Honeywell

Universal Work Station Specification and Technical Data

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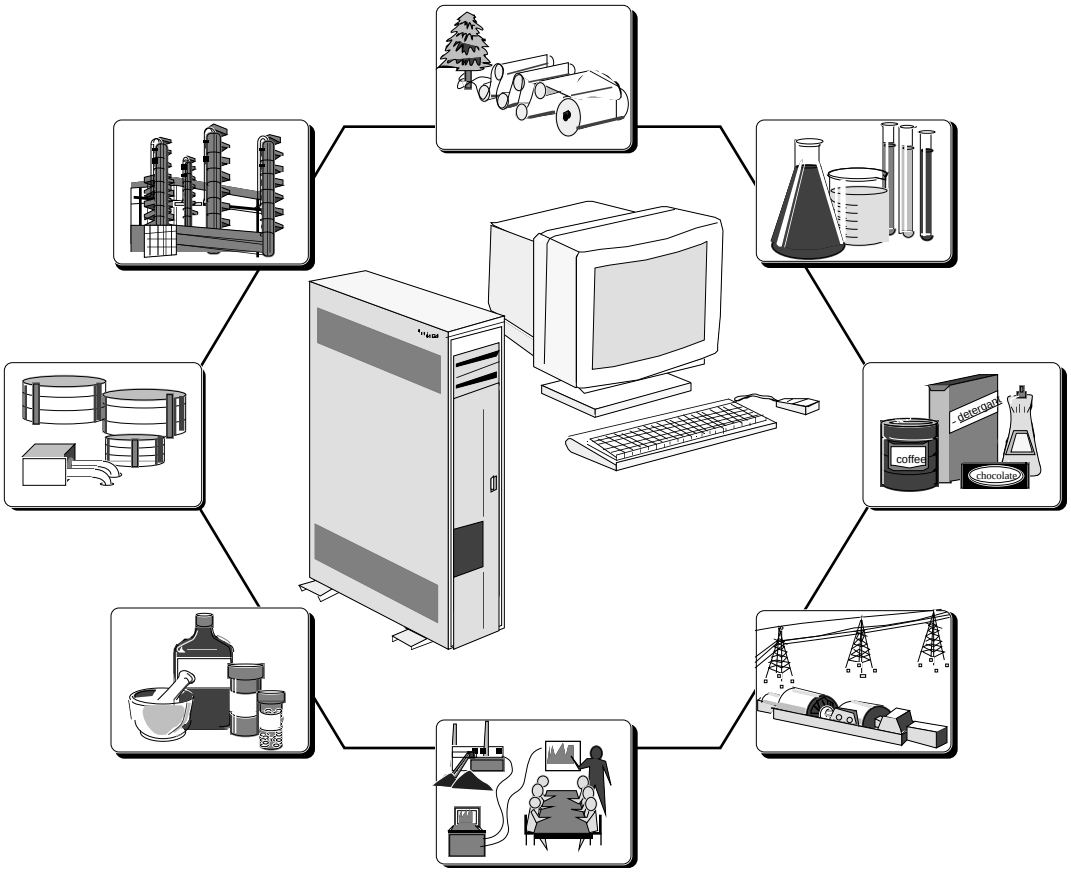

Total Plant

TDC 3000X Universal Work Station

Specification and Technical Data

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Introduction

This Technical Data defines the significant functions of the TDC 3000X Universal Work Station, which is an alternative human interface in the TDC 3000X System for users other than operators.

The Universal Work Station (UWS) is one of the modules on the Local Control Network (LCN). As Figure 1 indicates, the Universal Work Station communicates with other modules on its own LCN, modules on remote LCNs through the Network Gateway, process-connected devices on Universal

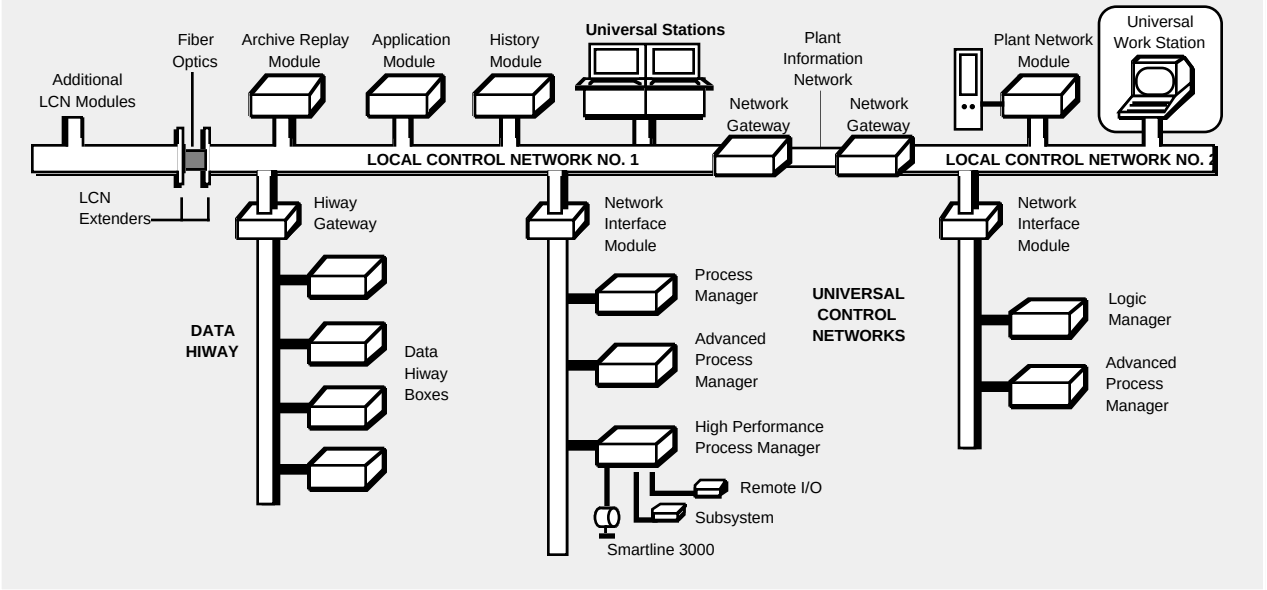

Figure 1 — TDC 3000 XArchitecture with Universal Work Station

Control Networks by way of the Network Interface Module, and with process-connected boxes on the Data Hiways by way of the Hiway Gateway.

The Universal Work Station, illustrated in Figure 2, like the Universal Station (see *Universal Station Specification and Technical Data*), provides a single window to the process. While Universal Stations are typically grouped together into a process operator's console located in a control-room environment, the Universal Work Station has been designed for placement in an office setting for the following users.

- **For the process engineer**, the Universal Work Station provides a universal window to configure the system database, build graphic displays, prepare Control Language (CL) programs, and to verify these entries.
- **For the maintenance technician**, the Universal Work Station provides a universal window to monitor system performance and to diagnose system failures.
- **For the process supervisor**, the Universal Work Station provides a universal window to monitor the process and the system in real time, and to retrieve historical data.

The base Universal Work Station consists of a desktop CRT, separate keyboard with enclosure, mouse, and desk-side electronics enclosure. To accommodate different user requirements, two versions of the UWS are available. One of these is intended primarily for process engineers and maintenance technicians, and the other for use by a process supervisor. Refer to **Physical Description** and **Optional Equipment** near the back of this publication for complete descriptions of the available UWS models.

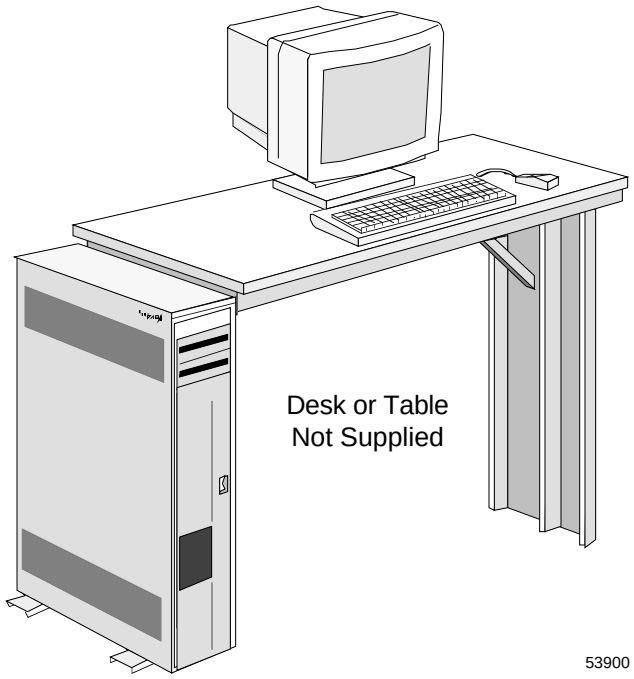

Figure 2 — Universal Work Station

Functional Description

The following are the major functions of the Universal Work Station:

- For the **process engineer**;
  - Build the process and system database, graphic displays, and reports.
  - Prepare, edit, and compile Control Language programs.
  - Load operating software and databases from a History Module, cartridges, or floppy diskettes.
  - Load Honeywell-supplied software updates.
- For the **maintenance technician**;
  - Diagnose problems in the LCN-based modules, Universal Control Networks, Data Hiways, and process-connected devices.
  - Display and print relevant information that is required during troubleshooting.
  - Display and print system hardware information; for example, board revision numbers.
- For the **process supervisor**;
  - Monitor processes or portions of a process, using standard displays or custom graphic displays.
  - Monitor process, sequence, and system alarms, and operator messages.
  - Display files.
  - Display and print process histories, trends, and averages.
  - Display and print reports, logs, and journals.
  - Monitor status of system equipment in the control room and near the process.

– Load other system modules with operating software and databases from a History Module, cartridges, or floppy diskettes.

Communicating with the Process and the System

The process engineer, maintenance technician, and process supervisor can communicate with the plant process and the TDC 3000X System. They can view the displays and make entries by using a keyboard or by selecting and activating a target on the screen, depending on the operation that is to be performed.

The Universal Work Station displays are identical to the Universal Station displays, which are designed to present information to the user in the best possible way. A combination of techniques ranging from traditional bar graphs to contemporary pattern-recognition designs, is used to accomplish this goal. Many displays have both dynamic and interactive areas. Dynamic areas contain information that is periodically updated or have graphic elements whose attributes may vary with the associated process values. For example, the color of a numeric or bar representation of a process value on a graphic display may change to red when the value reaches an alarm condition. Interactive areas accept entries from the keyboard or from targets on the display.

