

## I/A Series® Software Historian



*Historian software collects, stores, processes, and archives process data from the control system to provide data for trends, Statistical Process Control (SPC) charts, logs, reports, spreadsheets, and application programs.*

The I/A Series Historian software is an easy-to-use data collection tool that allows the user to organize and enforce a plant data collection philosophy. The Historian software provides extensive data collection and management functions, and data display functions for use by process engineers or operators.

Typical historical data are process analog and/or digital variables (points). Historian software can also collect and display application generated messages.

You can use Historian software to collect data in support of the following production control functions:

- Cost accounting
- Equipment performance analysis
- Historical trending
- Information retrieval
- Inventory management
- Legal record maintenance
- Lost time analysis
- Maintenance reporting
- Material accounting
- Process analysis
- Production reporting
- Quality control.

The Historian software is an integral part of the I/A Series production control domain (refer to Figure 1). Historian software can:

- Retrieve variables from process databases or accept data from production control databases maintained by user application programs
- Perform built-in calculations on the collected data
- Store calculated (reduced) data in a real time, relational database.

Application software in a plant-wide control system can access the Historian database to obtain historical data for process control, production control, and management information reporting.

You can use SPC chart displays of Historian data to monitor process variables on-line via the Statistical Process Control Package (SPCP).

You can build displays for trending historical data via the Display Builder and Display Configurator with Trending software (refer to the Human Interface PSS 21S-2B1 B3).

Using the I/A Series software or Ace Report Writer, you can generate detailed reports of historical data for management information.

Examples of I/A Series industrial software that interface with the Historian software are:

- Batch Plant Management
- Data Validator
- Display Manager
- Display Configurator with Trending
- Object Manager (for process data histories)
- Operator Action Journal
- Operator Message Interface
- Real-Time Database Manager
- Spreadsheet
- Statistical Process Control Package
- System Monitor
- Report Writer.

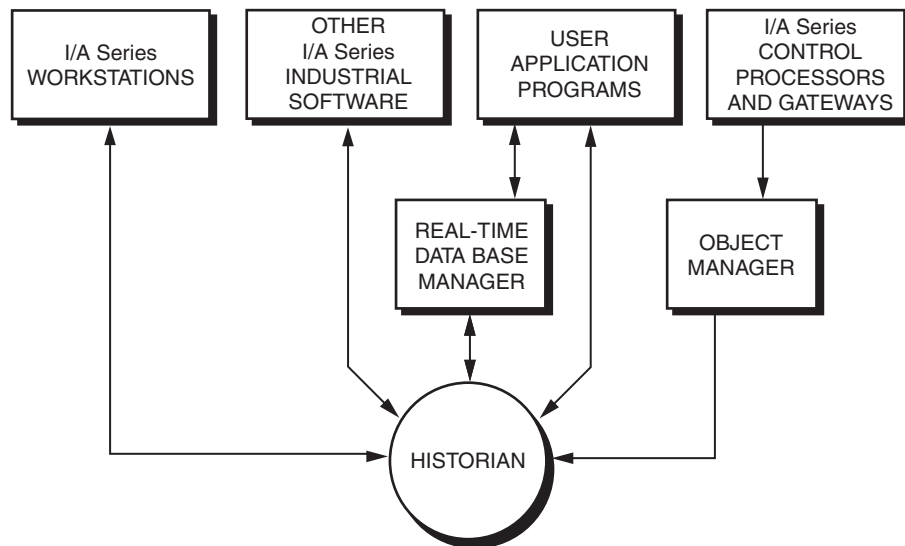


Figure 1. Historian Software Application Diagram

Historian software operates on an I/A Series Application Processor (AP) or an Application Workstation (AW).

Multiple independent Historian programs may be distributed within an I/A Series network; however, you cannot install multiple Historian programs in the same application processor.

For trending purposes, workstation displays can access historical data from multiple distributed historians on an I/A Series network.

