Communication Ports

- MONITOR – 25-pin, RS-232 serial for network test and status

- NETWORK – 9-pin for network communications

Certifications

Communications

AutoMax®

DISTRIBUTED CONTROL SYSTEM

A-B Remote I/O Scanner Module with Adaptor Mode

Model No. 57C443A

The Allen-Bradley Remote I/O Scanner Module with Adaptor mode can be used as either a scanner or as an adaptor on A-B Remote I/O networks. Adaptor mode functionality was added with the 57C443A release. Modules prior to this release are scanner mode only.

The AutoMax Allen-Bradley Remote I/O Scanner will link AutoMax DCS to devices on the Allen-Bradley Remote I/O network such as Allen-Bradley 1771 I/O, Flex I/O, Block I/O and SLC500 Remote I/O. This functionality further expands your interoperability and aids in simplifying the integration process between the two systems. This card resides in the AutoMax Multibus rack and connects as a scanner to Allen-Bradley Remote I/O devices, thus allowing AutoMax to control devices on the A-B Remote I/O network.

Up to 32 racks of remote I/O may be connected to the Scanner with a selectable baud rate of 57.6K, 115.2K, and 230.4K. For A-B Remote I/O, 1/2, 1, and 2 slot addressing may be utilized. Complementary addressing will not be available. The scanner will be able to communicate to 1/4, 1/2, 3/4, and a full rack. If a partial rack is used, the next rack will begin on the next full rack boundary in the I/O image table. Therefore, any physical Remote I/O Device must be at least 1 logical rack. This module can scan both discrete and analog I/O as well as force inputs and outputs. A maximum of 48 block transfers will be allowed to utilize the transfer of register data.

As an adaptor, the module can communicate with an Allen-Bradley Remote I/O scanner as one ore more remote racks. The module can also be configured as any partial rack or a combination of partial racks. The module monitors discrete inputs and outputs on any combination of remote chassis that share its remote I/O link. The module can respond to up to 48 different block transfer read or write requests. However, it does not monitor the block transfers to or from other I/O chassis on the remote I/O link.

Standard Allen-Bradley 1770-CD cable will be used to connect the Remote devices with the scanner card.

The AutoMax System will interface, thru the Scanner Card's Dual Port memory, to the A-B Remote I/O network. The AutoMax Programing Executive has a Graphical User Interface for this card. The card may also be used with AutoMax versions prior to 3.6 if you select the Generic card option for the AutoMax Programming Versions 3.X or by using the IODEF definition statement with AutoMax Versions 2.X or earlier.

The AutoMax System will interface, thru the Scanner Card's Dual Port memory, to the A-B Remote I/O network.

Certifications

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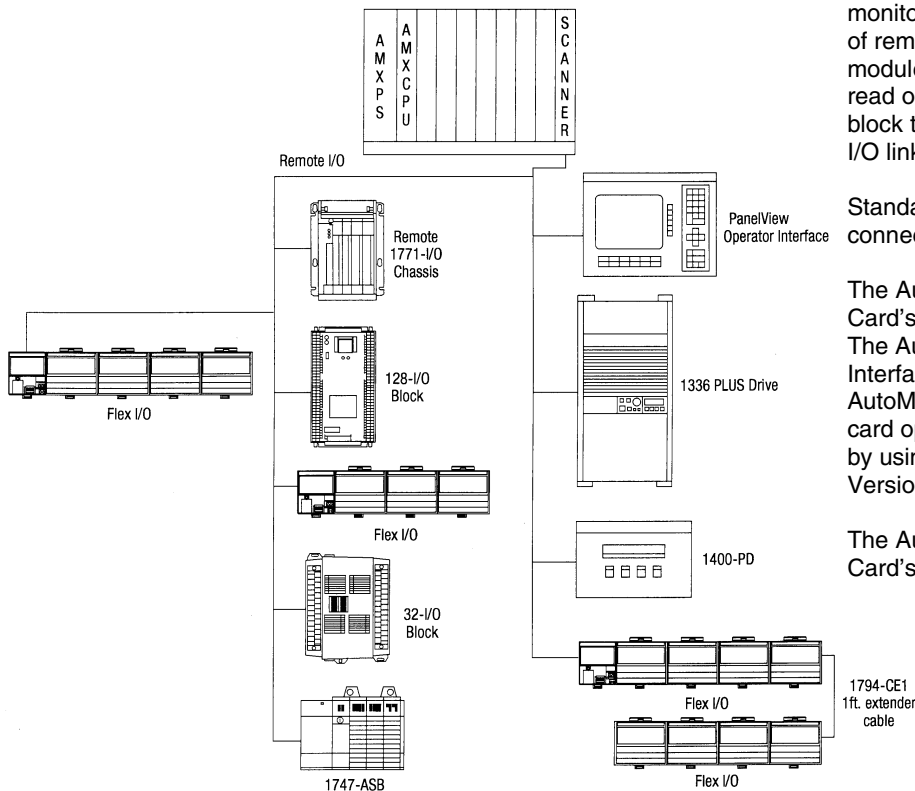
R-NET Communications Network

