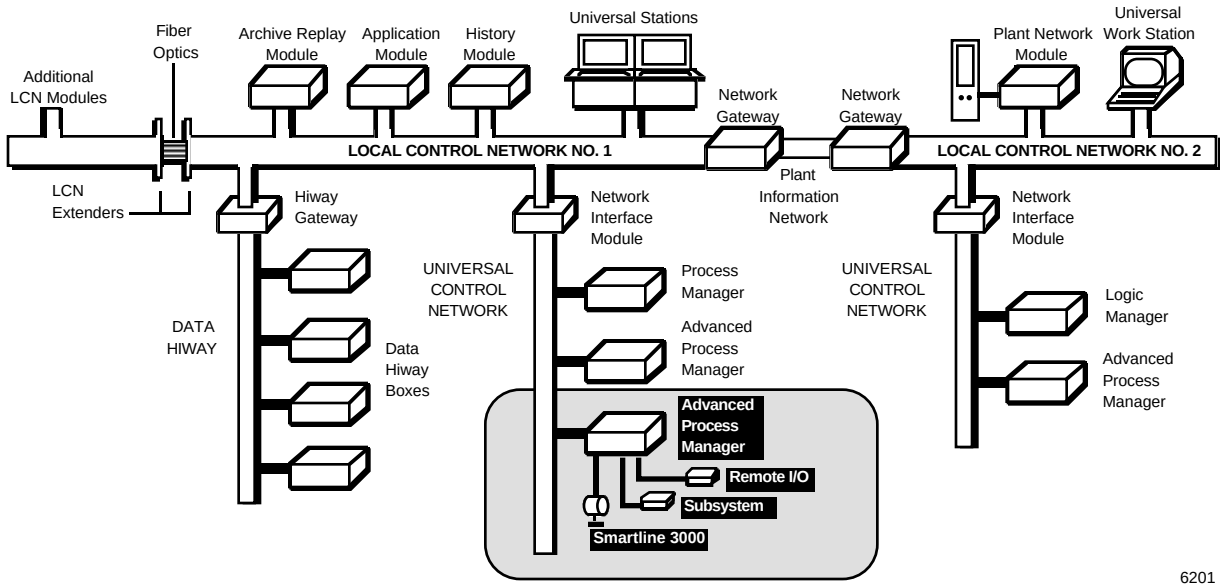

Figure 2 — TDC 3000^X Architecture

Introduction

The Advanced Process Manager (APM) is Honeywell's premier TDC 3000^X data acquisition and control device for industrial process applications.

Like the Process Manager™ (PM), the Advanced Process Manager's new-technology platform offers a range of capabilities that best meet today's and tomorrow's process requirements. The APM offers highly flexible I/O functions for both data monitoring and control. Powerful control functions, including regulatory, logic, and sequencing control are provided for continuous, batch, or hybrid applications.

An optimal toolbox of functions that can be configured and programmed meets the needs of data acquisition and advanced control requirements in a highly secure and performance-intensive manner. Of course, APM's capabilities include peer-to-peer communications and compatibility with industry-standard communications protocols.

As seen in Figure 2, the Advanced Process Manager is a fully integrated member of the TDC 3000^X family. Accordingly, it is capable of:

- Performing data acquisition and control functions, including regulatory, logic, and sequential control functions, as well as peer-to-peer communications with other Universal Control Network-resident devices.
- Providing bidirectional communications to Modbus™ and Allen-Bradley compatible subsystems through a serial interface.
- Fully communicating with operators and engineers at Universal Stations and Universal Work Stations. Procedures and displays are identical or similar to those used with other TDC 3000^X controllers. Plant personnel may already be familiar with them.
- Supporting higher level control strategies available on the Local Control Network through the Application Module and host computers.

Advanced Features

As described above, the APM has the same functionality of the PM plus:

- Digital Input Sequence of Events (DISOE) processing
- Device Control Points
- Array Points for CL Programs
- Foreign device (serial) interface capability
- Larger Memory (over four times larger than the PM)
- String Variables
- Time Variables

Universal Control Network

The communications channel for the Advanced Process Manager is a local area network called the Universal Control Network (UCN). Introduced to TDC 3000^X users in 1988, the UCN is the platform for process I/O connections to the TDC 3000^X.

