Honeywell

TDC 3000X Plant Network Module Specification and Technical Data

PN03-500
R500
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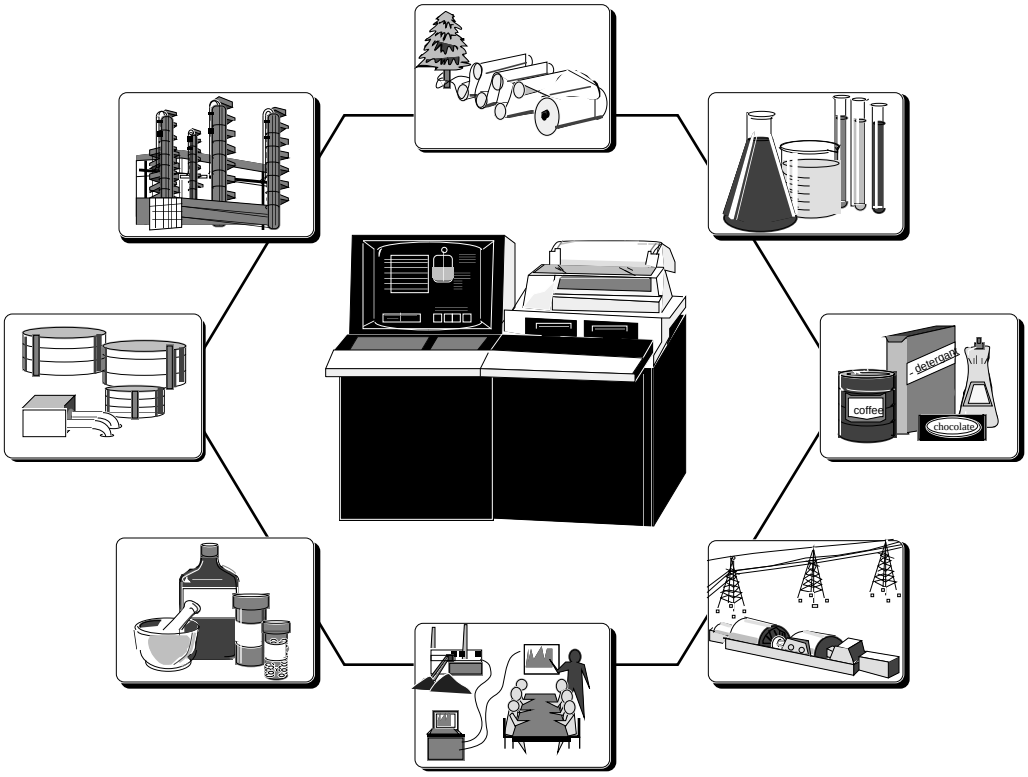

Total Plant

TDC 3000X Plant Network Module

Specification and Technical Data

Introduction

This publication defines the significant functions of the Plant Network Module (PLNM), a TDC 3000X module that serves as a high-speed, dedicated interface between the Local Control Network (LCN) and a DEC™ VAX™ or AXP™ computer.

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The PLNM is a node on the LCN, as shown in Figure 1. It allows a DEC VAX or AXP computer to communicate with all the modules on the LCN and associated Universal Control Networks and Data Hiways. See *System Technical Data* for more information on the Plant Network Module's relationships with other modules and process-connected devices.

Honeywell's CM50S software package provides the interface between the PLNM and the DEC computer. The CM50S uses the Ethernet Local Area Transport (LAT) communication channel between the VAX or AXP Computing Module and one to four PLNMs. Figure 2 illustrates the system relationships. For complete details on the CM50S package, refer to *CM50S Specification and Technical Data*

