Introduction

This publication describes the significant new features available with Honeywell’s Universal StationX—a TDC 3000X user interface that provides the capability to display process data and information system data side-by-side in real time on the same visual display screen. Universal StationX features the functionality of a workstation based on the UNIX™ operating system and X Windows software environment. The Universal StationX is designed to operate with system software Release 430 or later, and interfaces with all other node types and personalities that are compatible with software Release 430.

Universal StationX is designed to be housed within either the existing or new ergonomically designed furniture. To achieve this significant step forward in control system design, and in keeping with our commitment to TotalPlant™ Open Solutions, Honeywell has imbedded a coprocessor, containing workstation technology that includes X Window System™ software, within the TDC 3000X Universal Station.

Figure 1 illustrates the Universal StationX dual hardware interface that allows it to serve as a module on the TDC 3000X Local Control Network (LCN) as well as a node on the Plant Information Network (PIN).

UNIX is a trademark of AT&T.
TotalPlant is a trademark of Honeywell Inc.
X Window System is a trademark of the Massachusetts Institute of Technology.
Accordingly, it communicates with other modules on single or multiple LCNs; with process-connected devices on Universal Control Networks and Data Hiways; and with PCs, workstations and other devices that reside on the Plant Information Network and communicate using industry standard network communications and operate under the X Windows environment.

A single Universal Station can be connected to an LCN, or multiple Universal Stations can be grouped together with Universal Stations to form integrated Operator Consoles.

### Functional Description

#### X Windows

The X Window system is a sophisticated package of layered software that permits users at a variety of different computer platforms to share information from different applications through an easily customized graphic user interface. Not only can such data be visually shared, but multiple sets of data can be viewed in several “windows” that are opened simultaneously on a single CRT screen.

#### Universal Station

**TDC Functions**

The Universal Station performs all TDC 3000 operator, engineering, and maintenance functions identically to the way they are performed at any other Universal Station.

The **process operator** can

- Monitor and manipulate both continuous and discontinuous processes or portions of a process, using standard displays or custom graphic displays.
- Annunciate and handle 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 and change 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.

The **process engineer** can

- 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.
- Verify the above entries by implementing and observing them through the operator’s personality of the Dual Personality US.

The **maintenance technician** can

- 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 a detailed description of the Universal Station functions, refer to the *Universal Station Specification and Technical Data*.

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### Key Universal Station** Features

- **Fully integrated Universal Station and UNIX (RISC) processors**
- **Power of TDC process control plus flexibility of X Windows**
- **Concurrent presentation of external data from multiple X Windows compliant devices**
- **Motif environment for re-sizing and moving windows**
- **Magnification capability using touchscreen**
- **Improved performance and higher resolution CRT displays**
- **Limited access for system security**
- **Fail-safe fallback to ensure view to the valve**
- **Dual CRT capability**

### Additional Features

Since Universal Station is a Universal Station with X Windows capability, the user has the option of operating the station like any other Universal Station or of invoking the X Windows environment. Figure 2 shows the System Status Display as it normally appears on a Universal Station—occupying the full CRT screen. Under X Windows the same display can occupy the full screen or, as Figure 3 shows, can appear reduced in size to accommodate other displays on the same screen. Even with multiple windows on one screen, the path to the valve can remain in view along with the information provided by the other displays.

Since cursor positioning on the screen is used for activating windows under X Windows, and also by TDC 3000 for making system selections and entries, options for cursor positioning are provided.
A touchscreen is standard, and either a mouse or trackball option can be selected. Both of these devices are equipped with pushbuttons for convenience of the user.

Standard X Window features that are supported include:
- Customized Title Bars,
- Scroll Bars,
- Resizing,
- Reduction to icon,
- Repositioning,
- Window overlaying and tiling, and
- Text font, size, and color selection.

Using X Windows procedures the LCN display can be moved, resized, and iconified (reduced to a small selectable image). A complete LCN display can occupy the full screen or reduced to a window that requires just 1/4 of the screen area. In either case, the window can be further reduced so as to expose only a portion of the display. Scroll bars then allow viewing of any desired area. Whatever its size, the LCN window responds to touchscreen selection and to the normal keyboard commands.

