Honeywell

History Module Specification and Technical Data

HM03-500
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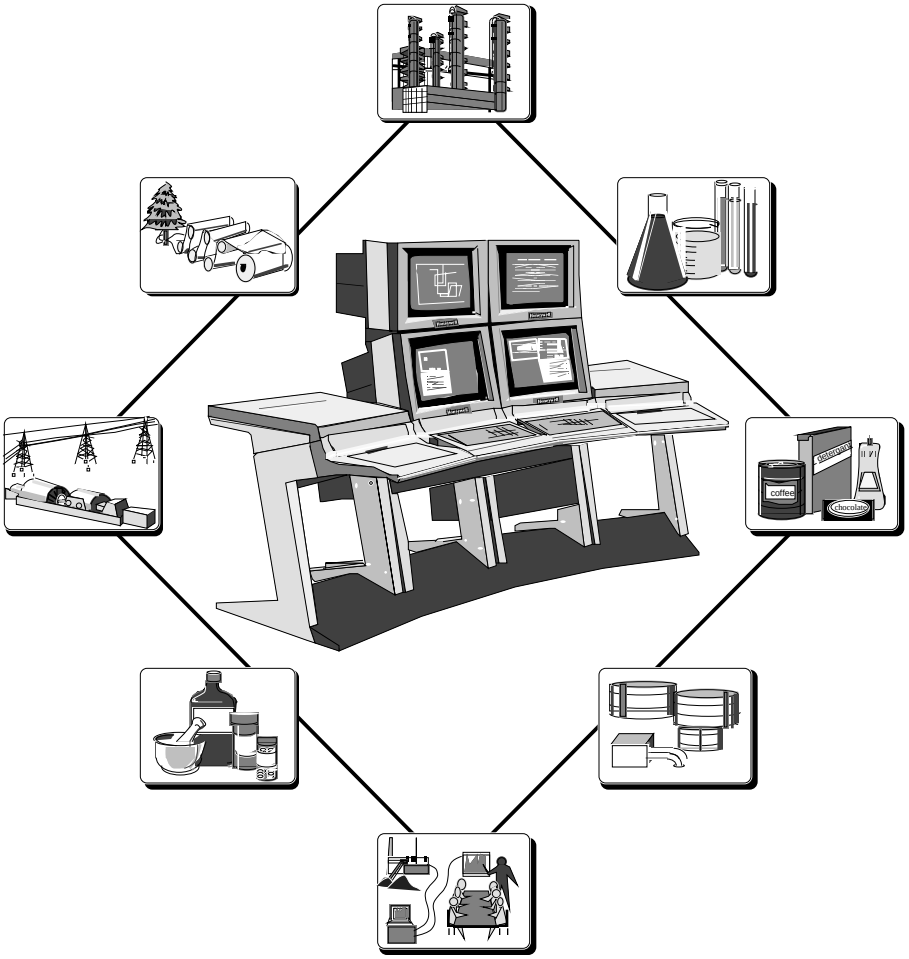

Total Plant

TDC 3000X History Module

Specification and Technical Data

Introduction

This publication defines the significant functions of the History Module, which is a TDC 3000X module that provides mass storage for information, including historical data.

The History Module (HM) is one of the modules on the Local Control Network (LCN) shown in Figure 1. The History Module can communicate with all modules on the Local Control Network and with the process-connected devices on the Universal Control Networks and Data Hiways. It stores process and system information that can be displayed or printed at a TDC 3000X Universal Station, or accessed by a Computing Module on the LCN, or accessed by another LCN via a Network Gateway. See *System Technical Data* for more information on the History Module's relationships with other modules and boxes.