As programmable controllers have become more cost-effective and more powerful, they have been used in a greater number of industrial applications. As their use and number have increased, a strong need has arisen for a simple, cost-effective means of communication between programmable controllers.

R-NET, Reliance Electric's Industrial Network, meets this need. R-NET provides a peer-to-peer communications scheme for distributed control and centralized data gathering applications. R-NET allows 32 AutoMate PLCs and/or other devices to communicate with each other. R-NET, a baseband coaxial cable system, is arranged in a multidrop configuration. R-NET connects devices up to 6000 feet apart, easily accommodating typical industrial control applications.

Utilizing a token passing scheme, each network node controls the network in turn and transmits for a certain maximum time. When the transaction is complete, the token is passed to the next node in sequence. This peer-to-peer (masterless) system makes R-NET a multi-application network, due to the fact that a single node failure will not affect any other node.

Because of the deterministic nature of the token passing scheme and a data rate of 800K baud, R-NET has the speed that is required to handle Supervisory Control and Data Acquisition, management information system support and program development – loading/verifying. Global coils can also be used for real-time interlocking.

An IBM-compatible personal computer with a R-NET PC Link Card and the APS Programming System Software can be connected anywhere along the network to program/monitor any AutoMate on R-NET.

Interfacing the AutoMate 30/40 to R-NET is as simple as plugging an R-NET processor card into the rack and connecting the network cable to it. Based on the Motorola 68010 and a high-speed serial controller, the R-NET processor handles all network communications, thus freeing the AutoMate processor to perform other tasks. Data transfer between the processors occurs directly over Multibus – not serially. The R-NET system is therefore superior to networks utilizing programming ports for serial communication between programmable controllers and network processors.

Interfacing other devices (minicomputers, color graphics terminals, etc.) to R-NET is accomplished using any of the Reliance Gateways. The Gateway Interface Head is a stand-alone communications processor that connects to foreign devices via RS-232, and a software protocol similar to ANSI 3.28. Messages to or from the foreign device are buffered and translated to R-NET protocol by the Gateway.

The Process Control Gateway is a communication processor that uses MODBUS protocol and provides a standard RS-232 interface. It allows multiple MODBUS masters to get data from any of the controllers.