A zoom feature permits enlargement of a selected area of an LCN or X Windows application display. Touching the touchscreen at the desired location causes an enlargement of that area to appear in a small window nearby.

Security
The assurance of process security was a primary objective during the design of Universal Station\(^X\). Consequently, TDC 3000\(^X\) control is given the highest priority at all times. For this reason, the primary LCN window can be configured by the engineer so that it cannot be covered or overlapped by any other window.

The Operator and Engineering keyboards remain active regardless of which window is active. Furthermore, if a failure should occur in the X Windows/UNIX system, Universal Station\(^X\) is designed to revert to standard TDC 3000\(^X\) operation. In addition to the system security achieved through control system priority, further security is available as the result of user access definition. Each user, by name, is assigned an access level; depending on the level assigned, the functions that can be performed by that user may be restricted. This is discussed in more detail later.

HP-UX 9.0 contains the features intended to fulfill the U.S.
Department of Defense Trusted Computer Systems Evaluation Criteria for C2. This level of security includes an auditing facility for security relevant events, additional file access control lists for better file security, a shadow password file for storing encrypted passwords where only privileged users can read them, and security related documentation for system administrators and users.

RISC Processor Features

The RISC board used in the UXs is Hewlett-Packard’s Model 743 board, which contains their Precision Architecture RISC (PA-RISC) processor. The specific processor is the PA7100LC and it is available in two clock speeds - 64 MHz or 100 MHz. Both versions of the processor are available in the UXs and both include a built-in high performance floating point coprocessor. Memory Options are 32 MB, 64 MB, and 128 MB RAM. Hard disk options include 525 MB, 1.2 GB, and 2.4 GB. Table 1 contains the specific performance data on both versions of the processor.

The I/O for the RISC board includes:

LAN
- Type: IEEE 802.3/Ethernet
- Data Range: 10 MB/sec
- Connector: 15-pin micro D-sub

Networking Products
- NCS
- Berkeley 4.3
- TCP/IP
- BSD 4.3 Network Services
- ARPA Services
- DECnet supported as an option

SCSI Interface (1 available)
- Type: SCSI II: single-ended, 8 bit

- Data rate: 5 MB/sec synchronous, 1.5 MB/sec asynchronous with standard cable lengths
- Device limit: 7 devices
- Connector: ALT-1 of SCSI II 50-pin high density

Serial Interface (1 available)
- Type: EIA RS-232-C, CCITT V.24/V.28
- Data rate: 460.8 Kbps (16550A-compatible UART)
- Device limit: 1 per interface
- Connector: 9-pin female micro D-sub (adapter cable is available)

The following functions are included with the X Windows coprocessor:
- Plant Information Network communication protocols,
- X11R5 compliant, X Window server, and
- Terminal Emulators.

The protocols supported for PIN communication include TCP/IP and DECnet™.

Along with the server, Honeywell X Windows client applications can co-reside on the Universal StationX. The clients can execute on Universal StationX and use external PIN servers for display.