History Modules significantly extend the capacity of the TDC 3000X system to store historical plant and process information. Host computers connected to the LCN through a Computer Gateway or Plant Network Module can use the stored information to perform data reductions and calculations required by various plant departments.
All the information that is stored in the History Module is formatted by the process engineer during system configuration, so that various plant departments have the information required to perform their specific tasks. For example:

- **Operations** may need historical data of certain process variables collected as time-averages on an hourly, shift, daily, and monthly basis to guide them in their day-to-day operating decisions. Storage of discrete data samples can be configured to augment the historical

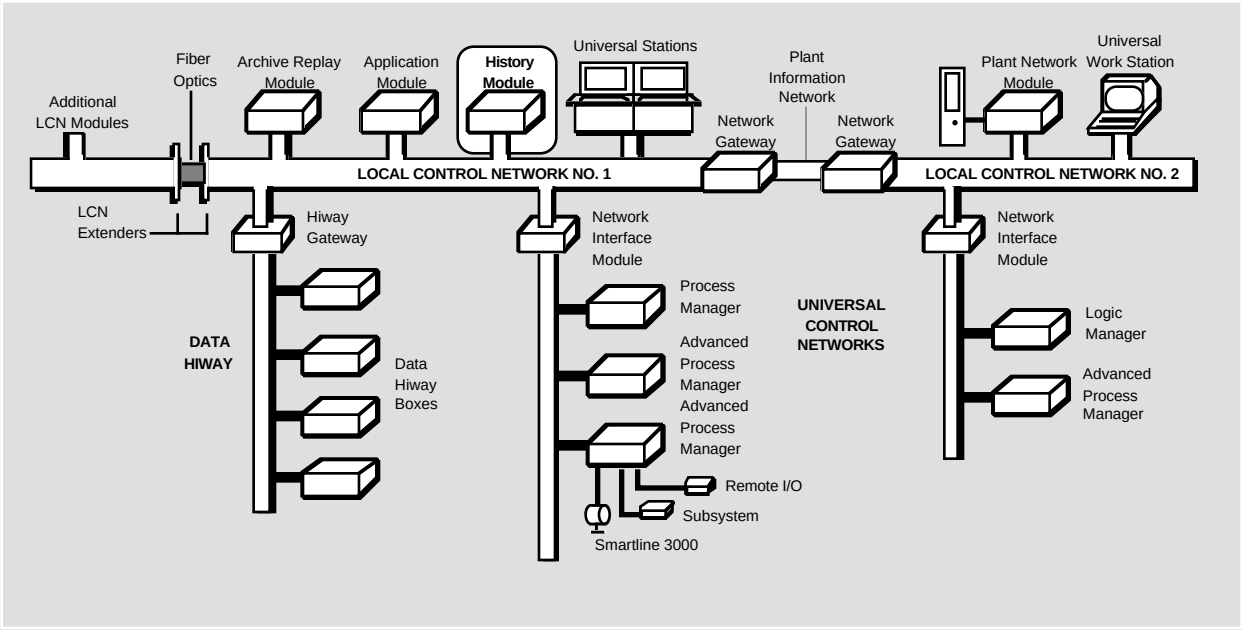

Figure 1 — TDC 3000X Architecture with History Module

averaging. In addition, process event histories can be collected.

- **Engineering** may need process or event historical-data that is collected during a given interval of time, to establish base cases or to perform plant tests. The historical data can be formatted so that it is gathered by areas of interest such as one reactor or all heat exchangers.

- **Management** may need historical data to determine the current condition of the plant, to make decisions involving schedules and costs. This historical data can consist of process throughput rates, totals, and costs that are periodically sampled and averaged.

- **Maintenance** may require historical data arranged according to the individual pieces of process equipment. This historical data can also consist of event journals of all system errors, failures, and maintenance actions. Analysis of errors can also be done.

- **Quality Control** may require historical process-data to evaluate product quality. The results of these evaluations can become part of the plant operating history.

New History Module Features

New History Module Features in R500 (or higher) LCN Software

- Supports large capacity disk drives. (Only R5xx

LCN software provides user-available drive capacities greater than 512 MB per drive)

- Very fast access volume search using AVL (binary search) feature
- Faster History and Journal access (using K4LCN processor). *Only R5xx LCN software supports K4LCN processor*
- Maximum volume size = User-available disk capacity. (In R4xx and earlier LCN software releases, max. volume size was restricted to 99,999 KB)
- Automatic detection of duplicate directories

Functional Description

As shown in Figure 2, history and journal information stored in the History Module is available for display or printing at the Operator's Console or for access by a Computing Module through the Local Control Network.