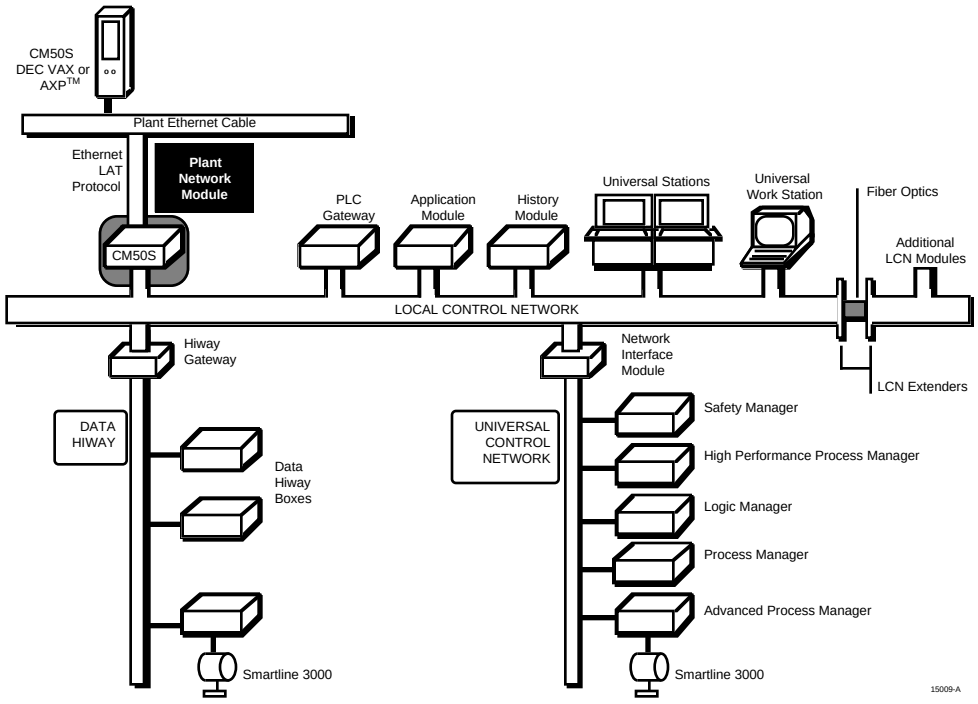

Figure 1 — TDC 3000X Architecture with Plant Network Module

New PLNM Features in R500 LCN Software

- History journal data retrieval added
- Improved file transfer speed
- Enhanced file transfer command to list files into a dataout file (now identical to Command Processor)

Functional Description

Using CM50S software, the Plant Network Module provides the interface between a single DEC VAX or AXP computer and the Local Control Network (LCN). The computer is expected to be used for data collection needed for management information system or plant management requirements (including both current values and historical data), and a higher level and wider scope of control than is possible with any other device. Typically, computer control strategies are implemented in conjunction with Process Manager, Multifunction Controller and Application Module control strategies.

Standard Software

The VAX or AXP computer must be loaded with the OpenVMS operating software and CM50S software MP-CM50S9 for VAX; MP-C50S10 for AXP.

The CM50S software must be at Release 3.0 (or higher) for the VAX version, and Release 4.2 (or higher) for the AXP version.

For VAX platforms, VAX/OpenVMS operating system version 5.4-1 (or higher) is required, while for AXP platforms, AXP/OpenVMS version 1.5 (or higher) is required.

The OpenVMS Forms Management Systems (FMS) runtime is required for CM50S operation.