### FUNCTIONAL OVERVIEW

Historian software performs four basic types of functions (refer to Figure 2 and Figure 3):

- Collects and historizes data from I/A Series control processors and gateways, I/A Series industrial software, and user application programs, as specified by the Historian software configuration database.

- Performs calculations on the collected historical data to reduce it to another form (reduced data).
- Manages historical data collections to satisfy the needs of various application programs, as specified by the Historian software configuration database.
- Retrieves historical data in support of other I/A Series industrial software.

The Historian software consists of three basic parts:

- Workstation interface
- Data collection
- Application interface.

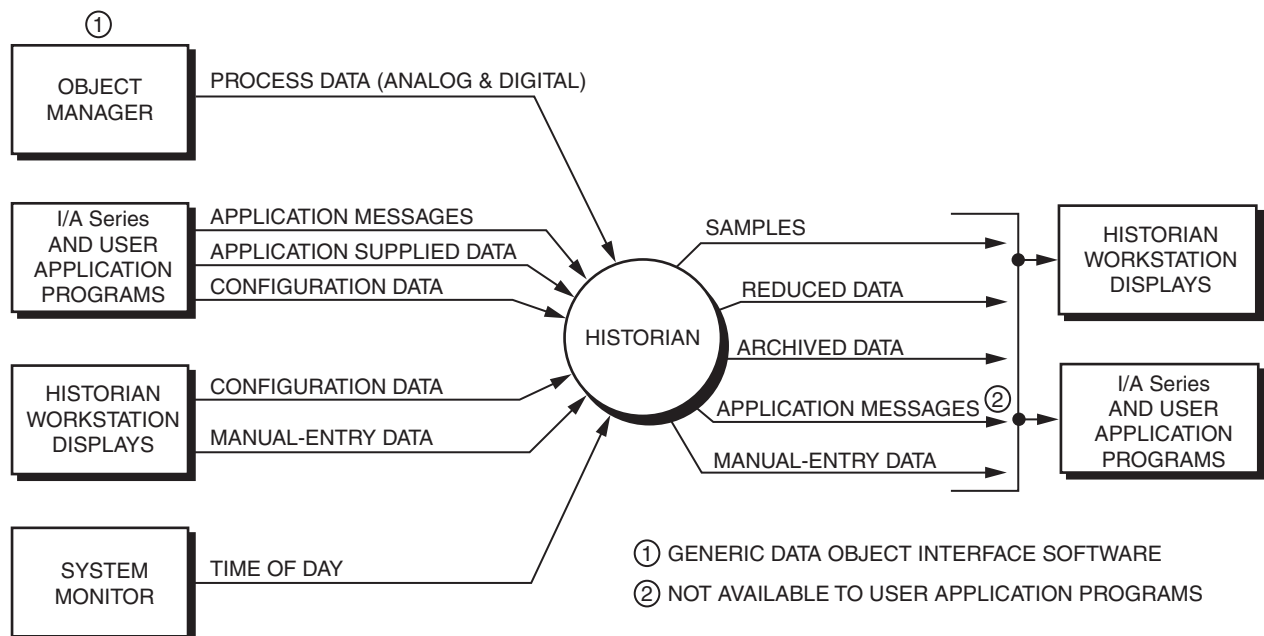
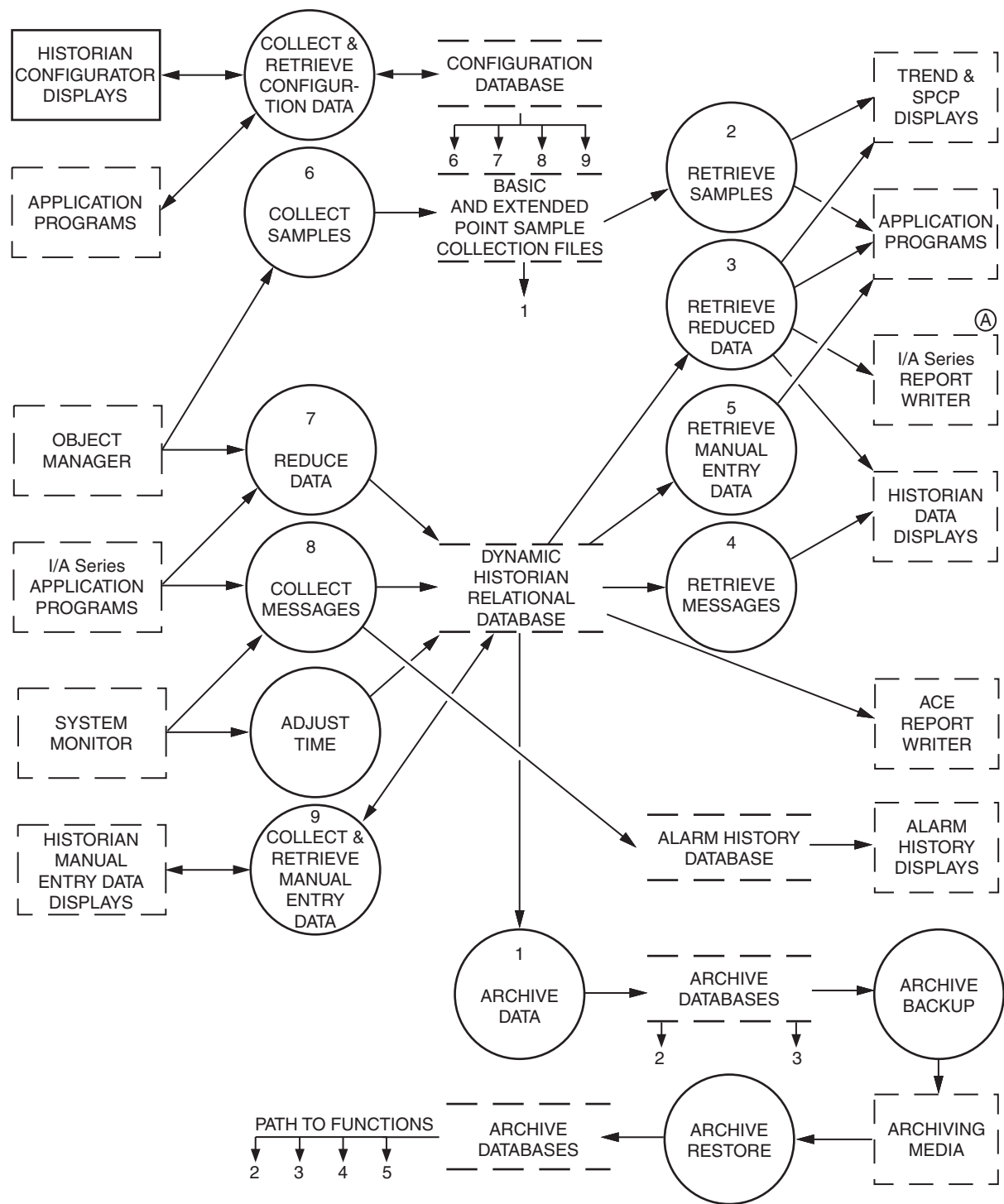