The operations of the History Module are controlled by the TDC 3000^X system according to instructions given by the process engineer during configuration.

Information Stored in the History Module

Functional allocation of storage areas in History Modules is set by the process engineer during system configuration. Storage requirements for a system vary according to the desired functional capabilities.
Some of the factors affecting History Module size requirements are:

- What "system" functions, such as storage of loadable software images, are assigned.
- Number of modules on the Local Control Network.
- Number of process-connected boxes on Universal Control Networks and Data Hiways.
- Number of points needing historization.

FUNCTIONS

The History Module serves as a system-wide, multiuse mass-storage facility. If so configured, a History Module can store:

- Continuous process History
  - Sample Data
  - Averages
- Event Journals (history)
  - Process Events
  - TDC 3000^X System Events
  - Sequence of Events
- Active System Files
  - Graphic Display Abstracts
  - Database Checkpoints
  - User Files (e.g., CL)
  - System Configuration Files
- Static System Files
  - Loadable Software Images
- On Process Analysis Program (maintenance aid)

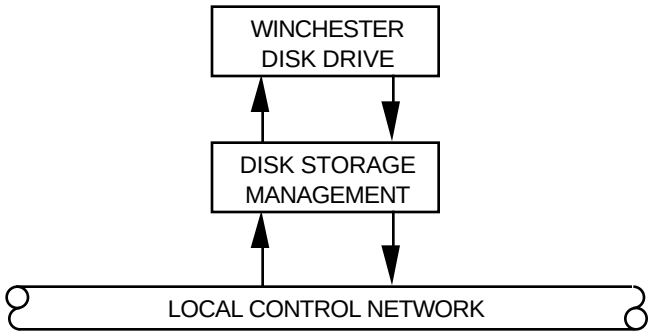

Figure 2 — History Module Elements

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- Length of history-storage requirement for snapshots and user averages.
- Amount of journal history required.

A typical allocation for a single drive History Module is shown in Table 1.

Table 1 — Sample Storage Allocation (Single Drive WDA-Type History Module)

NOTE: Applies to a typical system composed of one operator console containing four Universal Stations, with one redundant Network Interface Module, one Application Module, and one single-drive WDA-type History Module (875 megabyte capacity).

Continuous-Process History	For up to 2400 data points: • 1-minute snapshots for last week, and • 12-minute averages for last week For all 2400 data points: • Hourly averages for last week • Shift averages for last two weeks • Daily averages for last month • Monthly averages for last year
Event-History Journals	16 process units for this HM: • 5000 burst events • 5000 SOE events • 9999 system status changes • 2500 system errors • 2500 system maint. events For each process unit: • 1000 process alarms • 200 process changes • 200 operator messages
Schematic-Display Abstracts	Dependent upon space available.
Logs	Up to 100 pages or up to 30 of the free-format type
Loadable Software Images and System Files	US, NIM, AM, and HM
Loadable Database	1 Universal Control Network (NIM and Process Managers) 1 process area (1 console) 1 Application Module 1 History Module
User Space	For display building, point building, etc., • up to 20 displays at one time, • up to 1000 NIM points, • up to 200 AM points, and • up to 50 20-line CL programs

Continuous Process History

If a History Module is configured for continuous history, the values for up to 2400 data point parameters specified by the process engineer are collected at 5-second, 10-second, 20-second or 1-minute sampling rates and used to calculate and save various types of averages. Refer to *History Capacity* in the 'Specifications' section of this document for examples of large configuration history data collection.

The following base averages are maintained:

- Hourly averages for one week
- 42 shift averages (2 weeks at 3 shifts per day)
- Daily averages for one month
- Monthly averages for one year

Optionally, and subject to available space, discrete data samples (snapshots), and/or averages for one user-specified period between 3 and 30 minutes, can be computed and stored. Configurable retention times for these options range from 8 to 999 hours.