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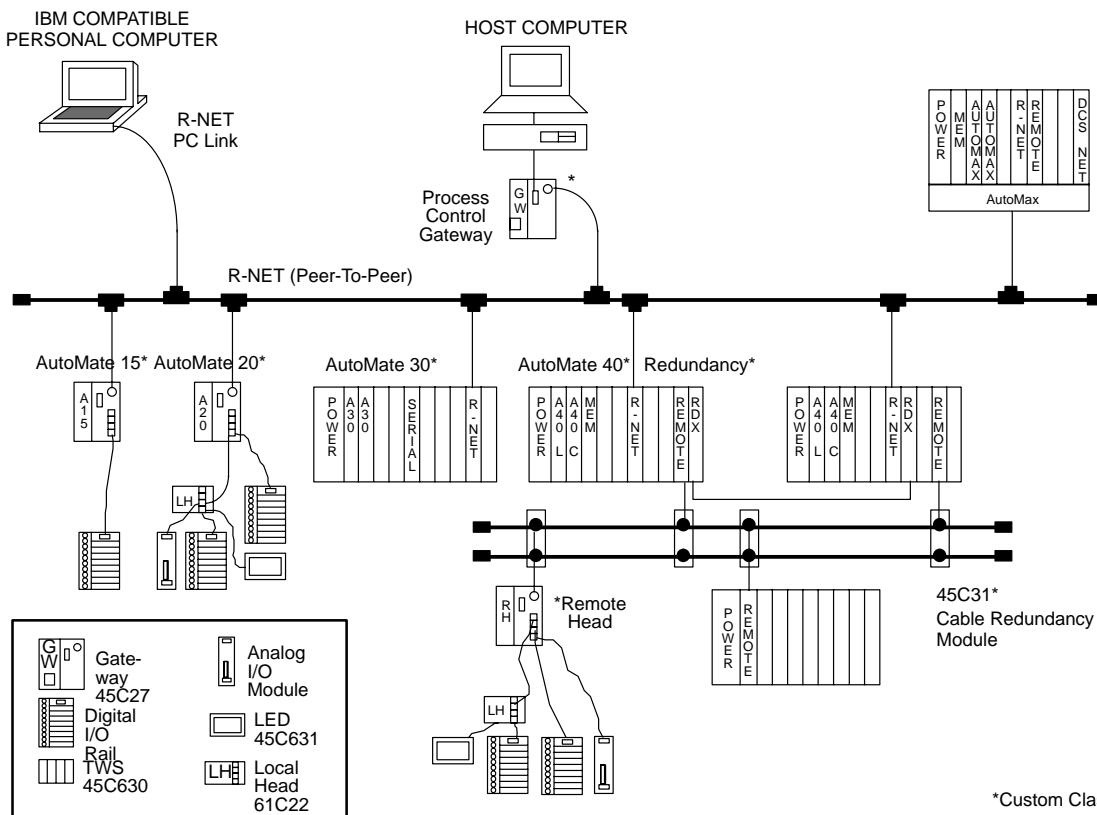
R-NET Processor Module

Model No. 57C429

The AutoMax R-NET processor is a single-board interface module to the R-NET Industrial Network, which is commonly employed in Reliance® AutoMate® PLC systems. It provides a peer-to-peer network connection between AutoMax and AutoMate systems, as well as with host computers and supervisory controllers. One of the main advantages of this topology is the ability of the network to continue communicating if nodes drop off line. Any AutoMax rack with up to four AutoMax processors can support multiple R-NET Processor modules. Multiple R-NET modules in a rack can be on the same or separate network lines.

The AutoMax R-NET processor allows AutoMax users to program tasks using the same RNETDEF variables and commands currently used by the 57C417 AutoMate Interface Module. The AutoMax R-NET Processor provides a BNC connector for direct coax cable connection and high-speed network response. The R-NET processor contains a limited memory image of an AutoMate 40 controller. Up to 2560 registers can be bit- or register-addressed with both read and write functions. The AutoMax DCS rack and its associated processors will have access to the memory image via dual port memory. Global coils are also supported. Global coil status is broadcast to each drop on the R-NET Industrial Network and can be controlled by any drop as well.

Each AutoMax R-NET Processor module contains 16K-bytes of dual-port memory for storing data that are transmitted over the network. The dual-port memory contains an image modeled on a subset of the AutoMate memory area by defining the destination as an AutoMate address. Data is transmitted from the AutoMate image area over the network using a subset of AutoMate communications commands. The dual-port memory can be accessed over the backplane bus by any processor in the rack through application programs.