Figure 2. Historian Software Data Flow



Ⓐ I/A Series REPORT WRITER CANNOT RETRIEVE REDUCED DATA RESTORED FROM ARCHIVES.  
--- = EXTERNAL TO THE HISTORIAN SOFTWARE.

Figure 3. Historian Software Functional Block Diagram

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## Workstation Interface

The Historian workstation interface allows users to access Historian software functions via I/A Series industrial workstations. It is a menu-driven system that is selected from menus in the user's environment. From a workstation, the user can easily configure Historian software operations for the desired data. The user specifies how much of each type of data the Historian is to maintain (e.g., hourly averages for a week). The user can add or delete variables from the Historian software configuration database at any time.

From a workstation, the user can easily start, stop, and schedule Historian software operations (e.g., sampling and data reduction) as needed for each application program. The user can easily retrieve and display historical data via the workstation.

## Data Collection

Historian software collects four classes of data:

- Samples
- Reduced values
- Messages
- Manual-data-entry (MDE) values.

Point samples are collected in separate files, one for each point.

The Historian software has four types of user-configured, data-collection groups:

- Reduction
- Message (predefined groups only)
- MDE
- Archive.

You can create multiple groups for reduction, MDE, and archive group types. Historian software includes predefined message groups required to support I/A Series software, e.g., System Monitor and Operator Action Journal.

You select process variables as members of the point sample collection. You can specify extended sample collection for members of the point sample collection.

You select members of the point sample collection as members of reduction groups. Reduction groups can be nested to form cascaded groups whose members are other reduction groups.

You can configure (create) MDE variables, and then, assign them as members of MDE groups.

You select members of the extended sample collection, reduction groups, cascaded reduction groups, or message groups as members of archive groups.

Historian software uses the Real-Time Database Manager to organize data that it collects for reduction, message, MDE, and archive groups. This allows application programs to use the I/A Series software or Ace Report Writer for reporting historical data.

## Application Interface

For more flexibility, the Historian application interface allows user-written programs to access the Historian database for advanced applications. The Historian library contains subroutines that allow application programs to configure data collection and retrieve historical data via calls to these subroutines. The Historian application interface allows you to use the Historian software without understanding the Historian database scheme.

**WORKSTATION INTERFACE FUNCTIONS**

The Historian workstation interface is menu-driven. Figure 4 shows the Historian workstation interface menu structure. The available Historian software functions are:

- Configuration
- Scheduling
- Data display
- Archiving
- Manual data entry/edit.

The Historian displays allow you to move through a hierarchy of menus from which you select the desired function. These displays provide forward and backward scrolling of data list menus and editing options where they are required. The Help function opens a window of Help text on the display when you select “Help” from the system menu bar.

**Configuring the Historian Software**

You configure Historian software from a workstation or an application program. You can configure the following types of data collections:

- Point sample collection
- Reduction groups
- Message groups (predefined groups only)
- Archive groups
- MDE groups.

For these data collections, you can configure:

- Point collection members
- Groups
- Group members
- Reduction group operations
- MDE variables.