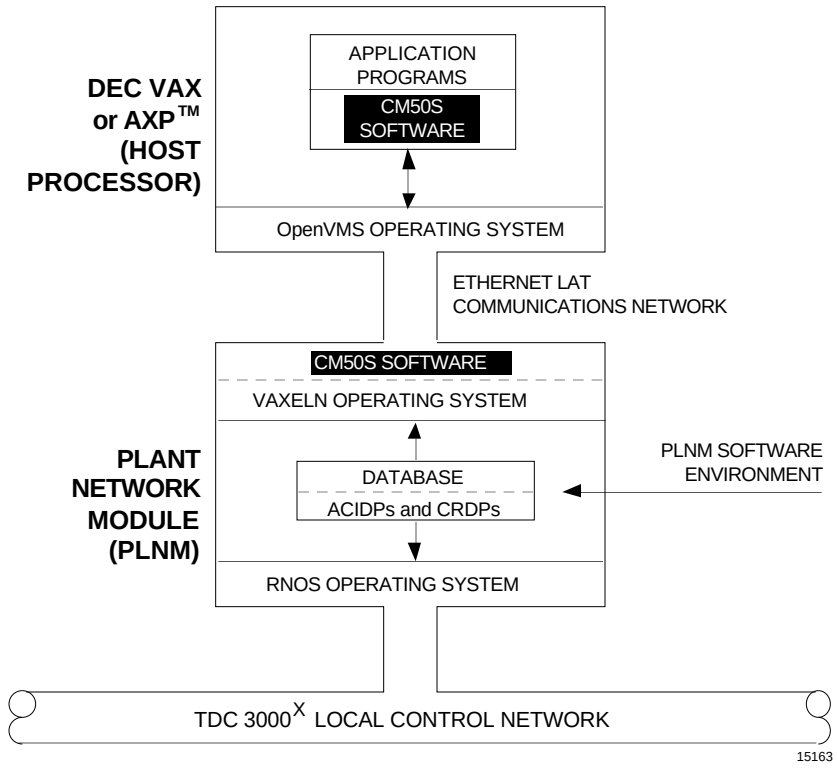

Figure 2 — PLNM/VAX with CM50S

With the above software packages, the part of the PLNM database that communicates with the TDC 3000X Local Control Network is configured in a similar manner to other LCN nodes through the Universal Station. No programming of the PLNM is required or allowed.

Host Computer to PLNM Link

The host (DEC VAX or AXP) computer communicates with a PLNM over an Ethernet cable link using the Ethernet Local Area Transport (LAT) protocol. The VAX or AXP hardware uses a standard Ethernet controller.

The Ethernet cable may be thin wire, thick wire, or fiber optic. The distance between the host computer and the PLNM is determined by the Ethernet network topology.

The Ethernet cable, transceiver, and transceiver connection are provided by the customer.*

As previously noted, a maximum of four PLNMs (on the same or different LCNs) may be connected to a single VAX/OpenVMS or AXP/OpenVMS Computing Module running CM50S software.

Each communication link may run at the data transfer rate of the Ethernet, up to 10 megabits per second. (NOTE: The communication data transfer rate is not the same as the overall throughput data transfer rate.)

* Honeywell IAC Services may be contracted to provide network installation services, if the customer so desires.

Data Collection and Storage

Computer application programs can gain access to data throughout the TDC 3000X system. This is accomplished through six major types of functions:

- Get/Store Point Data
- Get History
- Get/Send Message
- Transfer/Message Files
- Access Journals
- Obtain PLNM Status

PLNM Functions

- Provides a standard interface between the Local Control Network and a DEC VAX computer.
- Collects data from other LCN nodes and stores data to other nodes on request from the VAX.
- Collects continuous history data from the History Module.
- Provides for scheduling and/or operator/event demand of computer programs.
- Transmits messages to Universal Station operators.
- Receives messages from Process Manager and Multifunction Controller sequences.

Data

For Get- and Store-Data calls, the values are requested either by single point.parameter names, or in data tables or point lists that are defined and built by the user in the host (DEC) computer. The application program in the DEC computer supplies the ASCII character string names of the LCN data points and parameters that are to be accessed. Sixteen-character point names are supported. The tables contain ASCII data point and parameter names that will be fetched from and stored to the TDC 3000X system. The PLNM converts these external names to internal identifiers that are used in actual data transfers. The CM50S converts LCN IEEE data formats to VAX/VMS data formats. Real values are returned in engineering unit format. Status of data collected, as well as status of the call, is also returned. Using CM50S, up to 300* parameters can be collected or stored using a single Data Definition Table (DDT). The data tables are explicitly created by the user using internal and external tags.