™ Process Manager, Looptune-II, SP$_Q$C-II, and Logic Manager are trademarks of Honeywell Inc. Modbus is a trademark of AEG Modicon.

The UCN features a 5 megabit per second, carrier band communication system with a token bus network. It is designed to be compatible with IEEE* and ISO** standards. UCN communications are consistent with the growth and direction of evolving international standards, with appropriate Honeywell extensions for secure process control applications.

The UCN uses redundant coaxial cables and can support up to 32 redundant devices. The UCN supports peer-to-peer communication between devices on this network. This feature enables sharing information among Advanced Process Managers, Process Managers, and Logic Managers on the network, thus offering tremendous power and flexibility in implementing advanced, coordinated control strategies.

Network Interface Module

The Network Interface Module (NIM) provides the link between the Local Control Network and the Universal Control Network. Accordingly, it makes the transition from the transmission technique and protocol of the Local Control Network to the transmission technique and protocol of the Universal Control Network. The NIM provides LCN module access to data from UCN-resident devices. It supports program and database loads to the Advanced Process Manager and forwards alarms and messages from the network devices to the LCN. The NIM is also available in a redundant configuration to provide automatic continued operation in the event of a primary failure.

LCN time and UCN time are synchronized by the NIM. The NIM broadcasts LCN time over the UCN. The APM uses it for all alarm (or event) timestamping.

Functional Description

Functional Overview

The Advanced Process Manager is designed to provide flexible and powerful process scanning and control capabilities. To do this, it uses advanced multiprocessor architecture with separate microprocessors dedicated to perform specific tasks. As depicted in Figure 3, the APM consists of the Advanced Process Manager Module (APMM) and the I/O Subsystem.

The Advanced Process Manager Module consists of an Advanced Communication Processor and modem, Advanced I/O Link Interface Processor, and Advanced Control Processor. A redundant APMM can be optionally provided.

The Advanced Communication Processor is optimized to provide high-performance network communications, handling such functions as network data access and peer-to-peer communications. It also supports high-accuracy time stamps.

The Advanced Control Processor is the APM resource dedicated to executing regulatory, logic, and sequence functions, including an excellent user programming facility. Because communication and I/O processing are performed by separate dedicated hardware, the full power of the Advanced Control Processor can be applied to control strategy implementation. The Advanced I/O Link Interface Processor is the APMM interface to its I/O Subsystem.

The I/O Subsystem consists of the redundant I/O Link and up to 40 redundant I/O Processors. These I/O Processors handle all field I/O for both data acquisition and control functions. For example, the I/O Processors provide such functions as engineering unit conversion and alarm limit checking independent of the Advanced Process Manager Module.

The Smart Transmitter Interface processor provides full bidirectional communication to Honeywell smart transmitters, supporting transmitter configuration and improved data accuracy.

All control operations are performed within the Advanced Process Manager Module, with all data acquisition and signal conditioning being performed in I/O Processors. For added control security, the High Level Analog Input, Smart Transmitter Interface, and Analog Output processors can optionally be supplied as redundant devices. The remote I/O option allows I/O Processors to be remote-mounted up to 8 kilometers from the APM file. This option uses redundant fiber optic I/O Link extenders.

The process engineer has complete flexibility of choice in the assignment of point types and control strategies, within the maximum APMM design limits. These selections are implemented using the interactive tools provided by both the TDC 3000^X Universal Station and Universal Work Station.