### Table 1 — UXs RISC Processor and Memory Features

<table>
<thead>
<tr>
<th>UXs RISC board Specifications</th>
<th>64 MHz</th>
<th>100 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPECint92</td>
<td>66.6</td>
<td>100.1</td>
</tr>
<tr>
<td>SPECfp92</td>
<td>96.5</td>
<td>137.0</td>
</tr>
<tr>
<td>MFLOPS (DP)</td>
<td>25.3</td>
<td>37.8</td>
</tr>
<tr>
<td>MIPS</td>
<td>77.7</td>
<td>121.6</td>
</tr>
<tr>
<td><strong>Memory management unit</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Virtual memory address</td>
<td>48 bit</td>
<td>48 bit</td>
</tr>
<tr>
<td>Instruction TLB and data TLB</td>
<td>120 page entries unified, 16 variable block entries unified, fully associated</td>
<td>120 page entries unified, 16 variable block entries unified, fully associated</td>
</tr>
<tr>
<td><strong>External Cache</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruction data cache size</td>
<td>256 KB</td>
<td>256 KB</td>
</tr>
<tr>
<td>Organization</td>
<td>Direct Mapped</td>
<td>Direct Mapped</td>
</tr>
<tr>
<td>Bus width</td>
<td>64 bits</td>
<td>64 bits</td>
</tr>
<tr>
<td>Instruction cache bus peak performance</td>
<td>512 MB/second</td>
<td>800 MB/second</td>
</tr>
<tr>
<td>Main memory type</td>
<td>ECC single bit correct, double bit detect</td>
<td>ECC single bit correct, double bit detect</td>
</tr>
<tr>
<td>Memory Options</td>
<td>32 MB, 64 MB, 128 MB</td>
<td>32 MB, 64 MB, 128 MB</td>
</tr>
<tr>
<td>Main memory bus width</td>
<td>64 data bits w/8 check bits</td>
<td>64 data bits w/8 check bits</td>
</tr>
<tr>
<td>Main memory bus peak performance</td>
<td>128 MB/sec (64 byte duration)</td>
<td>133 MB/sec (64 byte duration)</td>
</tr>
<tr>
<td>System DRAM technology</td>
<td>60 ns, 4 &amp; 16 MB DRAM</td>
<td>60 ns, 4 &amp; 16 MB DRAM</td>
</tr>
<tr>
<td>Memory cards sizes</td>
<td>32, 64 MB</td>
<td>32, 64 MB</td>
</tr>
</tbody>
</table>
and external clients on the PIN can use the Universal StationX server for display.

All common terminals that are character based—such as DEC™ vt100, DEC vt220, ADM3a, and Televideo terminals—are supported as part of the X Windows product. Graphics terminals—such as DEC vt340—are supported on a customer purchased license basis.

Software

Universal StationX encapsulates the existing TDC operating environment with extensions that enable the dual operating environment. Universal StationX software uses the standard Universal Station Personality as provided for software Release 430 as its primary software platform. Through this platform, all current Local Control Network operator and engineering functions are incorporated. The specific software necessary to support the Motif Window Manager and X Windows are added to the platform to provide the Universal StationX features.

Anytime the X Windows coprocessor is restarted after being idled, the user name and password must be entered. Each person who is authorized to start the coprocessor is assigned one of four possible levels of access:

- View Only,
- Operator,
- Supervisor, and
- Engineer.

Universal StationX is provided with coprocessor software that greatly simplifies many procedures that are commonly performed by the various types of users. Figures 4, 5, and 6 illustrate the root menu and major submenus that are available at the click of the mouse, and a brief description of the functions that are configured for all systems. Users with UNIX expertise have the option to customize menus and to create new software to meet whatever unique requirements they may have.

Workstation software is required to take advantage of the open systems capability of Universal StationX. Honeywell has identified commercially available third party software that permits information transfer from Macintosh™ and PC computers. These packages reside in external computing devices—not on Universal StationX. Contact your Honeywell representative for details.

UXS Release 200 Software

Universal StationX R200 software adds enhancements to the base platform which builds upon HP-Ux 9.0, provides X11R5, OSF-Motif 1.2 and adds new features such as enhanced touchscreen support, and window frame with pulldown menus. The following identify the main components of Universal StationX R200.

- Base Platform:

  The base platform for the UXS software has been upgraded to HP-UX release 9.0 running on RISC processor. The X window server software has been upgraded to X11 revision 5 (X11R5). This is the next generation of UNIX operating system which supports OSF-Motif 1.2 drag and drop.

- HP-UX Operating System

  The HP-UX Operating System included with the UXS software is HP-UX 9.05 and it comes on DAT tape. This is the latest version of the HP-UX operating system for HP 9000 Series 700 and Series 300 and 400 workstations. HP-UX conforms to X/Open’s Portable Guide Issue 4 (XPG4), Federal Information Processing Specification (FIPS) 151.1, POSIX 1003.1 and POSIX 1003.2. It conforms to AT&T’s System V Interface Definition 2 (SVID 2). HP-UX also incorporates selected features from the University of California at Berkeley Software Distribution 4.3 (4.3BSD).