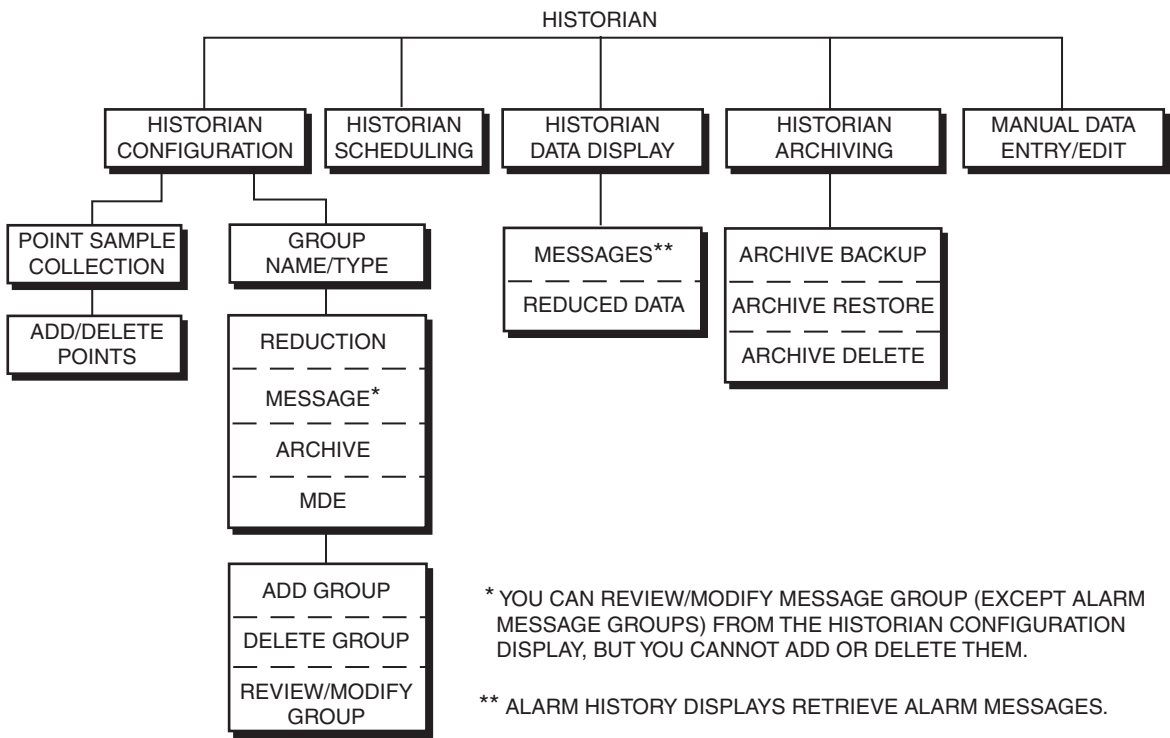


Figure 4. Historian Workstation Interface Menu Structure

For the point sample collection, you can add or delete points from the collection and select one of nine update times for each point. For reduction data, you define the groups, group members, and reduction operations. For archived data, you define the groups and group members. For MDE data, you define the variables, groups, and group members. Message groups do not have group members and you cannot delete these groups.

### Controlling Historian Software Operations

From a workstation you can:

- Start and stop Historian software
- Start, stop, or clear and restart data collection for each reduction, archive, and message group.
- Get the operational status of each reduction, archive, and message group.

Point sample collection automatically starts when the Historian software is started.

### Displaying Historical Data

The Historian data display function allows you to produce tabular displays of historical data on a workstation screen (refer to Figure 5). Selecting this function allows you to display:

- Sample point data
- Reduced data
- Messages
- Archived data
- Manual data.

The Historian software provides a set of displays to show a list of data groups in the historical database, to summarize the contents of the various data types, and to show, in the most detailed displays, the actual values or messages. The displays provide options for paging through data lists, and moving through the data hierarchy.

To display archived data, you restore the historical database from the archiving media. Then, you can display reduced data or messages from the restored database.






HISTORIAN: hist01 (PCAT00)						
HISTORIAN	HELP	REPORTS		SWITCH TO		EXIT
GROUP: casc_15 min						
POINT NAME: UC38_CNTRL01:PID001.SPT						
SUM	AVG	MIN	MAX	DATE	TIME	
102.0	10.2	5.0	15.9	12/31/91	10:10:00	OK
150.0	15.0	5.1	25.0	12/31/91	10:15:00	OK
210.0	21.0	5.2	25.2	12/31/91	10:20:00	OK
263.0	26.3	5.0	30.0	12/31/91	10:25:00	OK
250.0	25.0	10.0	35.0	12/31/91	10:30:00	OK
241.0	24.1	10.5	30.4	12/31/91	10:35:00	OK
202.0	20.2	10.0	25.0	12/31/91	10:40:00	OK
210.0	21.0	10.0	25.5	12/31/91	10:45:00	OK
200.0	20.0	5.9	25.5	12/31/91	10:50:00	OK
160.0	16.0	5.0	20.6	12/31/91	10:55:00	OK
<div><div></div></div>						

Figure 5. Tabular Display of Reduced Data

Users can also view sample, extended sample, reduction, and archived data using configurable trend objects contained in the Display Builder and configured through the Display Configurator (refer to the Human Interface PSS 21S-2B1 B3).

### **Archiving Historical Data**

From a workstation, you can back up and restore archive group data. The backup function allows you to store archive group data on streaming tape or diskette. The restore function allows you to restore archive data from these media.

### **SECURITY FEATURES**

You can modify and control Historian software operations through a workstation or an application program. You can configure the I/A Series software environment so that Historian software configuration and operation functions via a workstation are restricted to a particular user's environment, but you cannot restrict access to these functions via an application program.