Functional Description

R-NET is a synchronous baseband coaxial cable network system arranged in a multidrop configuration. Network access is granted using a token-passing scheme. Each network node controls the network in turn. When a node has the token, it can transfer data to any or all nodes on the network. When the transaction is completed, the token is passed to the next consecutive node on the network. Data is transmitted over the network via a Belden 9259 or equivalent coaxial cable at a rate of 800 kilobits per second utilizing the AutoMate communications protocol. Up to 32 AutoMate controllers and/or other devices may be connected to the R-NET network. The maximum cable length is 6000 feet using RG-11/U cable.

The AutoMax R-NET Processor module communicates over R-NET using the AutoMate Communications Protocol. A subset of the AutoMate command code is supported to specify what action is to be taken by the AutoMax R-NET Processor Module. These codes are used in BASIC programs and are initiated by executing a GATEWAY_CMD_OK@ function. The AutoMax R-NET Processor module can initiate only commands 1 through 4. However, it can respond to all of the commands listed below when initiated by the AutoMate controller:

Octal Code	Command Name	AutoMate Instruction
001	Read Point	
002	Write Point	
003	Read Register	GETRNT
004	Write Register	SNDRNT
013	Read Register List	
014	Write Multiple Points	
050	Who Are You	

All application program data is sent and received by the AutoMax R-NET Processor module's CPU. All handshaking, error-checking, and AutoMate command interpretation is also handled by the AutoMax R-NET Processor module; no additional load is put on the main Processor module(s) for communications.

Ⓤ Ⓢ **Certifications**

AutoMax
DISTRIBUTED CONTROL SYSTEM

Modbus Interface Module
Model No. 57C414

Features

LED Status Indicators

- OK – the module is functioning properly
- FAULT – 7-segment LED displays status and error codes

Thumbwheel Switches

- DROP NUMBER – drop or device number for the appropriate equipment or network

Communications Port

- GATEWAY – RS-232 asynchronous link to the non-AutoMax equipment or network

Certifications

The Modbus Interface Module (57C414) is used to interface the AutoMax to Modbus-compatible equipment. The Modbus Interface Module has the capability to transform up to four AutoMax Processor Modules in the same chassis into a single Modicon* 584 look-alike as viewed from the Modbus link. The Modbus Interface Module transfers data between the AutoMax and the Modbus equipment using a subset of the Modbus message function set. Both the RTU (binary) and the Modbus ASCII modes are supported.

AutoMate Interface Module
Model No. 57C417

transfers data between the look-alike AutoMate 40E registers and the remote devices using a subset of the AutoMate protocol command messages.

Features

LED Status Indicators

- OK – the module is functioning properly
- FAULT – 7-segment LED displays status and error codes

Thumbwheel Switches

- DROP NUMBER – drop or device number for the appropriate equipment or network

Communications Port

- GATEWAY – RS-232 asynchronous link to the non-AutoMax equipment or network

Certifications

The AutoMate Interface Module (57C417) interfaces the AutoMax to the Reliance Electric AutoMate programmable controller equipment. The RS-232 link may be connected to the R-NET™ Interface Head for access to the R-NET Proprietary Network, to the AutoMate® Serial Communications Card for communicating with one or more AutoMate processors in a rack, or directly to the AutoMate processor itself. The AutoMate Interface Module allows up to four AutoMax Processor Modules to look like a single AutoMate 40E as viewed from the RS-232 communications link. Each AutoMax Processor Module has access to the look-alike AutoMate 40E registers over the AutoMax Multibus backplane. The AutoMate Interface Module

AUTOMAX ®

DISTRIBUTED CONTROL SYSTEM

A-B Interface Module

Model No. 57C418

Features

LED Status Indicators

- OK – the module is functioning properly
- FAULT – 7-segment LED displays status and error codes

Thumbwheel Switches

- DROP NUMBER – drop or device number for the appropriate equipment or network

Communications Port

- GATEWAY – RS-232 asynchronous link to the non-AutoMax equipment or network

Certifications

The A-B™ Interface Module (57C418) provides the AutoMax the ability to communicate with Allen-Bradley programmable controller equipment. The A-B Interface Module transfers data between the AutoMax Processor Modules and the Allen-Bradley-related devices using a subset of the A-B protocol. This subset allows the A-B Interface Module to look like a PLC-2, or PLC-3 when viewed from the serial port. The module can act as a master or slave on the A-B Data Highway.