* Some data types are restricted to under 300 parameters per transaction, due to specific limitations on the maximum message size on the LCN.

Once built, these tables are stored in the host computer. Copies can also reside in the PLNM for use with Get-Data Calls. The Plant Network Module also supports the accessing of Custom Data Segment arrays using a single call.

Storing data is handled in a similar manner to collecting data—either single point, whole arrays or data definition tables can be used. There are several levels of security provided in the CM50S to assure proper access control for writing data to the Local Control Network and its associated UCNs or Data Hiways. Writes can be prevented at the process device, UCN/Hiway and program level.

History

Continuous history data from History Modules can also be obtained by the computer. This includes PV values, as well as other real parameters selected for historization by the History Module. Both snapshots and averages can be accessed. Historical data for up to 24 parameters can be obtained in a single call. History can be accessed in relative or absolute time. Min/max data is also available.

Messages

Computer programs can send messages to the Universal Station operator by way of the PLNM. Such messages optionally may require confirmation by the operator. This allows the computer programs to request an action and to be suspended until a confirmation is received from the operator that the requested action has been completed.

Other devices on the LCN can send character-string messages to individual application programs in the computer. These messages are received by the PLNM and held, pending a transfer request by the application program.

The CM50S, in conjunction with optional layered products, provides additional graphics interface to the US.

File Transfer and Management

Application programs running in the host computer can read and write files on the LCN History Module. Utilities are provided for support functions such as file copy, file re-naming, creation and deletion of files and directories in user-created volumes, moving files from one directory to another, and listing volume and file attributes.

History Journal Access

An application program in the host computer may also retrieve the history journal events from an LCN.

History journals include system journals (i.e., System Status, System Maintenance, System Errors, and Status Notification Journals) and process journals (i.e., Process Alarms, Operator Messages, Process Changes, and Sequence-of-Events journals).

Either complete journals can be retrieved or a specific time interval may be specified. Specific events can also be selectively extracted from the journals, using various filters.

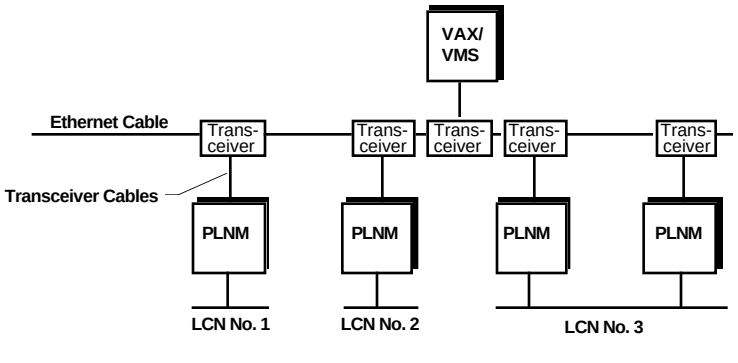

Figure 3 — Ethernet LAT Topology Used with CM50S

PLNM LCN Database

When configuring, the PLNM node type is the same as the CG. At load time, the diagnostics recognize the CNI board, which is unique to the PLNM.

Visibility of computer operation at the Universal Station is provided by a PLNM database, which can also be accessed by using the data-collection and storage facilities described above. This database consists of the following types of information:

- Advanced Control Interface Data Points (ACIDPs)
- Calculated Results Data Points (CRDPs)

Both of these can have optional custom data segments that hold data that is associated with computer programs. For example, the results calculated by an optimization program can be stored in a data point's custom data segment. The results are then available to the operator at a Universal Station for historization in the History Module, for calculations by the Application Module, etc. In addition, with the CM50S, each ACIDP is associated with a computer program and represents that program's status to the LCN.