  This operating system also comes with a number of "Ease of Use" functions:

  - HP VUE 3.0

    HP VUE 3.0 is a simple, intuitive, point-and-click user interface for HP-UX. It includes many features such as individual workspaces for different tasks, a "dashboard" with commonly used functions, a File Manager that performs common file operations using icons, drag and drop, slide-up toolboxes, a Motif based text editor (VUEpad) - you are not forced to use "vi," and a variety of productivity tools.

  - System Administration Manager (SAM)

    SAM greatly eases many common system administration tasks, such as adding users, configuring peripherals, configuring networking, managing processes, and many others. SAM includes both Motif and terminal interfaces.
### X Menu

- **Shuffle**
  - Moves the active X Window between foreground and background.
- **Native Window**
  - Allows the native LCN window to be partially obscured.
- **Keyboard Focus Policy**
  - Configures window behavior attribute.
- **X Host Authorization**
  - Authorizes remote computing resources to display X applications on this station.
- **Window Print**
  - Prints the contents of the selected window.
- **Refresh**
  - Performs a redraw of the X application windows.
- **Restart**
  - Restarts (resets) the Motif Window Manager.
- **Logout**
  - Sends a kill message to all X hosts to close open applications, logs the user out, and idles the coprocessor.

**Figure 4 — View Only Root Menu with X Menu**

### Applications Menu

- **Unix Load**
  - Bar chart display of UNIX processor loading.
- **Calculator**
  - Full function calculator.
- **Datebook**
  - Calendar/Datebook. A window can be made to appear upon occurrence of an event.
- **Telenet**
  - Accesses the TELNET TCP/IP protocol.
- **DECnet**
  - Accesses the DECnet protocol.
- **Change Password**
  - Allows change of login password.

**Figure 5 — Engineer Root Menu with Applications Menu**
Update and Install
Update is a feature that greatly simplifies the procedure of installing and updating both the operating system software and application software.

X Window and Starbase
These are the run-time components for X11R4 and X11R5, as well as Starbase and Starbase Display List. These components provide both client and server support for X Window-based applications. HP's X Window system allows applications written in GKS, Starbase, and other graphics libraries to have full access to HP graphics capabilities.

The HP-UX also comes with a number of built-in Networking features:

TCP/IP Networking
TCP/IP-based services in HP-UX include:

ARPA/Berkeley services-telnet, ftp, rlogin, remsh, sockets, tftp, rwho, finger, gated, BIND, and a number of others.

These TCP/IP services are supported over FDDI, IEEE 802.3 and Ethernet. Kernel support for AT & T Stemas is included in HP-UX RunTime. Stemas itself is available as a separate product. Network File Systems (NFS) provide transparent file sharing and distributed applications between multivendor systems.

NetStart
NetStart provides the capability for a workstation to do a cold boot from a server over the network, and then load enough code from the server to reboot and do a network update of HP-UX.

Network Computing System (NCS)
NCS supplies a standard Remote Procedure Call (RPC) mechanism for running distributed client/server applications.

Other Networking Products
There are many other networking products that are available separately for HP-UX. These include:

FDDI interface hardware
OSI products
X.400
X.25
ISDN
Apollo Token Ring
SNA and other IBM connectivity products

HP-UX also allows for Asynchronous Data Communications:
Communication services include the asynchronous multiplexer manager software, which supports CCITT modem
communication, BSD job control, block-mode communication, and nonblocking I/O. The asynchronous multiplexer manager supports communication with other operating systems via one or more multiplexer channels, and hardwired or modem links using the uucp capabilities of HP-UX. The uucp commands provide file transfer, remote process execution, and virtual terminal capabilities.

• **Touchscreen Enhancements**

Touchscreen enhancements are provided with UX/S Release 200. A configuration option - via a control panel - will allow the touchscreen to emulate a three button mouse. This allows the capability for drag and drop and point and click. This feature takes advantage of a function in the I/R technology touchscreen that can detect the presence of multiple pointing devices in the touchscreen.

When multiple pointing devices are detected, the TPDG hardware in the UX/S simulates a mouse emulation mode. This touchscreen enhancement is user configured on a system wide or user specific basis. Touchscreen enhancement requires Revision B of the TPDG firmware.