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* Institute of Electrical and Electronics Engineers

** International Standards Organization

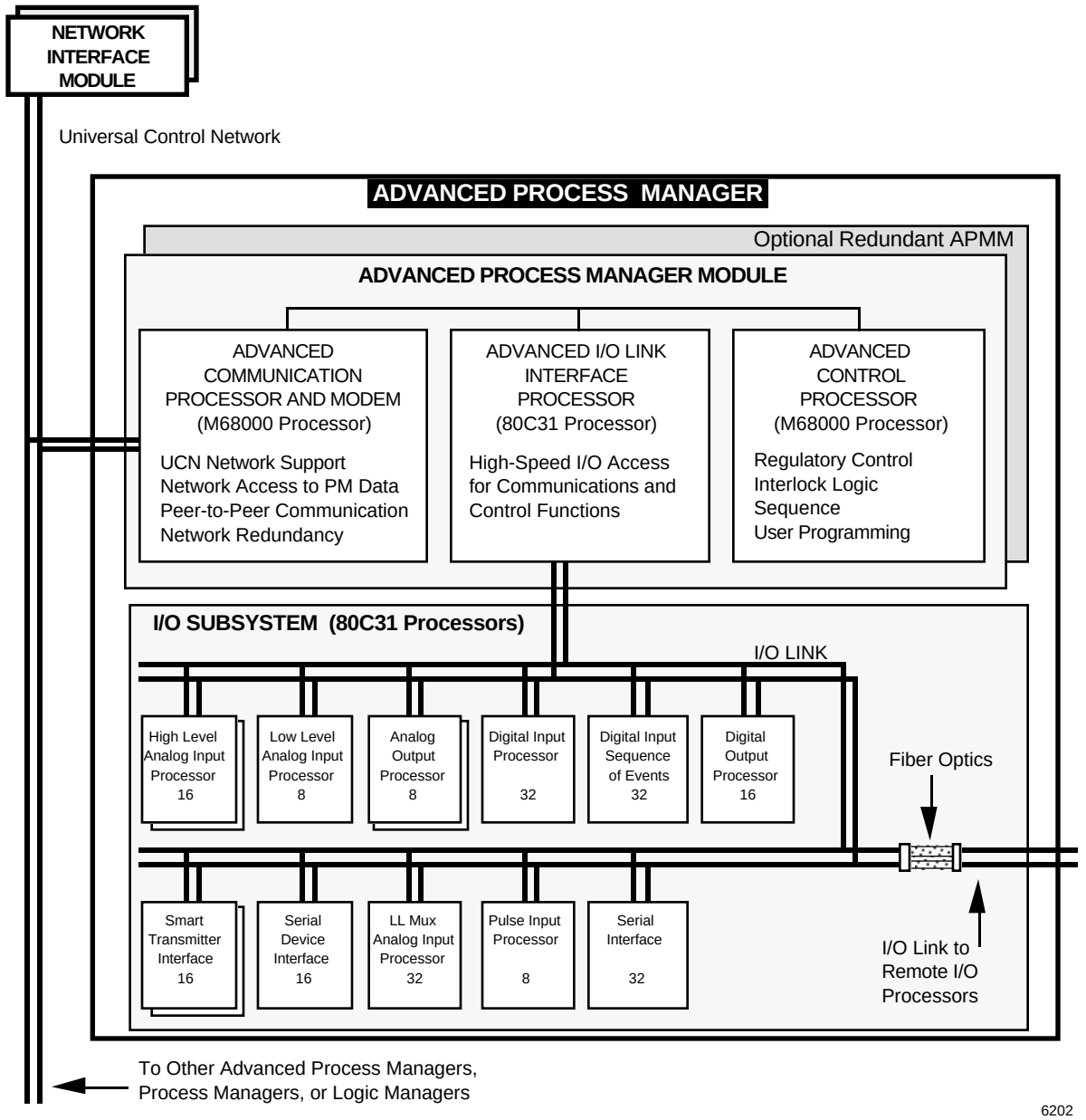

Figure 3 — APM Architecture

Control Functions

The Advanced Process Manager Module (APMM) provides a variety of control tools that can be customized to address a wide range of process automation needs.

Functions, from I/O scanning through regulatory and logic control to more advanced control, can be easily implemented through the APM. Included are a sophisticated regulatory control package, fully integrated interlock logic functions, and an advanced process engineer-oriented Control Language (CL/APM).

CL/APM is an enhanced version of the Control Language implemented by Honeywell in the Process Manager. This language facility includes the sequence structures needed to handle batch or hybrid applications as well as the computational capability needed for some continuous control tasks. Key to the power of this control capability is the sharing of the data within the APM, and sharing of data from other devices on the Universal Control Network.