Event History

Event history for up to 36 process units can be stored in the History Module. Event history consists of process alarms, operator process changes, system changes, operator messages, SOE events, system-error journal, and system-maintenance journal.

Configuration of the number of events to be kept (e.g., last 500) allocates the memory space required.

Display Abstracts

Space can be allocated to store custom graphic-display abstracts in a History Module (the abstracts contain all of the display image except the dynamic information that appears on the display). The number of abstracts stored is defined by the user.

The number of display abstracts each area's database can accommodate is limited to 999 abstracts. Additional abstracts can be kept in other volumes to be searched based on area configuration.

Loadable Software Images

The History Module can also be configured to store software images, thus allowing modules on the LCN to be loaded from the History Module (rather than from floppy or cartridge disks) after a simple command from the operator.

Database

Information on the data content of the equipment on the Local Control Network, Universal Control Network, and Data Hiway is stored in the History Module and can be quickly uploaded (checkpointed) and downloaded through simple commands from the operator. This database storage is used each time a point-owner module is loaded with its software image (HG, NIM, AM, PLNM) and any time a process-connected device is reloaded (Hiway box or UCN node).

General Files

These files are source files for Control Language (CL), data-point building, and user text files.

On Process Analysis Program

This program performs periodic analysis of accumulated errors for each module on the LCN and issues replacement recommendations if an Optimum Replaceable Unit (ORU) has exceeded predefined error-frequency limits. These recommendations are presented to the Universal Station operator and are entered in the maintenance journal.

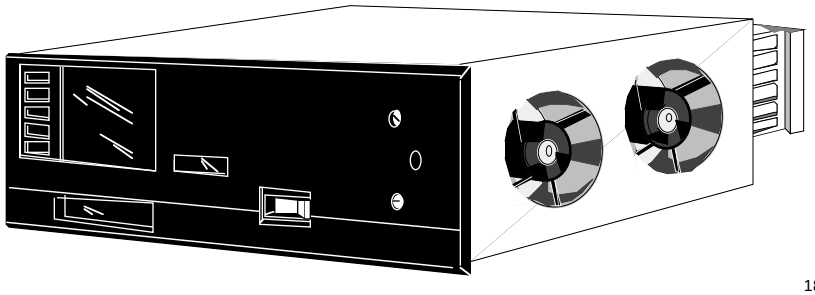

Figure 3 — TDC 3000^X 5-Slot Enclosure

Tool Kit Displays

Two optional tool kits (DIA1 for LCN cable statistics and TLK1 for various node operation information) can also be put on the History Module. These displays allow engineers and operators to better understand the LCN operations.

Options

The number of History Modules needed for a specific system varies according to system size and functionality. Typically, one History Module is used for each Operator Console in a TDC 3000^X system so that the Operator Console and History Module handle one process area. It is also possible for two consoles to share a History Module, or for several History Modules to serve one console, as required by the quantity and mix of process data points that are to be handled.

Up to 20 History Modules can be configured on a Local Control Network.

Physical Description

5-Slot Configuration

The History Module consists of a 5-slot electronics enclosure with Winchester disk drives mounted on one (or two) drive trays and installed in a chassis assembly (WDA) in the upper two slots. The 5-slot enclosure also contains all required electronic boards and a power supply.

The disk drives and electronics module are mounted on a plug-in board and connected to the electronics by cables. The electronics module connects to the Local Control Network (LCN) using standard LCN coaxial cables and connectors. For a full description of the 5-slot enclosure, see the latest *System Technical Data.*

The History Module can be configured as:

- Single drive, nonredundant
- Dual drive, nonredundant
- Single drive, redundant
- Dual drive, redundant

History Modules configured with redundant disk drives have two drive trays installed containing up to four drives in a single chassis assembly (WDA).
One set of disk drives can be removed without affecting the other set of drives in History Modules with redundant drives (single- or dual-redundant), because each tray has its own power switch.