MaxPak III High Speed Link Module

Model No. 57C424

The MaxPak III High-Speed Link Module allows a standard hardware configuration to be applied to many different uses including position and tension regulation.

Features

LED Status Indicators

- OK – the module is functioning properly
- FAULT – 7-segment LED displays status and error codes

Thumbwheel Switches

- DROP NUMBER – drop or device number for the appropriate equipment or network

Communications Port

- GATEWAY – RS-232 asynchronous link to the non-AutoMax equipment or network

The MaxPak III High-Speed Link Module (57C424) is designed to reside within an AutoMax DCS system rack, and permits the direct connection of the AutoMax rack to a MaxPak III drive controller. This module provides point-to-point communications fast enough to allow closed loop regulation, and passes control loop, as well as reference and feedback data.

AUTOMAX®

DISTRIBUTED CONTROL SYSTEM

Toledo Scale Interface Module

Model No. 57C428

Features

LED Status Indicators

- OK – the module is functioning properly

- FAULT – 7-segment LED displays status and error codes

Thumbwheel Switches

- DROP NUMBER – drop or device number for the appropriate equipment or network

Communications Port

- GATEWAY – RS-232 asynchronous link to the non-AutoMax equipment or network

U/L ® CSR C E **Certifications**

The Toledo® **Scale Interface Module (57C428)** provides the AutoMax DCS with weight data from any of the following Toledo Scale Digital Indicators: 8132, 8140, 8142, and 8530. This module is a read only device as seen by the Toledo digital indicator. It uses Toledo Scale standard protocol to read the weight data from the indicator when operated in continuous output mode.

Ethernet Interface Module

Model No. 57C440

The Ethernet Interface Module (57C440) allows the direct connection of an AutoMax DCS system to an Ethernet local area network allowing the complete utilization of Ethernet capabilities over thin and thick wire transceivers, as well as fiber optic and broadband modems. Ethernet provides a high speed, industry-standard link between the AutoMax system and other host computers which support Ethernet (IEEE 802.3) and the TCP/IP protocol. The Ethernet Interface Module may be mounted in any rack which contains one or more AutoMax processors. The AutoMax DCS control system will support up to two modules in one rack.

AUTOMAX®

DISTRIBUTED CONTROL SYSTEM

Multibus ControlNet Module

See Section 7-11 for details on the MBCN card.

Modbus Plus Interface Module

Model No. 57C441

Features

LED Status Indicators

- OK – the module is functioning properly
- FAULT – 7-segment LED displays status and error codes

Thumbwheel Switches

- DROP NUMBER – drop or device number for the appropriate equipment or network

Ⓤ Ⓛ ⓒⓢⓐ **Certifications**

The Modbus Plus Interface Module (57C441) enables the direct connection of an AutoMax DCS system to the Modicon Modbus Plus network. The Modbus Plus network provides peer-to-peer communications at 1 Mbaud with Modicon 984 series programmable controllers, using twisted-pair wire. Up to 32 nodes can operate on the Modbus Plus network at one time. This module may be placed in any slot of an AutoMax rack that contains at least one AutoMax processor, and can communicate with up to four AutoMax processors within the same rack. The AutoMax rack which contains the Modbus Plus Interface module appears as a single station on the Modbus Plus network.