• **Dual CRT Support**

The dual-CRT function of UX/S Release 200 allows one set of UX/S electronics to control two CRTs. When the dual-screen feature is selected, screen positioning can be configured in either one-over-one or side-by-side CRT arrangement. With UX/S Release 200, all UX/S nodes must be configured to determine whether they are a single- or dual-screen version.

If the UX/S is a dual-screen configuration, then the viable options for configuration must be either an over-under or side-by-side configuration. Dual-CRT support is an option requiring a high-resolution RISC board. If the dual-CRT option is not selected, then this high-resolution RISC board is not required.

Dual-CRT support utilizes one set of electronics, keyboard, and pointing device (trackball or mouse), providing both operational access and overview to the system. Cursor movement from one screen to another is a user configured option. The user configures whether the relative pointing device (trackball or mouse) is allowed to move the cursor from one screen to another or whether a Motif Window Manager menu item is used to switch screens. Touchscreen capability will only be available with the primary CRT in a dual-CRT configuration.

Dual CRT support still provides only a single native LCN window in the lower tier, with the second CRT capable of supporting multiple Plant Information Network (PIN) applications and up to four multiple schematics—a separate optional software package. This capability provides a significant cost savings for our customers.

• **Native LCN Window**

The native LCN window has undergone enhancements. Firstly, the style of the windows and its associated frame have been changed (see Figure 7). A menu bar has been added containing zoom and option menus. The zoom menu is used to select the zoom factor of the native window to be either 100% or 200%. The option menu is used to control the behavior of the native LCN window. Currently defined behaviors are: allow partially obscured, fully obscured, magnify to fit in LCN window, and disable zoom touch when 200% zoom is selected. A window menu item has been added to allow users to maximize the window and set zoom factor to 200%. This is accomplished by use of an accelerator key.

Scroll bars can now be configured to be only visible when a portion of the native
LCN window is clipped. If all of the window is visible within the frame, the scroll bar will not be visible. This enhancements allows for full viewing of the LCN window.

• **Key Repeat Timer**

This capability allows the user to configure the response of keyboard interaction. There are three predetermined settings: slow/normal/fast or the user can select exactly how often (in milliseconds) a key is to be repeated.

• **Zoom Touch**

A configuration parameter has been provided to the X server that will disable zoom touch in the native LCN window, if the scale factor of the native LCN window is 200%.

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### Options

A Laser Printer is available for producing a hard copy of any selected window displayed on the Universal Station\(X\). The user should be aware that this printer requires additional time to print a copy of the Native LCN Window compared with a standard LCN printer screen print. Network printing will be available.

**Network Printing Facility with U\(X\)S**

Beginning with U\(X\)S Release 200, the printing of an X window displayed on the U\(X\)S screen will be accomplished by a network printing facility. Honeywell provides, as an option, a laser printer (Laser Jet 4/Plus) and a network interface connection (JetDirect) to support network printing. The network interface connection consists of two components: a card that is inserted in either a Laser Jet 4 or Laser Jet 4/Plus printer and software (DAT media) that can be loaded on the U\(X\)S. The interface connection greatly improves the printing speed and, at the same time, eliminates the need for having the laser printer directly connected to the U\(X\)S station.

**Laser Jet 4/Plus Printer**

The Laser Jet 4/Plus is an improved laser printer now being offered by Honeywell to support U\(X\)S X Windows printing capability. Specific attributes of the printer are as indicated:

- Faster printing at 12 pages per minute
- 600 X 600 dpi resolution
- Memory enhancement (MEt) allows printer to print more complex graphics and scanned images with standard memory
- Over 120 levels of gray produce smooth transitions
- Support JetDirect interface cards enabling network connections easier and faster

**CD ROM Drive**

Starting with Release 200, a CD ROM drive as been qualified as an added option on our U\(X\)S stations.

The CD ROM drive is required in this release to access UNIX documentation.

The CD ROM documentation disc comes with the license to operate and one user’s certificate; additional user's certificate can be purchased at additional cost.

This enhancement to the U\(X\)S enables the customers to save money and shelf space on costly cumbersome paper documentation and updates. With the CD ROM drive, customers could enjoy the convenience of on-the-screen, simple and direct access to comprehensive UNIX manuals and instructions.