All displays, except the user-built displays where the user defines the data organization and display interrelationships, are standard displays that have predefined formats and interrelationships. The standard displays available for each type of user differ, because information needs are not the same. Engineers, for example, need displays that help to build graphic displays and construct reports. They also are likely to need access to the operator's displays for verification purposes. Maintenance technicians, on the other hand, need displays that are a guide through the diagnosis of a problem. A supervisor needs displays that help to monitor the area of the process for which he or she is responsible. Figure 3 shows the types of displays that are available for the users at the Universal Work Station.

In general, there are three ways to call up a display:

1. Use preassigned keys on the keyboard to call up a display,
2. Use user-configured keys on the keyboard to call up a display,
3. Activate a target on another display.

A number of keys on the Engineer's Keyboard, and Supervisor's Keyboard directly call up displays.

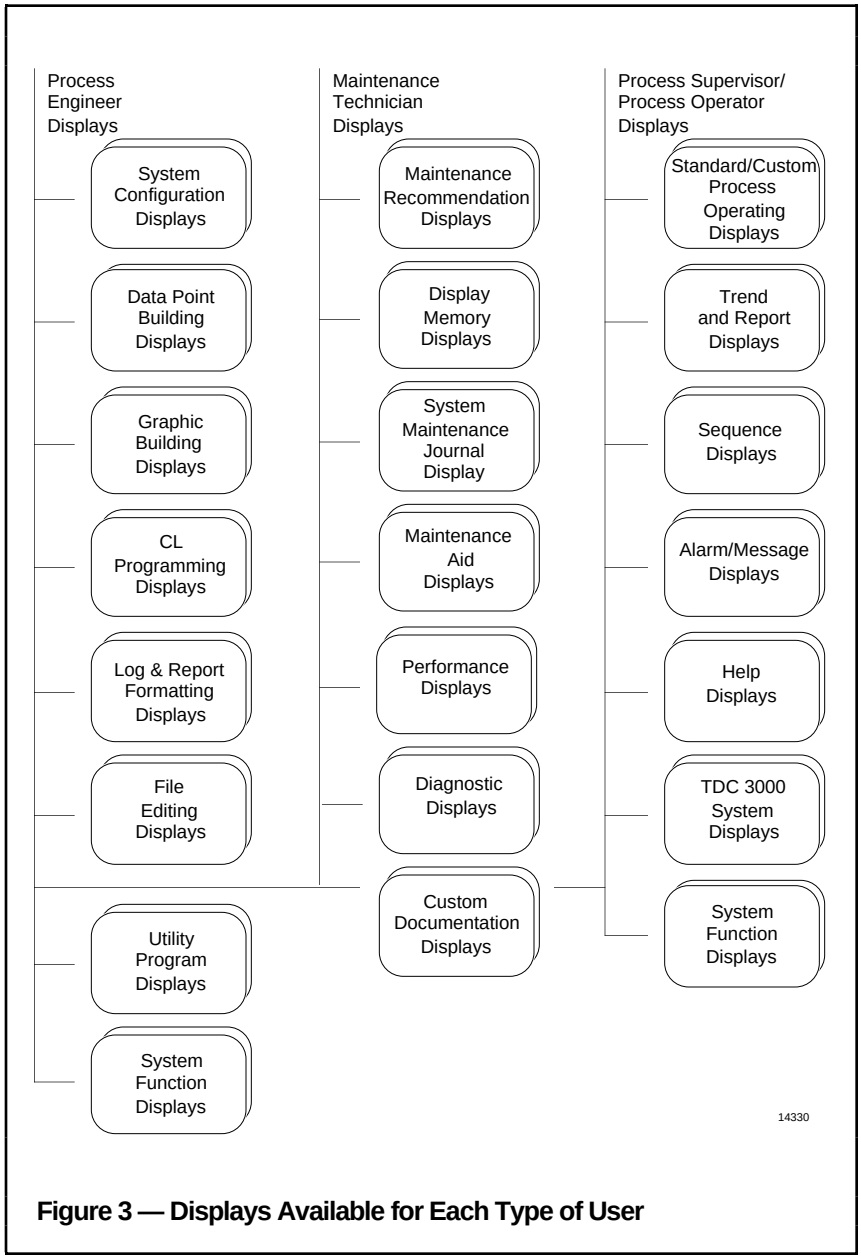

Figure 3 — Displays Available for Each Type of User

Some keys call up displays that are independent of what currently appears on the screen; others call up displays that are associated with the current display. A minimum number of keystrokes is required to call up a display. Frequently used displays can be assigned to one of the user-defined function buttons on the UWS keyboards so they can be called up with a single keystroke.

Optional peripherals such as the Cartridge Disk Drive, and printer are available for use with the Universal Work Station.

Cartridge Drives are used to load LCN modules with databases, to load operators' and engineers' software into Universal Work Stations, to load Honeywell-supplied software updates, and to save data generated by the process engineer and by the system itself.

The printer can be used to print copies of logs, reports, files, trends, journals, displays, and records of process, system, and sequence alarms. The printer also provides full-graphics screen copies for the station to which it is connected.

The mouse provides for a convenient means of quickly repositioning the cursor on the CRT screen for selecting and activating targets.

Operational Security

In the UWS, the control of access to the system is accomplished using configurable buttons. The user is able to configure buttons that set the access to any of three levels. When the UWS is started, it is put in the operator access level. This level can be changed by pressing a configured button. The three levels supported are:

1. **Operator Level**—permits a process operator to monitor and manipulate process parameters during normal operation, but does not permit changes to sensitive process parameters.
2. **Supervisor Level**—permits authorized personnel to alter certain configured sensitive process parameters and also permits all functions allowed at the Operator Level.
3. **Engineer Level**—permits a process engineer to perform all the process and system functions.

A fourth level of access (view only) can be configured. This level of access can call up displays to monitor the process and the system, but does not permit any data entry.

Over 30 functions are configurable into one of the three primary levels of access described above. This includes such functions as the following:

- Save and restore databases of process-connected devices.
- Load the database of an LCN module.
- Start up and shut down LCN modules.
- Enable/Disable history collection.

Another security check occurs whenever an entry is made. The system checks each entry to make sure it is the right type (alpha, numeric, etc.) and conditions are correct for the operation. If the entry is invalid, an audible error tone is generated and an appropriate error message is displayed in the operator-error field of the screen.

Process Engineering Functions

With an Engineer's Keyboard connected to the Universal Work Station, software that enables the engineer to build or modify, all or any part of, the database needed by the TDC 3000^X System to meet its established objectives is enabled.

The Universal Work Station employs a sophisticated forms-management capability that simplifies information entry. This capability provides easy-to-use, preformatted video-display forms to enter information for the building functions.

A Help facility is available to assist the process engineer as information is entered during the building of system structures such as points, displays, and reports.

The process engineer can do the following engineering-related functions:

- Configure the system database
- Build data points
- Build graphic displays
- Prepare, compile, and link Control Language programs
- Build logs and reports
- Edit files
- Use utility programs
- Call up System Function Displays

Configuring the System

Configuration data entry-related tasks are initiated through the Engineer's Main Menu (Figure 4), which is called onto the screen through a dedicated button on the keyboard. The Main Menu allows the process engineer to select from several groups of activities when configuring or reconfiguring the system.

1. **Network Configuration** activities include naming units, areas, and consoles; defining modules on the Local Control Network; and allocating space on the History Module for storage of data volumes. Network Configuration establishes places of

These engineering-related functions are accessed through the Engineering Personality Main Menu Display, which is the first display that appears after the process engineering software is loaded into the Universal Work Station. Following the selection of a function, the Universal Work Station provides the process engineer with access to the various features of that function.

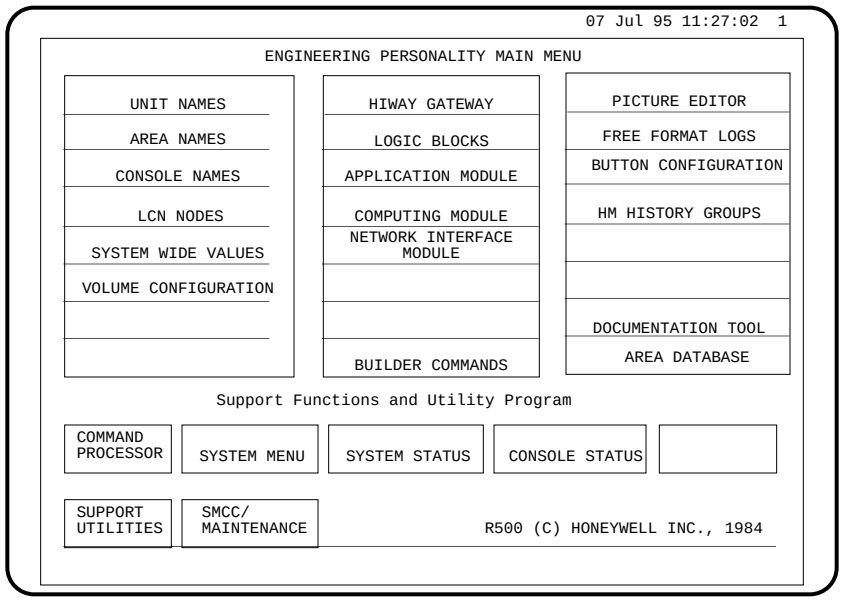

Figure 4 — Engineer's Main Menu

residence for the data points to be built.

2. **UCN/Hiway Configuration** activities include assigning interface modules to each Universal Control Network and gateways to each Data Hiway, defining the devices on the UCNs and hiways, and defining the types of modules or slots within those devices.
3. **Point Building** activities include defining names and parameters of process data points that are to reside in UCN devices, hiway boxes, Application Modules, and Computer Gateways. Point Building provides data points to be used by system functions that are used to build the process-operations database.
4. **Function** activities include building custom graphics, free format logs, and history groups; specifying actions that function buttons cause; retrieving specified data from system devices and manipulating it for display in a desired format; and using the Area Database activity to configure process areas. Configuring a process area consists of such actions as configuring standard operating displays, assigning logs and reports to printers, and creating an area configuration file. The Area Database activity provides the process operation environment within which the process operator (or supervisor) monitors and manipulates the process.
5. **Support Function** activities support the above groups of activities, as necessary. Support Functions include command processor operations such as copying files, creating program source files, and building CL message libraries; system menu operations such as checking how data points are distributed in the system; system status operations such as checking status of modules; and console status operations such as checking the status of Universal Stations and Universal Work Stations.