### **COLLECTING DATA**

All process control points – global variables accessible through the Object Manager – that the Historian software is to collect are assigned to the Historian point sample collection. These global variables are either compound:block.parameters or shared variables created by I/A Series or user application programs. The Historian software also stores user-supplied data values in the specified reduction group/point location. The Object Manager is the generic data object interface between processors in an I/A Series network.

### **Point Samples**

The maximum number of points for sample collection is:

- 4000 points for the 50 Series AP/AW
- 500 points for the AP20.

Historian software stores point samples by:

- Point identifier
- Time stamp
- Value
- Status tag.

The Historian software connects to process points through the Object Manager which sends the Historian software an updated point data value (sample) when the point value exceeds the last stored value by a specified amount (deadband).

When configuring points into the historical database, you specify the change deadband for each point, and a minimum time threshold (update time) for storing changes. The historical point data is not updated until the specified deadband and update time have been reached. The available update times are: 1, 2, 4, 10, 20, and 30 seconds, and 1, 2, 5, and 10 minutes.

The Historian software stores the basic point samples on the system disk in circular files, one for each point. Each file contains up to 99,200 samples per point for the 50 Series AP/AW and up to 200 samples per point for the AP20. On the 50 Series AP/AW, the number of samples per point defaults to 600, but you can configure (extend) it up to 99,200 samples per point. When the maximum number of samples is reached, the Historian overwrites the oldest samples.

On the AP20, the Historian software supports extended sample collection, which allows you to collect up to 99,200 samples per point for the number of points determined by available disk space. This requires an optional second hard disk (capacity of at least 80 MB) that is dedicated to collecting extended samples, archiving them, and playing back these archives. The Historian software stores extended point samples on the optional hard disk in the same manner as basic point samples are stored.

For trend displays, recent history comprises up to 600 samples per point on the 50 Series AP/AW, and up to 200 samples per point on the AP20.

You can add or delete member points from the basic or extended sample collections on-line via standard displays.



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## Reduced Values

Historian software provides the following data reduction operations:

- Average
- Maximum
- Minimum
- Standard deviation
- Kurtosis
- Sum
- Histogram.

Reduced values are stored in an historical database at varying time periods (e.g., by hour, shift, day, or week). Beyond the data reduction functions provided by the Historian software, you can use your own programs for data reduction operations. The Historian software initiates the specified tasks that call standard application packages or your own programs to perform other calculations.

A cascaded reduction group uses input data from other reduction groups. The specifiable reduction operations for a cascaded group are: average, maximum, minimum, and sum.

You specify data reductions when configuring the Historian software or when requesting other functions through I/A Series application software. You can specify the minimum amount of data required for a data reduction operation and the time span for which you want to store reduced values.

The Historian software stores the data records for a reduction group in a database. When the maximum number of records specified by the configuration is reached, the Historian software deletes the oldest data values. To retain the data long-term, you can archive the reduction group.

Data reductions execute on a schedule which is set by a user or an application program. Scheduled executions can be delayed - specifying a delay factor allows leveling of the data reduction processing load on the application processor.

## Messages

The Historian software collects messages passed by I/A Series software to provide an information base for display by the Historian and use by other application software. For example, System Monitors send the Historian messages to indicate system alarm conditions. Control processors send the Historian messages to indicate process alarm conditions. Each message contains a message identifier, and one or more data fields in a specified format.

Historian software includes predefined message groups (formats) required to support I/A Series software, e.g., System Monitor and Batch Plant Management. You can specify the maximum number of messages to be stored for each message group, except for process alarms messages.

## Archives

The Historian software archiving functions allow you to store and manage historical data on streaming tape or diskette. This allows unlimited off-line storage of historical data. Archives consist of named databases, which can reside on several storage media to provide a continuous history. A time stamp is appended to the database name for later reference.