Furthermore, because the CD ROM drive resides on the X side of the U\(X\)S, it can be accessed by all X terminals and workstations through the Ethernet network; therefore, at a minimum, customers would need only one CD ROM drive per Ethernet network. The drive is also a good investment for many years to come as the trend for documentation is shifting from paper to CD ROM media.

This 2-speed CD ROM drive has been qualified to be an integrated device on our furniture.

It can be mounted at three possible locations: on the classic furniture, the drive can be mounted in either the Upper Half Tier or in the adjacent table top work surface. On the new furniture, the drive can be mounted in the Cartridge/DAT tape housing (behind the flip-up door).

The CD ROM drive is offered as an optional item because customers could use their own CD ROM drive (on PC or HP 712/60 stations) to read UNIX documentation. Note that while CD ROM drives on PC can still access the documentation, they do not retain the user-friendly and professional documentation format and layout provided by those on U\(X\)S or System Administration stations. Moreover, having to get up and go to another location to access documentation on the PC could prove to be frustrating (and costly) after a while. The following provides technical information about the CD ROM drive:

- **Application discs:**
  - Red Book, Yellow Book, CDROM-AX, CD-Graphics, Photo-CD Multisession, CD-Bridge, and CD-1 Ready

- **Data Buffer Capacity:**
  - 64 Kbytes, min.
• **Disc Rotational Speed:**
  1X: approx. 200-530 rpm
  2X: approx. 400-1060 rpm

• **Sustained Block Transfer Rate:**
  75 blocks/sec (1X)
  150 blocks/sec (2X)

• **Sustained Data Transfer Rate:**
  150 Kbytes/sec (1X, Mode 1)
  300 Kbytes/sec (2X, Mode 1)
  171 Kbytes/sec (1X, Mode 1)
  342 Kbytes/sec (2X, Mode 1)

• **Burst Data Transfer Rate:**
  1.5 Mbytes/sec (ASYNC)
  4.2 Mbytes/sec (SYNC)

• **Random Average Access Time:**
  325 msec, typ.; 350 msec, max (1X)
  250 sec, typ.; 300 msec, max (2X)

• **Full Stroke Ave Access Time:**
  480 msec, typ.; 660 msec, max (1X)
  350 msec, typ.; 550 msec, max (2X)

• **Average Disc Spin Up Time:**
  1.2 sec, typ.; 1.5 sec, max.

**Pointing Devices**
Either a trackball or mouse can be installed in the Universal Station\(^X\).

**Packaging**
Current Universal Station\(^X\) furniture contains 19” CRTs that feature a new high resolution display (1280 x 1024 pixels). The new ergonomic furniture design uses a larger 21 inch flat screen CRT, also of high resolution (1280 x 1024 pixels).

At least one Universal Station\(^X\) on the LCN network requires a Cartridge Drive. It is used for loading TDC 3000\(^X\) devices with upgrade software and for backup and checkpointing tasks on the network.

In addition to the optional X Windows software for Universal Station\(^X\) previously described, other third party software and Honeywell application software is available or soon will become available for Universal Station\(^X\).

Ask your Honeywell representative about the latest products.

**Physical Description**

**Universal Station\(^X\) Packaging**
The Universal Station\(^X\) can be supplied in either the current TDC 3000\(^X\) furniture or the new ergonomic furniture.

**Current Furniture**
When supplied with the current furniture design, Universal Station\(^X\) uses new 19 inch high-resolution, 1280 x 1024 pixel, “pillow” type CRTs.

A Universal Station\(^X\), with the new CRT, can be installed in your existing US furniture.

**Universal Station\(^X\) Ergonomic Furniture**
Figure 8 shows an example of the new ergonomic console with both lower and upper tier screens. Its more open appearance incorporates technologies of the 1990s, and has been designed to improve the physical user interface.

The membrane-type QWERTY style operator’s keyboard is an integral part of the furniture’s worktable.