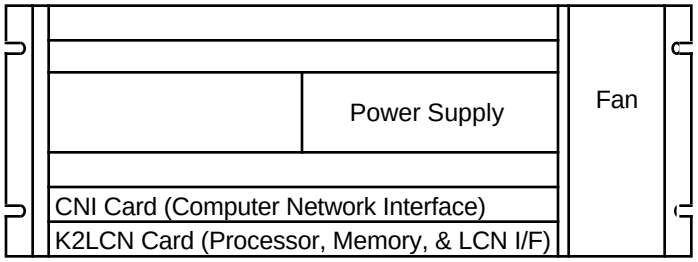

Figure 4 — PLNM Card File Showing Board Placement

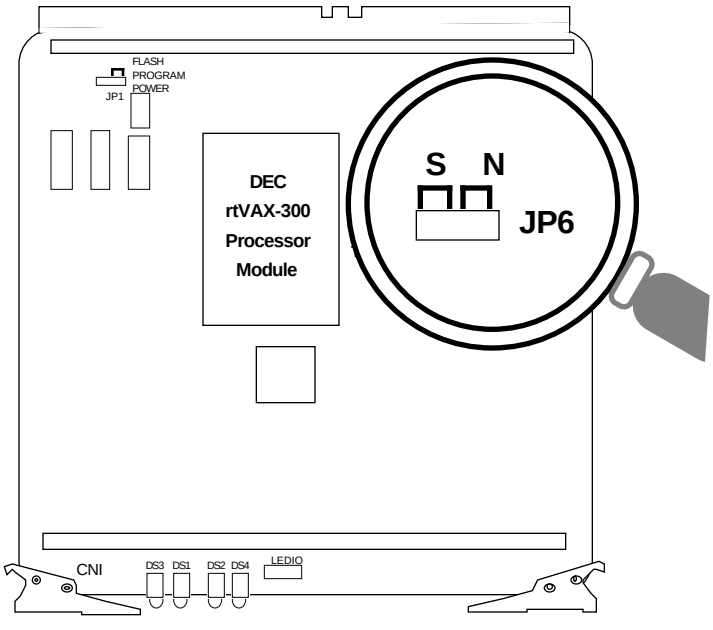

Figure 5 — CNI Board with rtVAX-300 Plug-In Module

Each ACIDP also contains security information about its associated program, which allows the program's access to TDC 3000^X data to be restricted; for example, to read only.

Up to 250 ACIDPs and up to 500 CRDPs can reside in a Plant Network Module. Each point can accommodate up to 10 custom data segments, each segment can contain 250 parameters, and each parameter can consist of a 1000-element array (assuming adequate memory is available).

Scheduling Computer Programs

Computer programs can be scheduled to run from the LCN. They can be configured to run on a cyclic, periodic, and/or demand basis. ACIDPs provide a convenient method of activating programs in the host computer. Modules on the LCN can request computer programs represented by ACIDPs to run. These requests can be initiated by an operator at a Universal Station, or by an event recognized in a Network Interface Module, a Hiway Gateway or an Application Module.

Options

The PLNM transceiver cable can be connected to either a DEC ThickWire (standard), ThinWire (office), or fiber optic Ethernet cable.

Using CM50S, a single DEC computer can be connected to up to four Plant Network Modules. Multiple PLNMs can interface to the same LCN or to different LCNs, as shown in Figure 3.

More than one DEC computer can be connected to an LCN, but each computer requires at least one PLNM.

A combination of PLNMs totaling up to 10 can be connected to a single LCN.

Physical Description

The PLNM is currently supplied from the factory as a module (boardset) that installs in a dual node cardfile (electronics chassis). For additional information on the dual node cardfile (DNCF). See *System Technical Data.*

The PLNM boardset consists of a dual node power supply, a Computer Network Interface (CNI) board, a CNI I/O board, and a LCN processor board. A choice of two LCN processor boards are available: K4LCN (68040 microprocessor) and K2LCN (68020 microprocessor). The K4LCN version requires R500 (or higher) LCN system software, while the K2LCN version is compatible with R320 (or higher) LCN system software.