The forms-management capability of the Universal Work Station plays a significant part during configuration by presenting the process engineer with preformatted displays into which configuration information is to be entered. These preformatted displays also list alternative values that can be entered into the form by selecting a target associated with the desired value. In addition, most entries have reasonable default values that can be accepted without further action by the engineer.

Building Data Points

This function uses the Data Entity Builder (DEB) to build, modify, or delete data points. A data point is a

database structure used by the system to represent such entities as a physical input or output or a control calculation. The process engineer can select from two modes for building points: in the first mode, the engineer enters the information to build the data points; in the second mode, data points are automatically built from files that contain previously defined data points, with the engineer entering only the information that differs from what is in the original points. The engineer can also create a template for a data point of a certain type. These templates contain specified default values for the parameters. Once created, users can modify copies of the templates to easily create other data points with slightly different parameters. The back-build feature of the Data Entity Builder is also used to review and modify data points in the system.

Building Graphic Displays

The process engineer uses the display-building function provided by the Picture Editor to create dynamic process-graphic displays. The Picture Editor allows the engineer to create, modify, and delete pictures by working with the picture itself. Thus, the process engineer can quickly and easily build powerful interactive custom displays without resorting to programming languages. The process engineer can use standard characters or addressable dots to build graphic displays. Figure 5 shows the working format provided by the Universal Work Station through which graphic displays are built.

Key features of the Picture Editor are as follows:

- **Line Drawing**—Lines can be drawn between any two points on the picture. This allows the process engineer to easily build representations of pipes, lines, etc.
- **Polygons**—Realistic representations of plant equipment such as valves, pumps, and vessels can be constructed. Both filled and wire-frame polygons are supported.

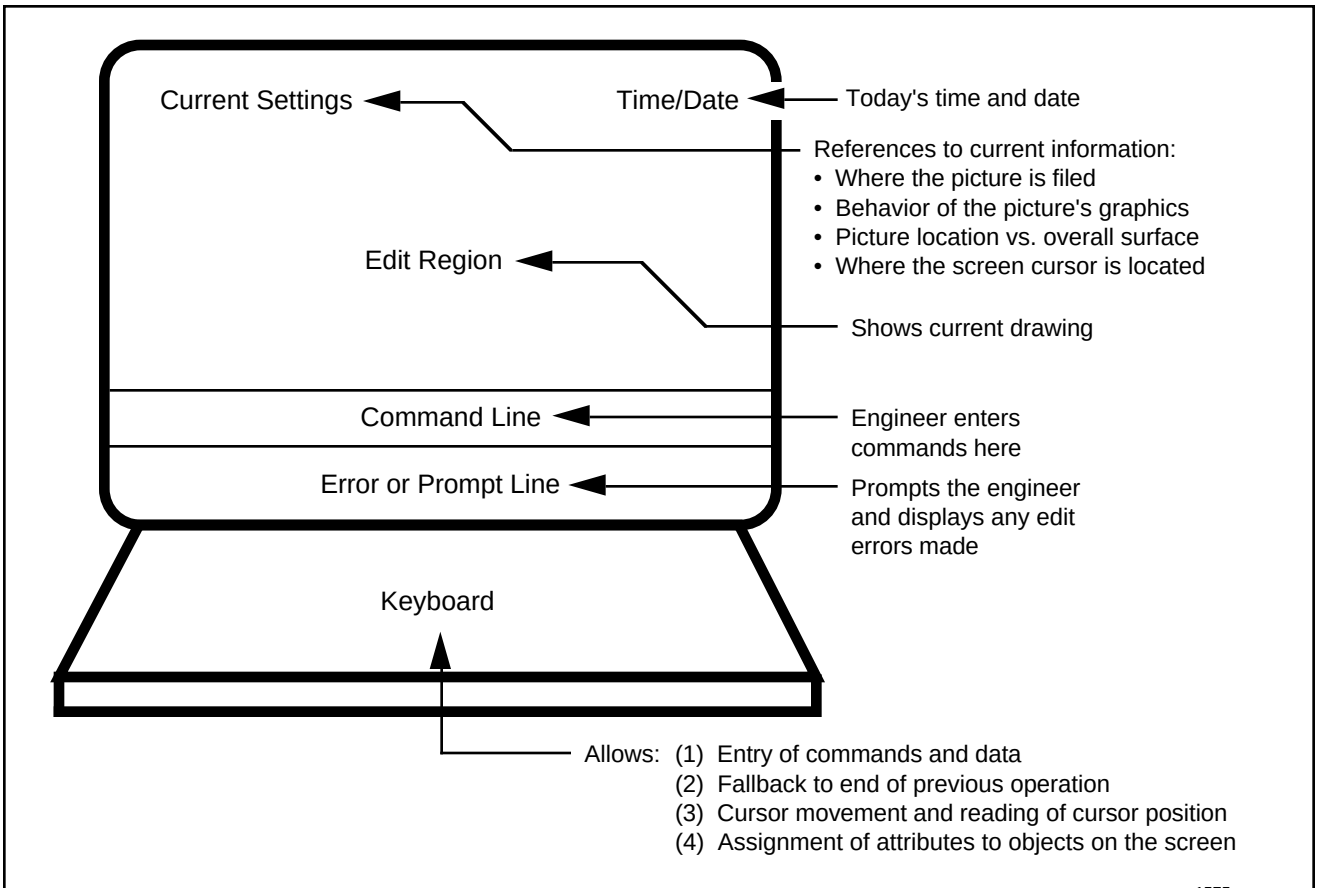

Figure 5 — Working Format for Building Graphic Displays

- **Display of Process Variables**—The value of a process variable can be represented in numeric form, with textual information such as data point descriptions.
- **Bar Graphs**—Process variables can be represented as dynamic bar graphs. Both horizontal and vertical bars of any length or width are supported.
- **Behavior of Display Objects**—The color, blinking, and intensity of objects in the display can be controlled, based on the value of the process variable. This allows abnormal conditions in the process to be represented by a corresponding change in a graphic display. For example, a blinking red pump might represent an alarm on that piece of equipment.
- **Subpictures**—Once a picture has been built, it can be added to any other picture as a subpicture. Thus, the process engineer can construct an image of an object such as a pump or valve only one time and quickly add it to a picture. The subpicture can be added to a picture, or many pictures, as required. This eliminates drawing the same subpicture over and over again. The subpicture can be added with its behavior intact, or the process engineer can choose that the subpicture has the same behavior of the picture to which it is added. The process engineer can also modify parts of the subpicture's behavior after it is added to the picture. For some subpictures, the engineer can specify that a particular data point provides the value that is to be displayed. To make the subpicture more flexible, the engineer can add the parameters that are to be displayed rather than the particular value.
- **Scaling of Graphics**—A graphic can be scaled when it is built or when it is added to a display. A process engineer can build detailed graphics as a large image and later shrink them to the desired size, or modify the size when adding them to a picture. Thus, a subpicture of an often-used item, such as a pump, can be built in one size and added to several displays in different sizes.
- **Interactive Displays**—The target capability of the Universal Station allows the process engineer to create pushbutton keys by drawing them as targets on a display. These serve as function keys that call up related displays and allow changes to process variables. The keys are supported by the keyboard and optional mouse.

Preparing, Compiling, and Linking Control Language Programs

This function allows the process engineer to use the Universal Work Station to prepare, compile, and link Control Language (CL) programs. Control Language programs allow the process engineer to define custom-control action in an Application Module (CL/AM), to define sequence programs for a Process Manager (CL/PM), Advanced Process Manager (CL/APM), and Multifunction Controller (CL/MC), and to define custom data segments for the Application and Computing Modules.

Control Language is a process-oriented language, designed for process and application engineers. With Control Language, engineers can solve process problems, even if they are not experienced software engineers. Control Language is most beneficial when used to implement small process programs that require unsophisticated calculations. High-level programming languages are used in host computers to implement larger or more complex programs.

The following are some of the features of Control Language:

- Step-oriented sequence structure that consists of primary and secondary sequence programs.
- Process-related language statements such as assignment, control, delay, communication, and termination.
- A set of useful arithmetic, logical, logarithmic, and trigonometric operators.
- Branch-on-condition statements.
- Operator messages.
- A powerful abnormal-condition handling capability.
- Easy ways to establish operator communication.

These features make it easy for a process engineer to translate a process control scheme into a Control Language program. A Control Language Compiler/Linker is provided in the Universal Work Station.

The process engineer can also use the Universal Work Station to test Control Language programs to ensure that the programs are operating properly before linking them to data points that are in service.

Building Logs and Reports

The engineer specifies the content and output schedule for preformatted logs, journals, and printed trends. He also can define specialized log formats by using the Free-Format Log Builder.

Specified logs (both preformatted and free-format), journals, and printed trends can be combined into reports. These reports are scheduled independent of the print frequency for the included items.

Editing Files

This function allows the process engineer to use the Text Editor to build and modify files. It offers screen-editing functions that include copy, move, and character-string search.

Using Utility Programs

The Universal Work Station allows the process engineer access to utility programs to do the following:

- List volumes and files
- Format/initialize cartridge disks, floppy diskettes and History Module-volume names
- Save/restore files
- Save/restore continuous history
- Copy, verify, delete, print/display, and rename files
- List the names of items with specified connections to other items in the database.

Calling Up System Function Displays

From the System Menu Display, the process engineer can use many of the same System Function Displays that are available to the supervisor during normal process operation.

Maintenance Functions

When faults occur in a TDC 3000X System, they are usually isolated by built-in tests and diagnostics that are executed during startup, restart, and on-process operation. (During on-process operation, the tests and diagnostics are executed in the background mode in each module.) The fault is usually isolated to an optimum replaceable unit (ORU), and a maintenance recommendation is issued. ORUs are replaceable assemblies that provide the best trade-off between the cost of the ORU and the cost of attempting to isolate problems to a smaller part of that ORU.

The maintenance functions are accessed from the Universal Work Station by way of the System Maintenance Menu (Figure 6).

The following functions are available to the maintenance technician:

- Call up maintenance recommendation displays
- Call up related displays
- Call error detail of a failed node

Maintenance Recommendation Displays

Through the Maintenance Recommendation Displays, the maintenance technician can review all active maintenance recommendations and related error information.

The maintenance technician uses the Engineer's Main Menu to call up the System Maintenance Menu Display. The targets on the screen can be used to call up other functions and displays to enable an analysis of system failures to be made.