**TDC 3000\(^X\) Integrated Keyboard (R510 Only)**
The Universal Station\(^X\) will also be available with a new Integrated Keyboard. This Integrated Keyboard is a combination of both an operator and engineering keyboard into one effective package that is suitable for console use. (See Figures 9 and 10.)
Figure 9 — Console Design Integrated Keyboard

Figure 10 — Desk Top Design Integrated Keyboard - available with UWS
Ergonomic improvements include a tilting operator’s keyboard and a full-travel engineer’s keyboard. A slide-out shelf is provided to accommodate the engineer’s keyboard. If the engineer wishes, the “roving” engineer’s keyboard design permits its removal for storage and security away from the control room.

Three console base heights are available. When ordering, you may choose a height of 650, 700, or 750 mm from the floor to the bottom of the console table. The furniture employs 21 inch high-resolution flat-screen displays. Like the earlier consoles, empty pods can be provided to accommodate auxiliary devices such as pen recorders, meters, telephone stations, and pushbuttons.

The new furniture provides additional flexibility by allowing the user to arrange the console in the common curved configuration or in a straight line. To eliminate gaps and provide a contiguous look, wedge inserts are provided for securing consoles that are to be arranged in a circular configuration. Also wedges can be supplied with upper tiers to provide either a 15° or 30° forward tilt.

**Universal Station**

Electronics for the Universal Station are provided in the TDC 3000 five-slot package. Up to two standard TDC card files for any LCN node can be installed on a single pedestal, as illustrated in Figure 8.

The Universal Station board compliment consists of:
- TPDG—high speed dual ported graphics board,
- TPDG I/O—provides I/O connections for TPDG board,
- WSI—Work Station Interface board with UNIX (RISC) coprocessor (64 MHz or 100 MHz version) and 32 MB, 64 MB, 128 MB RAM memory selection,
- WSI I/O—provides I/O connections for the WSI board,
- K2LCN-8/K4LCN-8 —LCN processor, interface, and memory, and
- K2LCN I/O—provides I/O connections for K2LCN-8 board.

An 8 amperes power supply is used in the five-slot electronics package.

The Universal Station uses an industry-standard engineer’s keyboard, shown in Figure 11, for input and control of its operation. Color coding is used to distinguish between LCN control keys, X Windows control keys, and keys common to both platforms.

The Universal Station touchscreen CRT provides high resolution with its 1280 x 1024 pixel display in either a 19 inch pillow screen for current furniture or a 21 inch flat screen for the new furniture.

Figure 8 illustrates two optional full height upper-tier modules containing additional CRT displays.

Either a trackball or mouse may be used with the Universal Station. The mouse has three buttons. Either of the two outside buttons (left or right) perform the Select function and the center button performs the Enter function. The trackball has two buttons.

Hard disc capacity is user selectable. Choice selections include 1 GB or 2 GB hard drive. The drive capacity is expandable allowing up to either two 1 GB or two 2 GB hard drives. The hard disk is provided to store software for the Universal Station. This hard disk contains the operating files for the UNIX, the X Windows application, and other files the user may store in the Universal Station.

The UNIX processor bootload is accomplished with a DAT (digital audio tape) drive housed no one Universal Station on the PIN network. The DAT and cartridge disk drives are located between the operator keyboard and the CRT.
Figure 11 — Universal StationX Engineer’s and X Windows Keyboard
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)
Specifications

Physical Measurements

Card File Measurements (5 Card)

<table>
<thead>
<tr>
<th>Approximate Dimensions</th>
<th>Approximate Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height 18.8 cm (7&quot;)</td>
<td>21 kg (46 lb)</td>
</tr>
<tr>
<td>Width 48.3 cm (19&quot;)</td>
<td></td>
</tr>
<tr>
<td>Depth 53.3 cm (21&quot;)</td>
<td></td>
</tr>
</tbody>
</table>

Power Supply

Universal AC Input: 102-264 Vac (autoranging); 47-63 Hz (frequency range)

The Universal StationX operates without disruption through an interruption in the AC voltage of up to 40 ms duration.

CRT Power

Auto-selected Voltage

- 90 - 132 Vac
- 198 - 264 Vac

Frequency

- 47 - 63 Hz

For detailed Universal StationX power requirements, see the LCN Site Planning manual.

Configuration Capability

- Maximum number of consoles per LCN: 10
- Maximum number of stations per console: 10