The LCN processor board and CNI board reside in slots in the front of the card file (Figure 4). The CNI board, illustrated in Figure 5, is a multilayer board, based on a 32-bit CVAX processor that is embedded in a plug-in module. This module contains the microprocessor chip with internal cache, an Ethernet controller, a 20 MHz clock, and a bootloader prom. The rtVAX-300 runs with the VAXELN real-time operating system that is downloaded from Ethernet or from flash proms.

The CNI I/O board plugs into a rear file extension. Mounted on this board is a 15-pin connector that accepts an Ethernet transceiver cable. Maximum length of this drop cable is 50 meters (165 feet) for standard cable and 12.5 meters (41.2 feet) for office cable. Connection to the Local Control Network is through standard LCN coaxial connectors.

Network Configuration

The rtVAX-300 module has a hardware address printed on it.

When installing CM50S, the system administrator runs an installation program after software installation is completed. This program requests the necessary address information and performs the network configuration

CG Upgrades

The Plant Network Module is a successor to Honeywell's Computer Gateway—the module that previously served as the interface to earlier releases of CM50S. For those users who have a CG and want to upgrade it to a PLNM, upgrade kits are available.

Plant Network Module Specifications

Physical Characteristics

Approximate Dimensions (In Dual Node Cardfile)		Approximate Weight	
Height	18.8 cm (7")	Dual Node Cardfile with:	
Width	48.3 cm (19")	Single Node	14.6 kg (32 lb)
Depth	53.3 cm (21")	Two Nodes	18 kg (40 lb)

Power Supply

AC Universal AC Input

102-264 VAC (autoranging power supply)
47-63 Hz (frequency range)
All Plant Network Modules operate without disruption through an interruption in the input ac voltage of up to 40 ms duration.

Communications Network Specifications — Plant Network Module to DEC VAX or AXP Computer

Network Type	Ethernet Local Area Network, IEEE 802.3
Data Rate	Up to 10 megabits per second
Topology	Transceivers connecting Transceiver cables to standard baseband Ethernet cable
Baseband Cable	
Types	PVC-insulated coaxial cable, plenum-rated coaxial cable, and fiber optic cable
Segment Length	Up to 500 meters (1,640 feet)
No. of Transceivers	Up to 100 spaced at least 2.5 meters apart
Transceiver Cable	
Length	Up to 50 meters (164 feet)

Operating Characteristics

PLNM Database Point Capacity	250 Advanced Control Interface Data Points
	500 Calculated Results Data Points
	40 Data Access Tables

Performance

The PLNM functions only with the CM50S interface software.

See the CM50S Specification and Technical Data (CM03-541) for performance data.

Configuration Capability

Maximum Number of PLNMs per LCN	10
CM50S	
Maximum Number of VAX's per PLNM	1
Maximum Number of PLNMs per VAX	4

Plant Network Module Specifications (continued)

CE Conformity (Europe)

This product is in conformity with the protection requirements of the following European Council Directives: 73/23/EEC, the Low Voltage Directive, and 89/336/EEC, the EMC Directive. Conformity of this product with any other "CE Mark" Directive(s) shall not be assumed.

Deviation from the prescribed procedures and conditions specified in the installation manuals may invalidate this product's conformity with the Low Voltage and EMC Directives.

Product Classification	Class I: Permanently mounted, permanently connected Industrial Control Equipment with protective earthing (grounding). (EN 61010-1-1993)
Installation Category	Category II: Energy-consuming equipment supplied from the fixed installation. Local Level Appliances and Industrial Control Equipment . (EN 61010-1-1993)
Pollution Degree	Pollution Degree 2: Normally non-conductive pollution with occasional conductivity caused by condensation. (IEC 664-1-1992)
EMC Classification	Group 1, Class A, Industrial, Scientific and Medical (ISM) Equipment. (EN55011-1991; Emissions)
Method of Assessment	EMC: Technical Construction File (TCF) LVD: Technical File (TF)

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TDC 3000 system

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