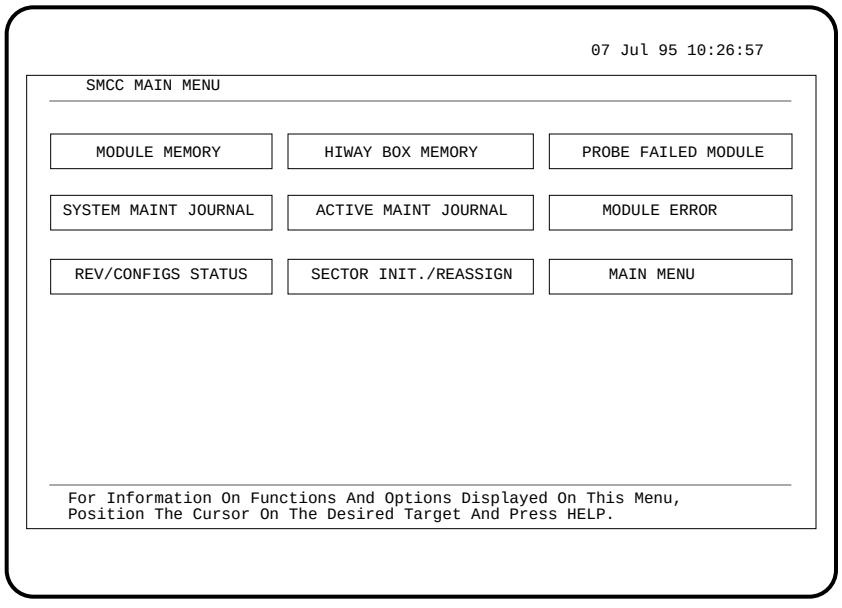

Figure 6 — System Maintenance Menu

One of these displays is used to initiate the error collection and analysis cycle of the On Process Analysis (OPA) program that resides in the History Module. During this cycle, the reported errors are correlated according to the devices in which they were detected, and any resulting maintenance recommendations are printed on the Real Time Journal and added to the maintenance journals.

Calling Up Related Displays

In addition to the maintenance recommendation displays, the maintenance specialist can call up related displays to obtain the following information:

- Memory contents of an LCN module.
- Maintenance journal activities selected by combinations of time, event type, and module type or address.
- Memory contents of a selected process-connected device.
- Error history of an LCN module.
- Current revision status of hardware/firmware.

Calling Error Detail of a Failed Module

This display allows the detailed inspection of the last error logged in a failed LCN module's memory, as long as its LCN interface still functions.

Process-Connected Device Status Displays

In addition to those displays available through the System Maintenance Menu, detailed hardware information can be accessed through device status displays, such as a Process Manager Detailed Status Display, a Logic Manager Detailed Status Display, or a Hiway Box Status Display.

Process Supervisor Functions

With the Universal Work Station the supervisor has available to him all displays and functions available to the operators at their Universal Stations, plus those supervisors' functions denied to the operators by Universal Station keylock (assuming the process engineer has configured the UWS accordingly). Therefore, many of the capabilities described below are primarily associated with procedures followed by the operators at Universal Stations.

The displays available to the supervisor and operators can logically be divided into three major categories as described below. Displays belonging to these categories are discussed in detail on the following pages.

Plant process displays, which are concerned with monitoring and controlling of the process, allow the supervisor and operator to do the following:

- Monitor and control continuous and discontinuous processes.
- Change process parameters, control modes, sequence execution states, and sequence execution modes.
- Monitor process trends.
- Handle process alarms, sequence alarms, and operator messages.

TDC 3000 X System displays, which are associated with the performance of the TDC 3000X System hardware and software, allow the supervisor and operator to do the following:

- Observe the status of LCN modules (including other Universal Work Stations), Universal Control Networks, Data Hiways, and process-connected devices.
- Reassign Universal Stations, areas, units, and peripherals.
- Load databases of LCN modules and process-connected devices.
- Handle system alarms.
- Initiate on-demand checkpointing.

System function displays allow the supervisor and operator to do the following:

- Select reports and histories for viewing and printing.
- Review data-point assignments to modules, process-connected devices, and units.
- Review titles of displays, reports, and logs.
- Perform Overview and Group edit functions.
- Initiate other system functions.

Plant Process Displays

The hierarchy of the process display types is shown in Figure 7. Included are Honeywell- provided standard displays as well as user-build graphic displays. These displays provide information to the process supervisor and permit changes to parameters in the process area for which that supervisor is responsible. The terms area, unit, group, and detail refer to increasing levels of detail as follows:

- **Area Displays** summarize the operating condition and trends of the data points that make up the plant area assigned to the Universal Work Station.
- **Unit Displays** summarize the operating condition and trends of the discontinuous and continuous operations in the units (subdivisions of areas) assigned to the current area.
- **Group Displays** show values and status for up to 8 data points that form a group, display trends within the group, or present status and sequence information for process modules.

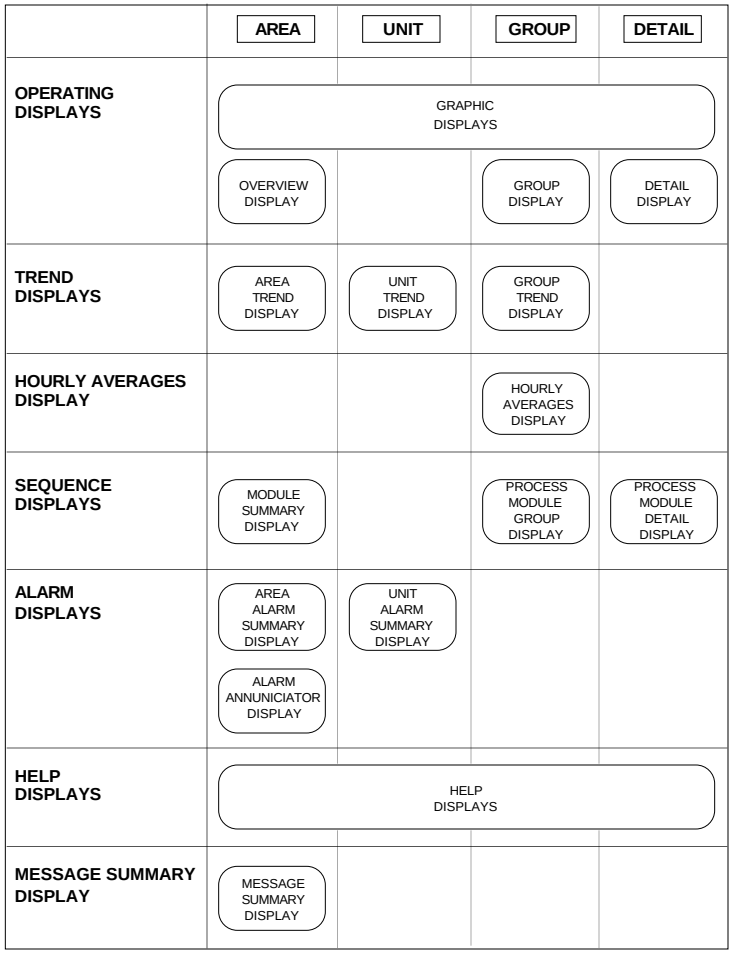

Figure 7 — Hierarchy of Process Displays 1488

- **Detail Displays** present all of the operating parameters and limits for individual data points and process modules.

Operating Displays

The primary operating displays include the Group, Detail, and user-built Graphic Displays. An Overview Display is also available.

Up to 400 operating **Group Displays** can be defined, each of which can contain parameters and action targets for up to 8 data points. A given data point can appear in any number of groups. See Figure 8.

The **Detail Display** presents detailed information for a single data point (Figure 9).

Perhaps the most powerful of all operating displays are the custom **Graphic Displays** (Figures 10 and 11), which are designed by the user and, therefore, can be based on concepts that are unique to the user's plant. They can contain graphic, textual, trend, and behavioral information and represent a whole area, a unit, or a single point. Graphics can be linked to many of the standard process displays and can themselves have targets that allow cursor selection of other graphics or standard displays. They can be used to make changes in process parameters; they can be used for control, and alarms can be displayed in a variety of ways. Because they can be stored on History Modules, cartridge disks, and floppy disks as well as in a Universal Work Station memory, the total number of Graphic Displays that are available to the operator can be virtually unlimited. In addition, Graphic Displays can be duplicated on separate HMs, providing disk redundancy for critical displays.

The **Overview Display**, while not required for running the system, can be useful for some applications. It presents information in condensed form for any combination of up to 36 operating groups. Analog data points are represented as vertical lines, the length and direction of which indicate the polarity and magnitude of deviation from the desired operating values. For counter-input points, the current mode of the counter is shown, and for digital points an indication is present only when in alarm.

Trend Displays

Trend Displays augment the operating displays by graphically presenting the recent history of key operating variables in trace form. The **Area** and **Unit Trend** displays (see Figure 12) are nearly identical in appearance, each showing the history of up to 24 parameters, that have been specified by the process engineer during system configuration.

Group trends (Figure 13) for up to 8 parameters can be displayed or printed as continuous trends or trend history over a user-specified time period. The Group Display trends have many useful operator control features, including eight time-window selections (X-axis), automatic data source selection, history time-window step-back, and Y-axis scaling.

The Group and Detail Displays show parameters and permit operator actions. The Group Display shows information for up to 8 points.

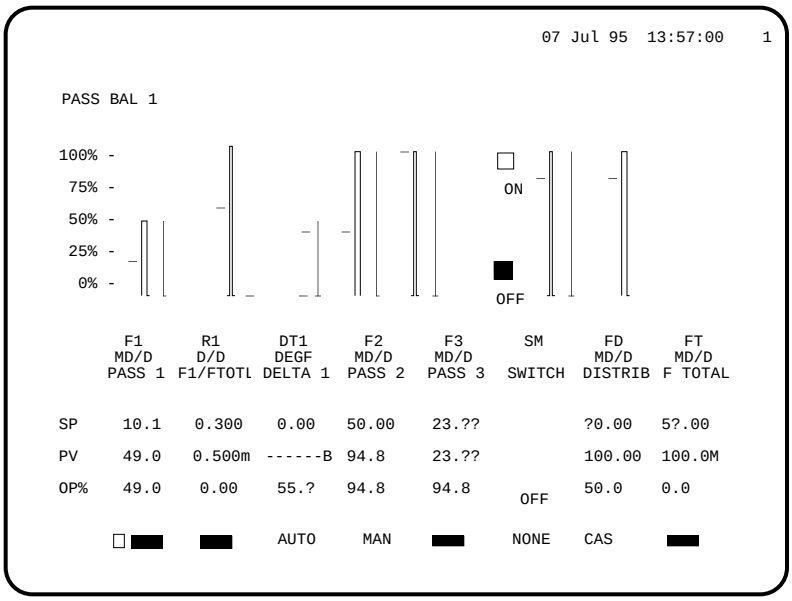

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Figure 8 — Group Display

The Detail Displays show more detailed information for a single data point or process module than is available on the Group Display. A Detail Display may consist of several pages of information.