All I/O values are converted to engineering units by the I/O Processors and are made available for both communications and further control processing by

the Advanced Process Manager Module (see Figure 4).

Conceptually, the APMM can be thought of as partitioned into "slots" of various types. These slots provide an allocated resource of processing power and memory that can be user-configured, including assignment of a tag name.

A tagged slot is referred to as a *data point* in a TDC 3000^X system. This data point structure is supported by predefined group and detail displays as well as by custom graphics.

Any of the following types of data points can be configured into APMM slots:

- Regulatory PV
- Regulatory Control
- Digital Composite
- Logic
- Device Control
- Process Module
- Array
- Flag
- Numeric
- Timer
- String
- Time

Each of these data point types is discussed in the text that follows.

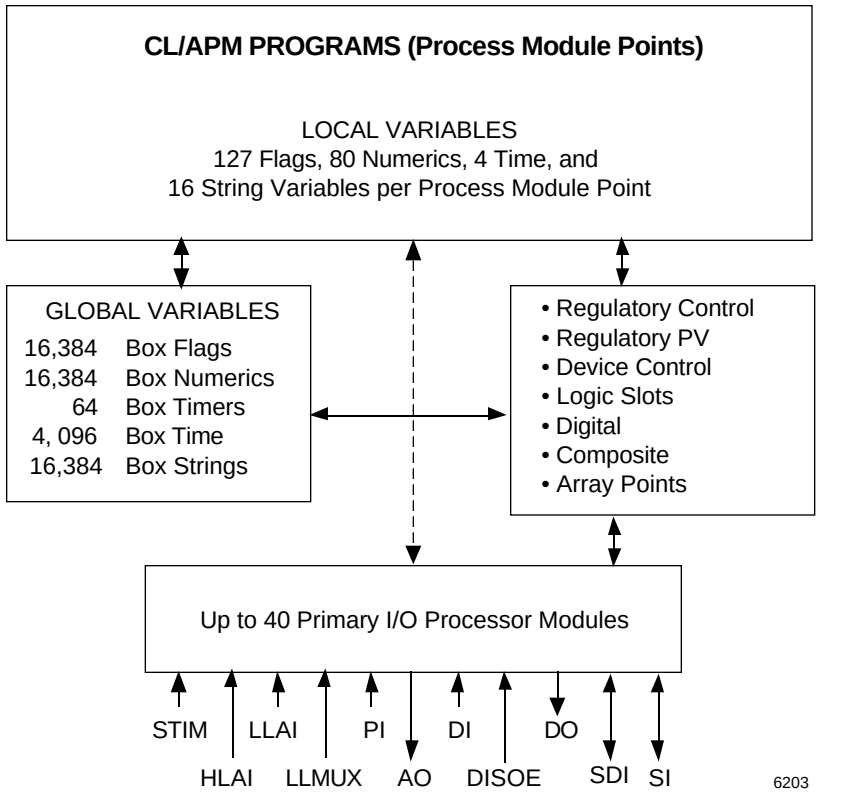

Figure 4 — Advanced Process Manager Functions

Regulatory PV Point

While standard I/O functions such as engineering unit conversion and alarming are handled directly by the I/O Processors, Regulatory PV points provide an easy-to-use configurable approach for implementing Process Variable (PV) calculation and compensation functions. PV processing provides a menu of selectable algorithms such as mass flow, totalization, and variable dead-time compensation. In addition, a full array of selectable functions, including extensive alarm checking and alarm suppression options, signal filtering, and algorithm equation

Table 1 — Regulatory PV Points

Available Algorithms	Supported Functions
Data Acquisition	PV Source (Auto, Manual, Substituted)
Flow Compensation	PV Clamping
Middle-of-3 Selector	EU Conversion and Extended PV Range
High/Low/Average Selector	PV Value Status and Propagation
Summer	PV Filter (Single Lag)
Totalizer	PV Alarming Bad PV PV High/Low PV HiHi/LoLo PV Significant Change PV Rate-of-Change +/-
Variable Dead Time with Lead/Lag	
General Linearization	
Calculator	