You can archive point samples, and reduction, cascaded reduction, message, and MDE groups over a specified time span. You specify the name, members, time span, and archive period for each archive group during Historian software configuration. You can archive any number of historical points or groups.

When the archive period is reached, the Historian software creates a new archive database for the archive group, and then deletes the old one, if it exists. The system then notifies the operator to back up the database through a message that is displayed on the message line of all Workstation Processors configured to receive the notification. The operator has until the next archive operation for that group to back up the archive database.

Historian software provides workstation displays for backing up, restoring, and deleting archive group data. The backup function allows you to store archive group data on streaming tape or diskette. The restore function allows you to restore archive data from these media. The delete function allows you to delete restored archives from the hard disk.

You can restore archive data in an application processor containing Historian software. You can then access the restored data through:

- Historian data retrieval displays
- Ace Report Writer
- Historian subroutine calls
- SPCP chart displays
- Trend objects on user displays

### **ADVANCED APPLICATIONS**

For more flexibility, user programs written in the "C" language can interface with the Historian software through calls to configuration, scheduling, and data retrieval subroutines in the Historian software library. A user-written program can interface with the Historian software to:

- Configure reduction and archive groups and modify message group configurations; for reduction groups, add and delete groups, group members, and operations.
- Perform bulk transfers of data values from user application programs to the Historian reduction database.
- Request or schedule data collection for reduction or archive groups.
- Retrieve point sample, reduced, and MDE data collected by the Historian software.
- Start and stop data reduction, message collection, and archiving.

An application program can use the historical database as a source of information for trend plots and reports. It can also use the Historian software to maintain a history of variables that can only be manipulated by the application program.

For example, a program may retrieve a group of historical reduced measurement values, statistically correct them, and return the results to another reduction group in the historical database.

Application programs can use the Historian software to manage a history of events or values and reduce and archive the data. Historian sample, reduced, and MDE data can be read by any program. The Historian software supports the following access functions:

- Get reduced data by group over a time span.
- Get sample, reduced, and MDE data by point for a time span or for a specified number of values.
- Get reduced data by operation over a time span.
- Get configuration information for a reduction, message, or archive group.
- Get configuration information for a reduction, or archive group member.

For even more flexibility, you can perform additional functions through user-written programs that use the Real-Time Database Manager.

### **INSTALLATION**

The Historian software is supplied on a set of diskettes, tape, or CD-ROM, which contain all necessary load modules, application libraries, Help files, automated procedures, and test databases.

You can install the Historian software on the I/A Series APs or AWs.

The Historian software supports extended sample collection on the AP20 but not on PWs. This requires an optional second hard disk that has a storage capacity of at least 80 MB. Extended sample collection is also supported on the 50 Series AP/AW, but does not require a second hard disk.

## FUNCTIONAL SPECIFICATIONS

### Installation

One Historian software per AP or AW.

On AP20, extended sample collection requires an optional second hard disk that has a storage capacity of at least 80 MB.

### Data Classes

Point samples, reduced values, messages, MDE values

### Group Types

Reduction, message, MDE, and archive

### Number of Collection Points

50 Series AP/AW - Up to 4000 points

AP20 - Up to 500 points

Number of collection points based on exception updates with minimum time threshold configurable at 1, 2, 4, 10, 20, and 30 seconds, and 1, 2, 5, and 10 minutes.

### Number of Samples per Collection Point

#### BASIC SAMPLE COLLECTION

Up to 99,200 samples per point for 50 Series AP/AW

Up to 200 samples per point for AP20

#### EXTENDED SAMPLE COLLECTION

Up to 99,200 samples per point for AP20

### Data Reduction Operations

#### NONCASCADED GROUP

Average, maximum, minimum, standard deviation, kurtosis, sum, histogram, user-programmed

#### CASCADED GROUP

Average, maximum, minimum, and sum

### Workstation Interface Functions

Configuration, scheduling, data display, archiving, MDE editing

### Application Interface Functions

Configuration, scheduling, data retrieval

### Storage Media for Archiving

Streaming tape or diskette

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