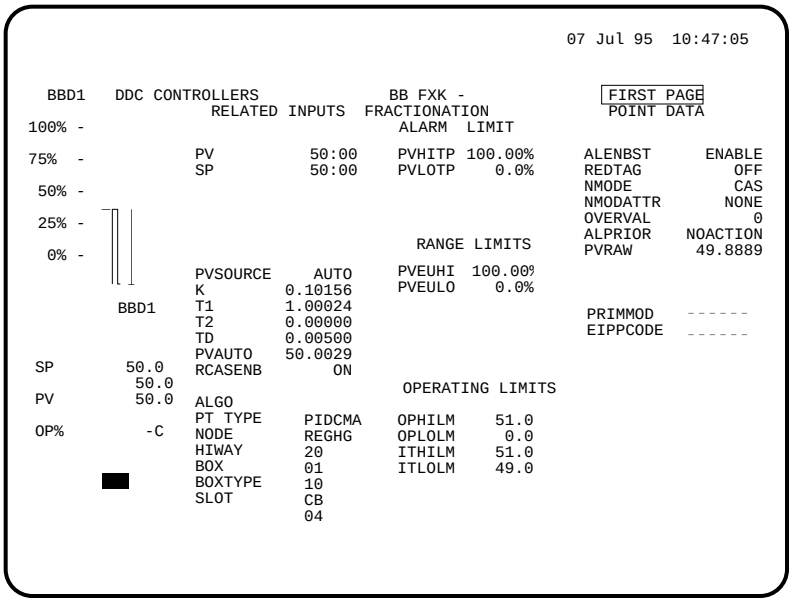

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Figure 9 — Detail Display

Graphic displays can be built so that the operator can monitor and manipulate the process directly from them. Both continuous and discontinuous processes can be managed from graphic displays. Basically, any data point parameter or sequence can be monitored and manipulated from any graphic display.

Graphic behaviors such as blinking, color changes, bar graphs, appearance of subpictures, and numeric values can be controlled by parameters of data points. Additionally, process alarms can be acknowledged from graphic displays.

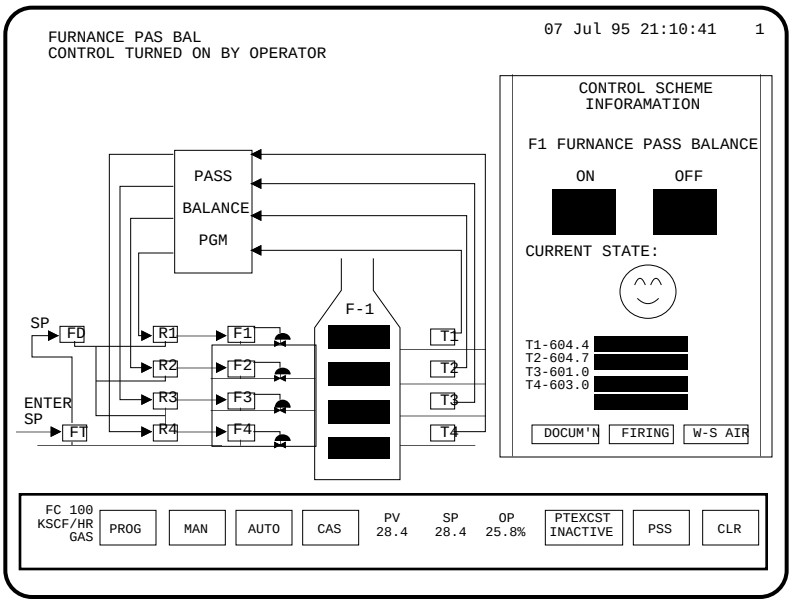

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Figure 10 — Graphic Display

The ability to bring another live display into a designated area within an existing graphic display is another convenient feature available for use on graphic displays. These process-related displays can include key information such as trends, process curves, batch totals, recipes, averages, operator messages, alarm handling information, and efficiency calculations. This feature allows the operator to bring up this other process-related data without switching to another graphic. The Trend Display in the illustration at the right is such an overlay and can be deleted by the operator at will.

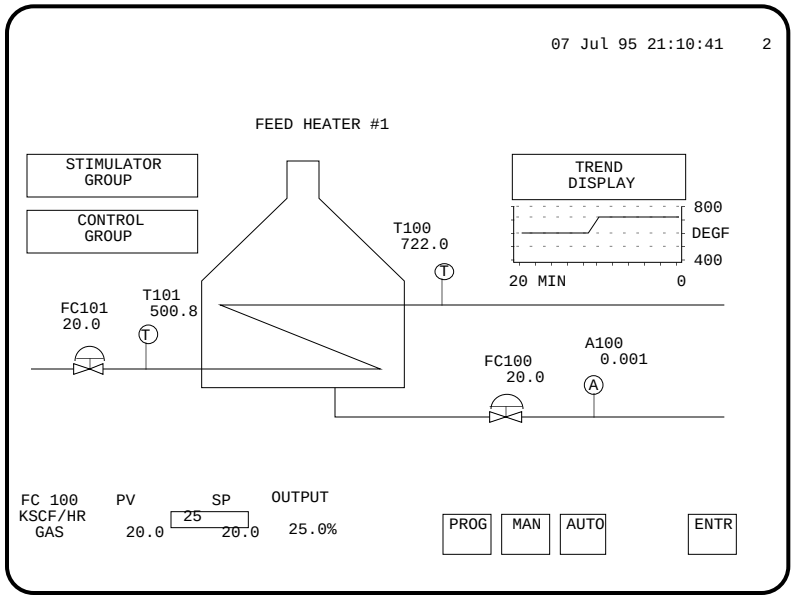

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Figure 11 — Graphic Display with Trend Overlay

The Area Trend and Unit Trend Displays present historical data for process variables (PVs) of up to 24 analog data points. These displays contain 12 sets of axes; each set of axes shows one or two trends. When two trends appear on one set of axes, the trends are shown in different colors. The time bases can be configured for 2 hours or 8 hours.

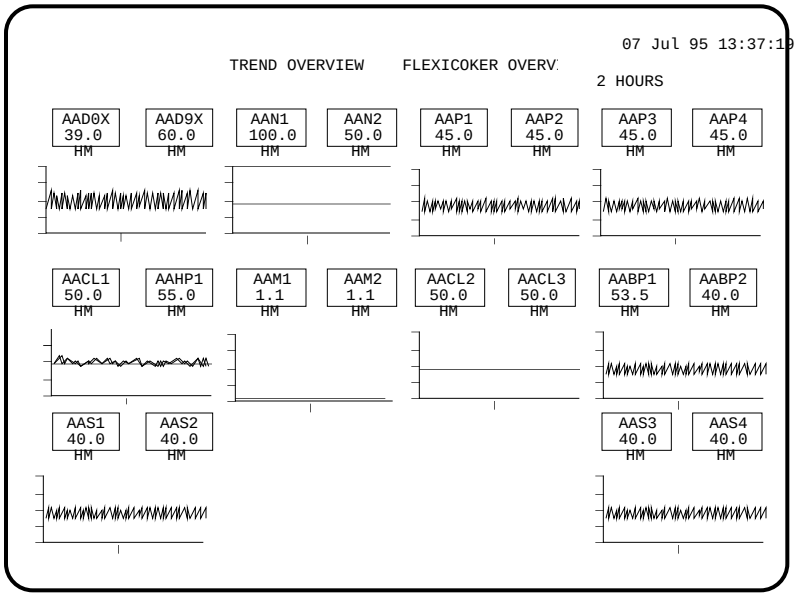

Figure 12 — Area Trend Display

The Group Trend Display replaces the bar-chart portion of the Group Display when the supervisor selects the trend function from the Group Display. The group trend portion initially presents historical data for up to eight PVs in the group, then continually updates the traces from the right margin. These trends are shown on one or two axes of up to four trends each. Each trend is shown in a different color. Operator control of trends include:

- Eight time-window (X-axis) selections
- Automatic data source selection with source indication
- Manual source change for each trace
- Time window step-back/forward through available history
- Variable (Y-axis) scaling

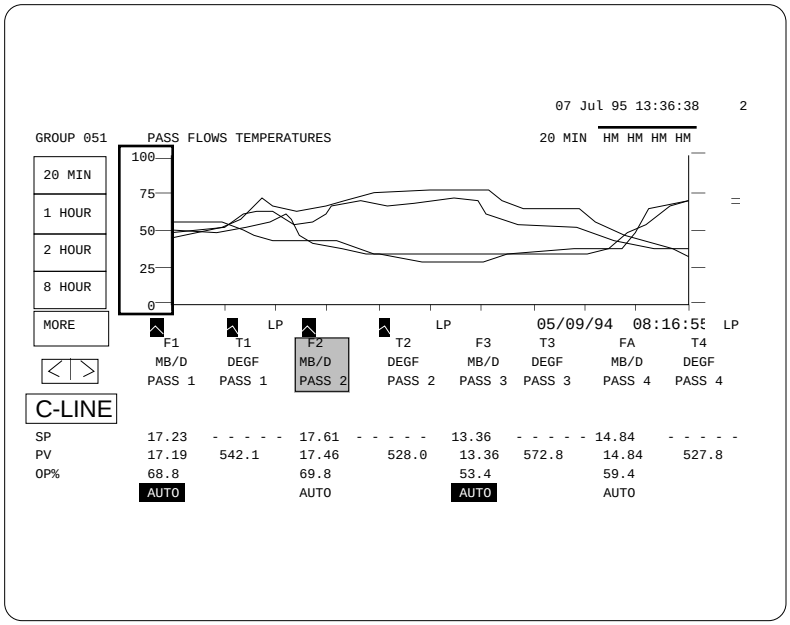

Figure 13 — Group Trend Display

The Hourly Averages Display, like the Group Trend Display, is called up from a Group Display. The Hourly Averages Display replaces the bar-chart portion of the Group Display with a list of the average PV values for the last 8 hours of each data point on the Group Display.