The disk drives are sealed and cannot be repaired in the field. They can, however, be replaced. If a disk drive fails and must be replaced, the tray with the failed drive can be easily removed from the chassis assembly (WDA) and the disk drive exchanged.

Redundant configurations support on-line maintenance. All drives within a single History Module must be identical for it to function properly.

All new-built History Modules are currently supplied from the factory with 875 MB disk drives only.

A single 875 R5xx MB disk drive has a storage capacity of 875.044 megabytes and a dual disk drive has a capacity of 1750.088 megabytes. These sizes are referred to as 875 megabytes and 1750 megabytes for simplicity.

It should be noted that R5xx LCN software is required in order to utilize all of the 875 megabyte disk drive capacity. When a History Module with 875 MB disk drives is used in a system running earlier LCN software releases, only 512 megabytes storage capacity per drive will be realized on R43x and R410, and 136 MB per drive on R3xx and R2xx releases.

Please refer to 'Specifications' for details on user-available drive capacities on systems running R4xx or earlier LCN software releases.

History Modules are available in a choice of two standard processor boards: The K4LCN board version requires R5xx LCN software, while the K2LCN board version is compatible with earlier LCN software releases (R320 or later).

History Module Specifications

Physical Characteristics

	Approximate Dimensions (5 Card Module)		Approximate Weight
History Module (including 5-Slot cardfile, electronics, disk drives, etc.)	Height Width Depth	18.8 cm (7") 48.3 cm (19") 53.3 cm (21")	21 kg (46 lb)

Power Options

Universal AC Input

102-264 Vac (autoranging)

47-63 Hz (frequency range)

The History Module operates without disruption through an interruption in the ac voltage of up to 40 ms duration.

875 MB Disk Drive Characteristics

Memory Capacity (Formatted Data)

Single drive:	875 megabytes* (exactly 875.044 megabytes or 896,046 kilobytes)
Dual drive:	1750 megabytes* (exactly 1750.088 megabytes or 1,792,092 kilobytes)

* A megabyte = 1024 k bytes = 1,048,576 bytes (1024 x 1024 bytes)

Average Seek Time (Typical)	11.4 milliseconds (average of 'read' and 'write' times)
Average Latency Time	5.54 milliseconds
Error Correction	Retries, generation and checking of check codes, correction of burst errors of up to 48 bits.

Read Error Rates

Unrecovered Data	<1 sector in 10^{14} bits transferred
Miscorrected Data	<1 sector in 10^{21} bits transferred

Seek Error Rate	<1 per 10^{7} physical seeks

User-available memory capacity depends on LCN system software release, as follows:

R5xx	875 MB per disk drive
R43x & R410	512 MB per disk drive
R40x & R420	417 MB per disk drive
R3xx & R2xx	136 MB per disk drive

History Module Specifications (continued)

History Capacity

The maximum amount of history that can be configured on a single History Module is determined by two parameters entered using the *Volume Configuration* target on the Engineering Menu. The parameters are:

- The number of groups configured for 60, 20, 10, or 5 second collection intervals where a group is equal to 20 points.
- The number of optional snapshot and/or user average hours configured for each group where a group is equal to 20 point.parameters.

Every configuration contains the following base averages:

- 1 Week of Hourly Averages,
- 42 Shift Averages,
- 31 Days of Daily Averages, and
- 12 Months of Monthly Averages.

The two examples below represent large continuous history configurations. The drive capacity utilization is based on user-available memory capacity of 875 MB (on R5xx LCN systems).

This configuration will fill one 875 WDA disk drive to 99% of its capacity:

Snapshot Interval	Number of Points	Snapshot Data	6 Min. User Averages
60 seconds	2400	820 hours	820 hours

This configuration will fill one 875 WDA disk drive to 88% of its capacity:

Snapshot Interval	Number of Points	Snapshot Data	6 Min. User Averages
60 seconds	820	999 hours	999 hours
20 seconds	240	960 hours	960 hours
10 seconds	120	480 hours	480 hours
5 seconds	60	240 hours	240 hours

Configuration Capability

Maximum Number of HMs per LCN: 20

History 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)