AutoMax®
DISTRIBUTED CONTROL SYSTEM
Selection Chart

Module	Description	Communication Medium	Transmission Rate	Number 0f Drops/Nodes Supported	Backplane Current Load	Model Number
Reliance DCS Network	Provides the necessary hardware to transmit control and status data between 2 or more AutoMax controllers in a network.	RG-59/U Coaxial Cable	875 Kbaud	56 nodes	2.5 A @ 5V dc .053 A @ +12V dc .0075 A @ –12V dc	57C404
Modbus Interface	Interfaces AutoMax to Modbus-compatible equipment. Supports RTU (Binary) and Modbus ASCII modes.	RS-232	1200, 2400, 4800, 9600, or 19200 Baud	1-99 devices	2.5A @ 5V dc .053 A @ +12V dc .0075 A @ –12V dc	57C414
AutoMax Remote I/O Interface	Provides necessary hardware for communication and control between AutoMax Processor Master Rack and remote racks containing general purpose I/O.	RG-59/U Coaxial Cable	875 Kbaud	7 remote racks per module	2.5 A @ 5V dc .053 A @ +12V dc .0075 A @ –12V dc	57C416
AutoMate Interface	Interfaces AutoMax to the Reliance Electric AutoMate PLC equipment.	RS-232	1200, 2400, 4800, 9600, or 19200 Baud	32 nodes	2.5 A @ 5V dc .053 A @ +12V dc .0075 @ –12V dc	57C417
A-B Interface	Interfaces AutoMax to Allen-Bradley programmable controller equipment. Communicates on A-B Data Highway (PLC-2 or PLC-3 modes)	RS-232	1200, 2400, 4800, 9600, or 19200 Baud	64 stations	2.5 A @ 5V dc .053 A @ +12V dc .0075 A @ –12V dc	57C418
Toledo Scale Interface	Provides AutoMax with weight data from the following Toledo Scale Digital Indicators: 8132, 8140, 8142, 8150	Serial, twisted pair, Toledo Scale standard protocol	1200, 2400, 4800, or 9600 Baud	1 device	2.4 A @ 5V dc .053 A @ +12V dc .008 A @ –12V dc	57C428
Reliance R-Net Interface	Interfaces AutoMax to the Reliance Electric R-Net Industrial Network	RG-59/U Coaxial Cable	800 Kbits/sec	32 drops	2.5 A @ 5V dc .030 A @ +12V dc	57C429
Ethernet Interface	DISCONTINUED					
Modbus Plus Interface	Interfaces AutoMax DCS systems to the Modicon Modbus Plus network.	Belden 9841 shielded twisted pair cable	1.0 Mbits/sec	32 devices	.60 A @ 5V dc	57C441
A-B Data Highway Plus Interface	Interfaces AutoMax DCS systems tothe Allen-Bradley Data Highway Plus network.	Belden 9463 twin-axial cable (Allen-Bradley 1770-CD)	57.6 Kbps @ 10000 ft. 115.2 Kbps @ 5000 ft. 230.4 Kbps @ 2500 ft.	64 stations	.65 A @ 5V dc	57C442
A-B Remote I/O Scanner with Adaptor mode	Interfaces AutoMax DCS systems to devices on the Allen-Bradley Remote I/O network.	Belden 9463 twin-axial cable (Allen-Bradley 1770-CD)	57.6 Kbps @ 10000 ft. 115.2 Kbps @ 5000 ft. 230.4 Kbps @ 2500 ft.	32 racks	65 A @ 5V dc	57C443A
Reliance DCS Network Exchange	Provides re-manufactured network module (M/N 57C404) in exchange for any version of the network card.	RG-59/U Coaxial Cable	875 Kbaud	56 nodes	2.5 A @ 5V dc .053 A @ +12 Vdc .0075 A @ –12 Vdc	57C490
Reliance DCS Network Upgrade	DISCONTINUED					
ControlLogix DCSNet	Migration connectivity between ControlLogix and AutoMax (DCSNet or Remote I/O)	MBCN 64 connection ControlNet tap and cable	875 Kbaud	56 nodes	N/A	56AMXN LDS*
MBCN	Multibus ControlNet for AutoMax	ControlNet tap and cable	5 Mbits/sec	64 connection	.35 A @ 5 Vdc	58820-1 LDS*

*Legacy Drive Systems

Notes