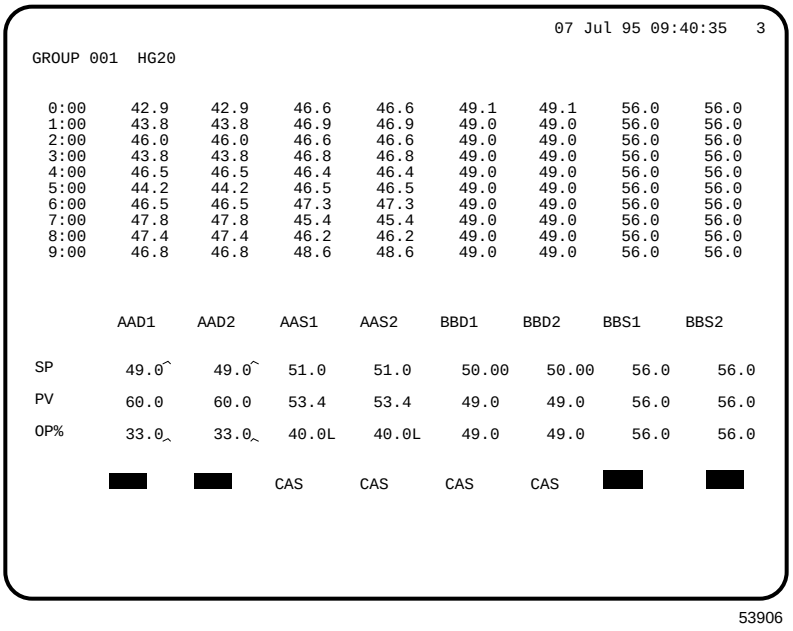

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Figure 14 — Hourly Averages Display

Hourly Averages Display

Like the Group Trend, the Hourly Averages Display (Figure 14) is directly associated with each Group Display. It provides a list of process variable averages for all points in the group on display when the request is made.

Sequence Displays

The supervisor can use the Module Summary Display, the Process Module Group Display, and the Process Module Detail Display to monitor Control Language sequence programs that execute in the process modules.

The Module Summary Display is a multipage display that summarizes the current status of process modules and sequences for up to 105 process modules.

The Process Module Group Display is the primary way the operator can manipulate the sequences associated with the process module and change the status and parameters related to a process module. The supervisor can also view, acknowledge, and confirm messages from those sequences.

The Process Module Detail Display is a multipage display of status and sequence information for a particular process module. Page 1 of the display also lists predefined messages for the operator, which are issued by the sequence program. Other parameters, status indicators, and process-connected device variables such as flags, numerics, and timers can be changed from the remaining pages of the display. Control Language programs, which contain the primary and secondary sequences, can be loaded into the system by using a separate page of this display.

Table 1 — Alarm Priorities

Priority Level	Universal Station Action	History Module Action
Emergency	Display and optionally print alarms	Journal
High	Display and optionally print alarms	Journal
Low	Display and optionally print alarms	Journal
Journal	None	Journal
Printer	Print Alarms	None
JNL Print	Print Alarms	Journal
No Action	None	None

Alarm Displays

Alarm displays are used to notify the supervisor of alarm conditions that can cause a process upset. The supervisor is notified of **plant process alarms** (caused by abnormal or important events and conditions in the pr**ocess) and TDC 3000 XSystem alarms** (caused by a failure in an LCN module or in a process-connected device). Process alarm conditions are assigned one of seven priorities as shown in Table 1.

Alarms are collected in the appropriate Unit Alarm Journal in a History Module, if a History Module is present. The number of alarms saved in the History Module is specified by the engineer.

When an alarm occurs, the following takes place:

- The ALARM SUMM key on each Supervisor's Keyboard in the appropriate console begins to flash. Other keys can be assigned to light, to indicate the unit in which a process alarm occurs.
- The alarm message is stored in the Unit Alarm Journal (if a History Module is present), printed on the assigned printer at the console, and entered (flashing) in the appropriate alarm displays.
- Flashing of an alarm in the displays continues until acknowledged, and the ALARM SUMM key flashes until all alarms have been acknowledged.
- The alarm indications remain until the alarm condition is corrected.

There are three alarm displays available. The **Area Alarm Summary Display** and the **Alarm Annunciator Display** are described in Figures 15 and 16. The **Unit Alarm Summary Display** is similar to the Area Alarm Summary Display and lists up to 100 of the most recent alarms of all priorities for a given unit.

The operator can acknowledge alarms and call up other Unit Alarm Summary Displays, from either of these displays, by using the annunciator boxes as targets. There are up to 36 Unit Alarm Summary Displays, 1 for each unit configured.

Help Displays

The Help Display feature allows the user to build displays that provide assistance to the supervisor. These displays can be assigned to standard process displays and are accessed by the supervisor by pressing the HELP key. A Help Display can be any of the standard displays or a user-built display that might contain special operating instructions.

The Area Alarm Summary Display lists up to 100 of the most recent emergency-priority and high-priority alarms that are detected in an area assigned to the Universal Station (which stores up to 600 such alarms). Twenty such alarms can be listed on each of five pages of this display. In addition, all units assigned to the station are represented at the bottom of the screen by targets for calling up the **Unit** Alarm Summary Displays.

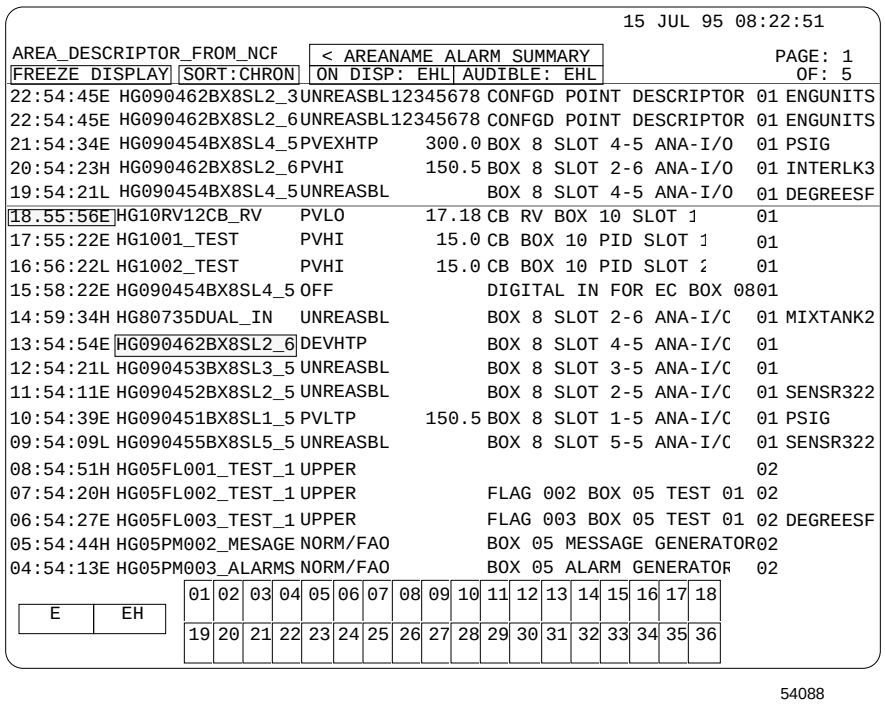

Figure 15 — Area Alarm Summary Display

The Alarm Annunciator Display is a user-configurable display that looks like and operates much like a conventional annunicator panel. This display has 60 annunciator boxes that are used to indicate any of up to 300 process alarms assigned to it (maximum of 10 to each box). By using an annunciator box as a target, the user can immediately call for displays associated with an alarm. Above the annunicator boxes are listed the five most recent emergency-priority alarms. In addition, like the Area Alarm Summary Display, there are targets at the bottom of the screen for calling up the Unit Alarm Summary Displays.

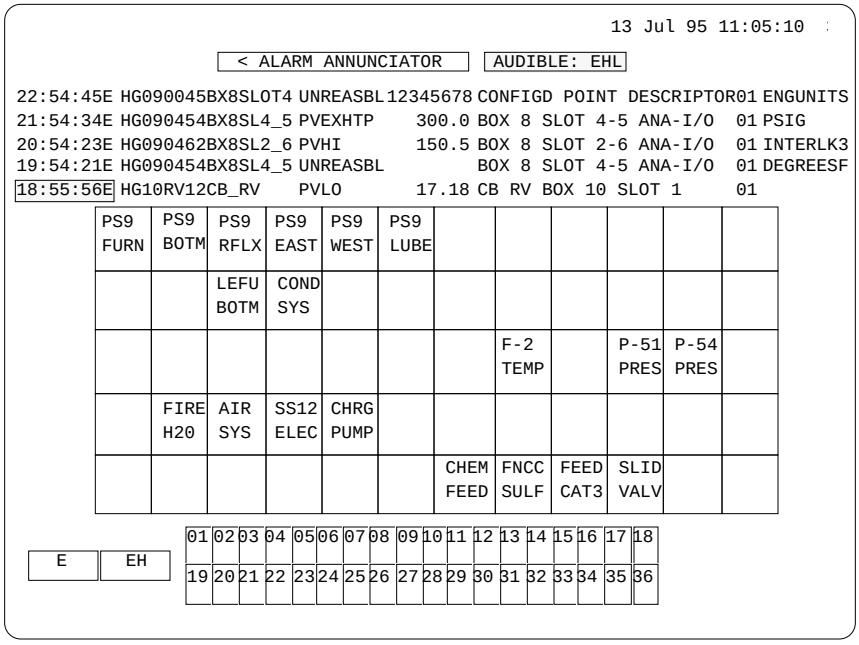

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Figure 16 — Alarm Annunciator Display

The System Status Display provides the status of each module on the LCN, including other Operator Consoles, and the status of each Universal Control Network and Data Hiway in the system. This display also acts as a system-display menu by providing targets for accessing all modules and Process Networks. The targets allow the operator to call up a display to obtain detailed status of a particular device or to make assignment changes. In addition, there are targets on this display for switching from one LCN cable to the other.

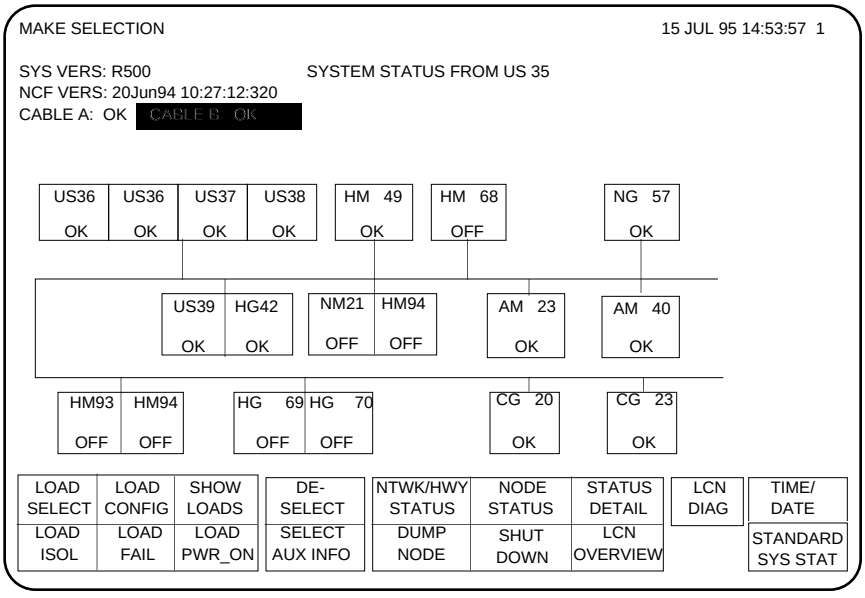

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Figure 17 — System Status Display

Message Summary Display

The supervisor can observe, acknowledge, and confirm messages issued by the Control Language sequence programs through the Message Summary Display. This display has up to 4 pages and is a listing of the 96 most recent Control Language messages that have been issued to the operator. The listing is in reverse chronological order, with the most recent message at the top of the list. Each message contains a message-status character, the time of the message, a unit identifier, a point identifier, and the message text. The message-status character indicates actions that the operator must perform, such as acknowledge and confirm the message.

TDC 3000 System^X Displays

The system displays show the assignments and status of the modules on the LCN and the process-connected devices on the UCNs and Data Hiways, and provide the means to define and change assignments or change the status.

System Status Display

The System Status Display (Figure 17) provides detailed status information for each node on the LCN. In addition, the display provides an easy method of loading any combination of LCN nodes as well as loading a pre-configured list of nodes. Support is also provided for customizing the System Status Display. The display can be customized to display one to five pages of information and can also be customized on a console by console basis.

Console Status and Assignment Display

The current status and assignments of Universal Stations, Universal Work Stations, and peripherals at the local console is shown on the Console Status and Assignment Display. It is through this display that process areas are assigned to stations and station-function changes are initiated. Other functions are as follows:

- Universal Station and Universal Work Station assignments for the local console
- Peripheral-status information for the local console
- Unit Assignments
- Maintenance recommendations
- Time and date changes
- Changes to levels of access

Unit Assignment Display

Through the Unit Assignment Display, which is accessed by a target on the Console Status and Assignment Display, the user can assign process units to an Operator Console. Data points in any process unit can be viewed on the screen of any Universal Station in any console, but data points can be manipulated for only units assigned to that console. The Unit Assignment Display lists the unit identifier and assignment status for each unit in the assigned area. Alarms can be disabled or inhibited on a unit basis.

LCN Module Status Displays

The supervisor can monitor the status of each module on the LCN through the module status displays. A status display is provided for each type of LCN module. (As an example, all History Modules in the system are listed on one status display.) Each display lists the module address and current status. From an individual module status display, the supervisor can restart modules, shut down modules, and perform database save/restore functions.

UCN Status and Detail Status Displays

The UCN Status Displays and Detail Status Displays allow the supervisor to monitor and manipulate Universal Control Networks and process-connected devices, and to monitor the status of the UCNs and devices. A display is provided for each UCN and process-connected device in the system. The **UCN Status Display** shows the current UCN status, the current NIM status, and the current status of all process-connected devices on a selected UCN. The **PM Status Display** shows the detailed status of a selected Process Manager and its complement of processors.

From these displays, the supervisor can perform functions such as switching to a backup UCN; issuing commands to process-connected devices; saving/restoring the database of devices; and downline-loading devices.

Hiway Status and Box Status Displays

These displays, while differing in format, perform most of the same functions for the Data Hiways and connected boxes as the UCN Status and Detail Status Displays perform for the UCN.

System Function Displays

The System Menu Display (Figure 18) gives access to four types of System Function Displays:

- Organizational Summaries
- Reporting Functions
- Overview and Group Edit Functions
- System Functions

Organizational Summary Displays

Organizational Summary Displays, accessed through the Organizational Summary Menu, allow the supervisor to easily determine data point assignments, data point use, and title assignments as described in the following paragraphs.

The system function displays are accessed through these targets on the System Menu Display. They provide summaries of several types of information about the process-point assignments, event histories and journals, historical data, and reports that are available from the system.

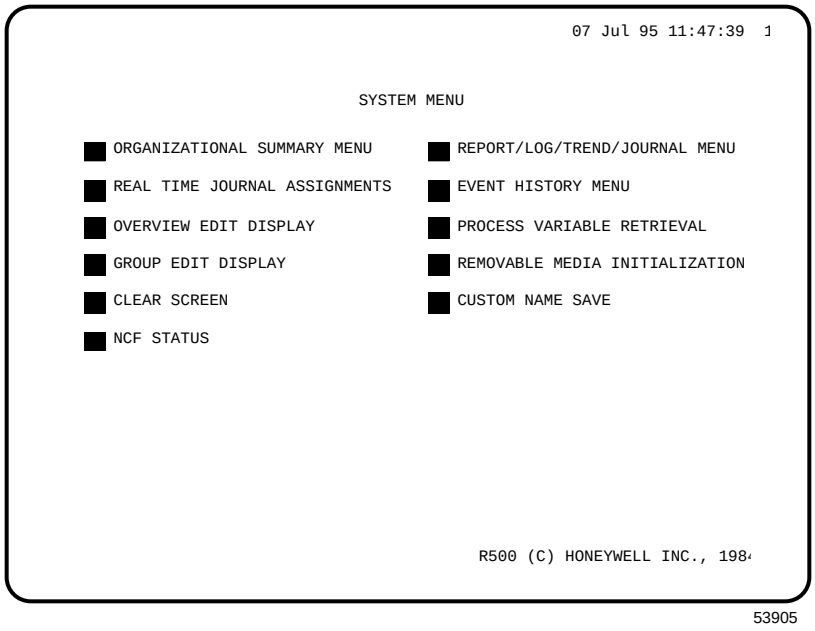

Figure 18 — System Menu

Unit Point Summary

The Unit Point Summary Display is a listing of the data points in a unit. The listing consists of more than one page and includes the hardware locations of the data points.

For each data point, the display lists the point ID, point descriptor, group display number, and hardware location.

Hiway Box Point Summary

This display provides the supervisor with a listing of all data points in a Data Hiway process-connected box selected by the operator. The data point listing is arranged in slot/subslot order beginning with slot 1, and uses the point ID, point descriptor, unit name, and group display number to describe the data point. A display, which can consist of more than one page, is provided for each process-connected device.

Point Usage List

This display lists the references in the area where the selected data point is used. The references consist of unit assignment, module address, box/slot/subslot address, group displays, trend displays, logs, and printed trends.

Point Attribute Summary

The Point Attribute Summary Display is a menu for selecting one of many displays, each of which is dedicated to one type of data point attribute. Each display is a snapshot of all the data points in a unit that have particular attributes (for example, all disabled alarms for a unit) at the time the operator requests the display.

LCN Node Point Summary

This display provides the supervisor with a listing of all data points in the selected LCN module. The data point listing contains the point descriptor, unit name, group display number, and address. A display, which can consist of more than one page, is provided for each LCN module.

UCN Device Point Summary

This display provides the supervisor with a listing of all data points in a UCN device selected by the supervisor. The data point listing shows the point ID, point descriptor, unit name, group display number, module, and slot number to describe each data point. A display, which can consist of more than one page, is provided for each device.

UCN Device Module Pt Summary

This display provides the supervisor with a listing of those data points in a Process Manager's Process Manager Module or I/O Processor Module selected by the supervisor. Like the Device Point Summary above, the data point listing displays the point ID, point descriptor, unit name, group display number, module and slot number to describe the data point. A display is provided for each selected module, and can consist of more than one page.

Title Summary

There are title summary displays for Area, Unit, Group, Unit Trend, and Schematic/FFL titles. A separate display is provided for each title type. The Schematic Title Summary Display lists the titles for those graphic displays stored within the Universal Station memory, and also lists the pathnames (which identify the storage devices) for all files in which graphics are stored.

Reporting Function Displays

These displays allow the supervisor to print or display a variety of logs and journals as follows.

Report/Log/Trend/Journal Menu

Logs, trends, journals, and reports are accessed from the Report/Log/Trend/Journal Menu Display. This display lists logs, printed trends, journals, and reports that have been configured or built for the area assigned to the Universal Work Station. From this display, the supervisor can print or display any log, trend, journal, or report and can also change the printer assignment. There can be a combined total of 100 logs, trends, journals, and reports for each area, with a maximum of 1000 points contained in all logs for an area.

A **log** is a set of historical values for a specified set of data point parameters. Logs can be included in reports or called up individually through the Report Menu Display. If a History Module is present, extended logs consisting of point-PV histories can be printed. If a History Module is not present, basic logs, which consist of a limited number of log types and historical values, are available. Logs can be printed in a vertical format or a horizontal format. In addition, the Free-Format Log Builder can be used to build free-format logs.

PV Trends for up to 8 points can be printed as continuous trends from the Group Display or as trend history over a specified time interval. Historical trends can be included in reports or can be called up directly from the Report/Log/Trend/Journal Menu Display.

The types of events that can appear in **journals** are process alarms, operator process changes, operator messages, system-status changes, system maintenance recommendations, and system errors. These events can be printed as they occur, can be included in reports, or can be called up from the Report/Log/Trend/Journal Menu Display.

A basic **report** can consist of the report-header information and one or more logs, printed trends, or journals. All reports for the area assigned to the console are configured in advance by the process engineer.

Event History Menu

Histories of process-related and system-related events are retrieved through the Event History Menu Display from historized journals. This display allows the supervisor to call up a history of events such as process alarms, operator process changes, operator messages, system status changes, system maintenance recommendations, system error messages, sequence of events records, and UCN/hiway device events.

Process Variable Retrieval

Histories of process variables for particular data points can be retrieved through the Process Variable Retrieval Display from historized point-PV data. This display allows the supervisor to display or print process-variable histories, including the current value or minute data, and hourly, shift, daily, and monthly averages. The lengths of these histories depend on the start/stop times and dates that the operator or supervisor enters.

Real Time Journal Assignments

The Real Time Journal Assignments Display can be called up to retrieve the listing of all real time journal assignments that are configured for the area assigned to the Universal Work Station. The supervisor can activate or suspend the real time output of any journal from this display as well as change a journal's print assignment. Each entry in the display lists the journal type and printer identifiers.

Overview and Group Edit Functions

Overview Edit Display

The Overview Edit display has two purposes: First, to show whether the overview information is presented as normal, suppressed, or deleted for all the configured overview display elements. Second, to allow the supervisor to change the current display state for any or all of the configured overview display elements from this display.

Group Edit Display

From this display, the user can temporarily reconfigure groups within the area known to a console. Group titles can also be changed. The supervisor can change any group, while the operator is

permitted to change only 10 free-use groups.

System Functions

Clear Screen

Selection of this target clears the Universal Work Station screen.

NCF Status

A display showing the operational status of each LCN node is invoked with this target.

Removable Media Initialization

This target selects the function that writes format information on new disk cartridges and floppy diskettes.

Custom Name Save

This target, which appears only when the engineer or supervisor access level is activated, initiates the saving of the system's custom data definitions on the History Module, cartridge disk, or floppy diskette.

Physical Description

The Universal Work Station consists of a desk-side electronics tower that measures approximately 28" high by 7" wide by 23" deep, an improved-definition 51.4 cm (20.25 inch) CRT, a supervisor keyboard, an optional mouse, and an optional engineer's keyboard.

A 5-card electronics module is mounted in the tower. The electronics module contains the processor, peripheral interface boards, and a power supply. Each of these items is an ORU for maintenance. A parity check is used for memory error detection. The electronics module also provides the interface electronics for the optional equipment described below and connects to the LCN with the standard TDC 3000^X transceiver.

The stand-alone CRT monitor connects to the electronics tower by cable. It incorporates controls that allow each user to adjust the displayed output to conform to ambient light conditions for viewing comfort.

Optional Equipment

Mouse
The mouse is a cursor-positioning and target-activating device. It has two pushbuttons, one for "selecting" a target over which the cursor has been positioned, and the second for "entering" data that has been typed onto the screen.

Station Options

Two versions of the Universal Work Station, based on keyboard options, are available to meet different user requirements.

Supervisor's Station

The Supervisor's Station option comes with a Supervisor's Keyboard. The UWS Supervisor's Keyboard is the same size and layout, and has the same color-coding as the Universal Station Operator's Keyboard (see Figure 20). Mounted in a desktop enclosure, it is a spill-proof membrane keyboard with 149 touch-keys that provide audible feedback when pressed. The keys are organized to make the user's demands for information and interaction with the process as quick and easy as possible. The keys on the right are grouped by related functions. Functions of the 86 keys on the left are defined by the process engineer during system configuration. Some keys are color-coded for easy recognition. The keyboard provides an audible warning if the user makes an invalid keystroke, or when more than one key is pressed at the same time.

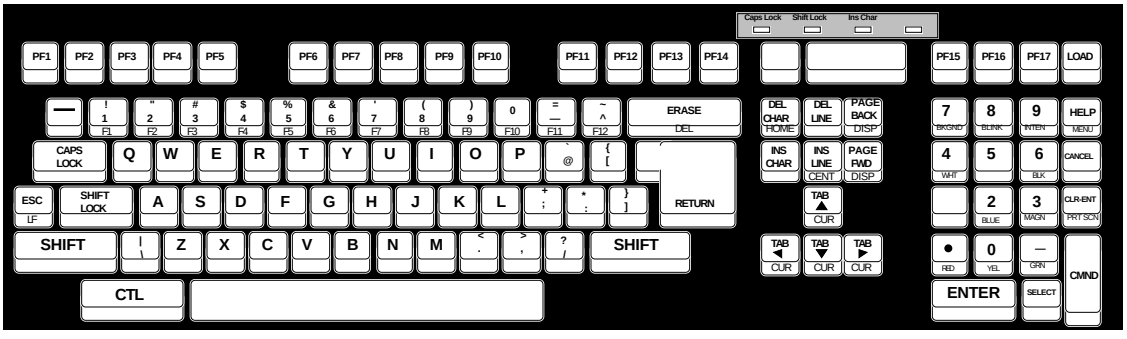

Figure 19 — Engineer's Keyboard

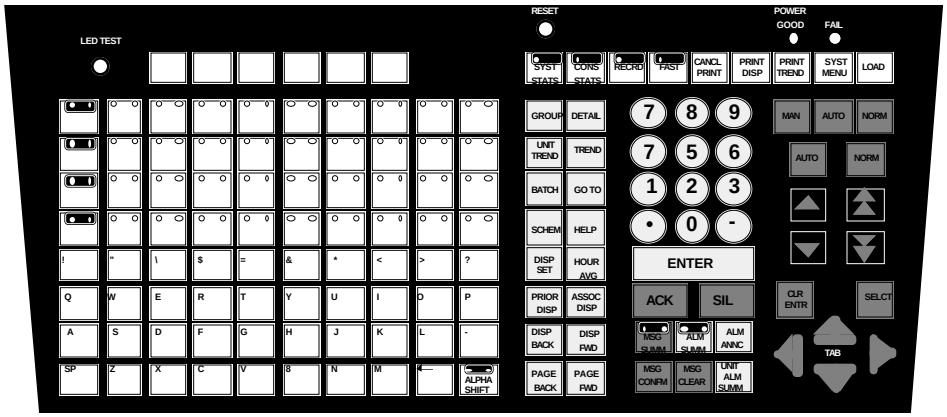

Figure 20 — UWS Enhanced Operator's Keyboard 4416

The UWS Supervisor's Keyboard differs from the US Operator's Keyboard, in that it does not support the annunciator horns nor does it support the keyswitch (access level is instead changed by button selection), and it is minus the LED test and Reset "buttons."

The supervisor's station is available in 4, 6, and 8 Mw of internal memory and can optionally support two cartridge drives.

Dual Personality Station

The Universal Personality Station option extends the tools available by providing both a UWS Engineer's Keyboard and a UWS Supervisor's Keyboard. This enables the engineer to perform all previously described engineering entry functions, and then to directly verify the results at the UWS. He or she does this with a keyboard and displays identical to those used by an operator.

The Universal Personality Station includes 6 or 8 Mw of internal memory. It is available in two models—one with dual cartridge disk drives, the other without external storage drives.

The Universal Personality Station also supports the Integrated Keyboard (IKB). The IKB combines a supervisor's keyboard and an engineer's keyboard in an ergonomically designed package. In addition to providing the same functionality as the operator and engineer keyboards, the IKB contains five additional buttons for invoking standard displays, a keyswitch, and an optional fixed trackball. (See Figure 21)

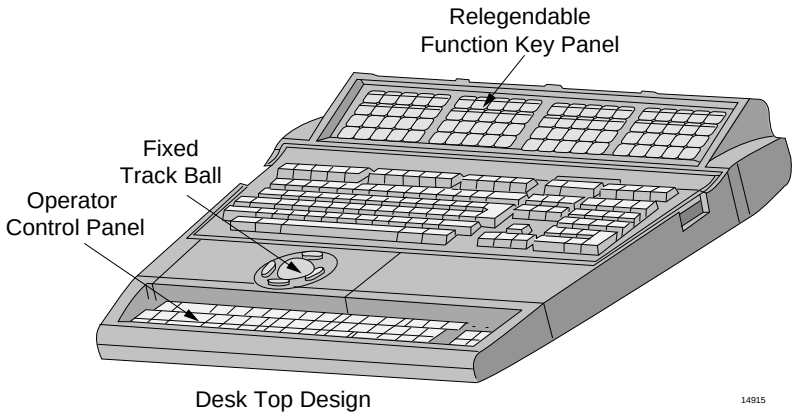

Figure 21 — Desk Top Design Console

Other Options

Disk Drives

The Cartridge Drives, when present, are mounted in the electronics tower. The cartridge disks measure 5 1/4 inches in diameter and have a capacity of 35 or 150 megabytes.

Matrix Printers

Two models of Matrix Printers with dot-graphic capability are available. Both are output only, tractor-feed devices. One prints 132 ASCII characters per line at a speed of 250 characters per second, while the other prints 136 ASCII characters per line at a speed of 400 characters per second. Both are capable of providing the screen print function.

Fiber Optics

The Universal Work Station accommodates a **Local Control Network Extender (LCNE)** or a **Local Control Network Fiber Link (LCNFL)**. These devices are for use with fiber optic cables and are described in the *Local Control Network Technical Data.*

Universal Work Station Specifications

Physical Characteristics

Approximate Dimensions		Approximate Weight
Electronics Tower:		
Height	72.2 cm (28.4")	34.0 kg (75 lb.)
Width	18.4 cm (7.2")	
Depth	57.2 cm (22.5")	
CRT:		
Height	45.7 cm (18.0")	18.0 kg (39.7 lb.)
Width	49.5 cm (19.5")	
Depth	50.8 cm (20.0")	
Screen Diagonal	51.4 cm (20.25”)	

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)

Electrical Requirements

Note: Inrush current to 5-slot module is limited to 10 A @120 V, 20 A @ 220 V.

Voltage:

Universal (AC Input: 102-264 Vac (Autoranging)

Frequency:

47 to 63 Hz

The Universal WorkStation's Electronics module operates without disruption through an interruption in the ac voltage of up to 40 ms duration.

Universal Work Station Specifications (continued)

Operating Characteristics

Capacities	
– Point Detail Displays	All points in the system
– Operating Group Displays	450 (400 standard + 50 Process Module Groups)
– Graphic Displays	Limited only by memory capacities of UWS, HM, and inserted cartridge and floppy disks
CRT Resolution	640 x 448 pixels

Cartridge Disk Drive	
Capacity	35 or 150 megabytes (5 1/4" cartridge disk)
Data-Transfer Rate	5.33 m bits per second
– Seek Rate	25 ms
– Latency	12.5 ms
Matrix Printer Printing Speed	
– Model 41	250 characters per second
– Model 46	400 characters per second