Honeywell

Five/Ten-Slot Module Service

LC13-500

INTRODUCTION
Section 1

1.1 OVERVIEW

This manual provides detailed instructions for maintenance, testing, troubleshooting and repair of the Five- and Ten-Slot Modules (part of the TDC 3000^X system). A typical Five-Slot Module is shown in Figure 1-1. The troubleshooting, disassembly, and assembly procedures are effective down to the optimum replaceable-unit (ORU) level. A spare parts list (subsection 5.1) contains ORU parts and is keyed to a module exploded view that is also used with the disassembly and assembly procedures.

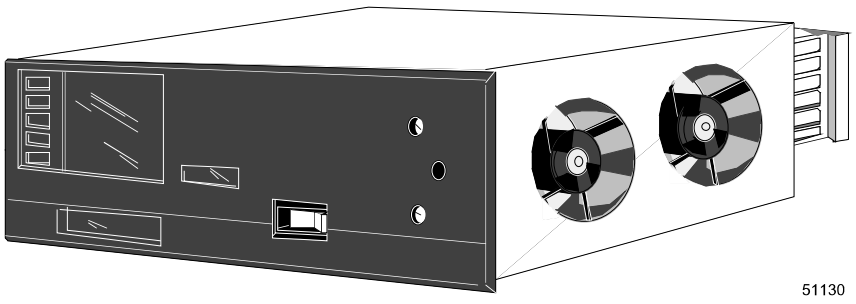

Figure 1-1 — Five-Slot Module

1.2 RELATED PUBLICATIONS

The following publications apply to the TDC 3000X system and should be referred to as required:

Title	Binder
LCN System Installation	LCN Installation
LCN System Checkout	LCN Installation
Universal Station Service	LCN Service - 1
Universal Station (Ergonomic) Service	LCN Service - 1
Universal StationX Service	Universal StationX
Universal StationX (Ergonomic) Service	Universal StationX
History Module Service	LCN Service - 2
Dual Node Module Service	LCN Service - 2
Maintenance Test Operations	LCN Service - 1
System Maintenance Guide	LCN Service - 1
Application ModuleX Service	Application ModuleX

MODULE DESCRIPTION
Section 2

2.1 GENERAL DESCRIPTION

The Five- and Ten-Slot Modules are configured to perform various functions, such as Applications, Gateways, History, and Universal Stations in the TDC 3000^X system. Each module occupies a specific address (node) on the Local Control Network (LCN). Figure 2-1 shows the module functions within a typical TDC 3000^X system.

The configuration flexibility is because of the inter-changeability of the component card assemblies (boards) in the module. In addition to the boards within the module, there are also companion input-output (I/O) boards mounted in a chassis on the rear of the module. The I/O boards facilitate interconnection of the module to the LCN or with the Data Hiway, Universal Control Network (UCN), external devices, and communication lines. The module also contains a power supply, located in the bottom of the unit, and a cooling-fan assembly, located on the right side.

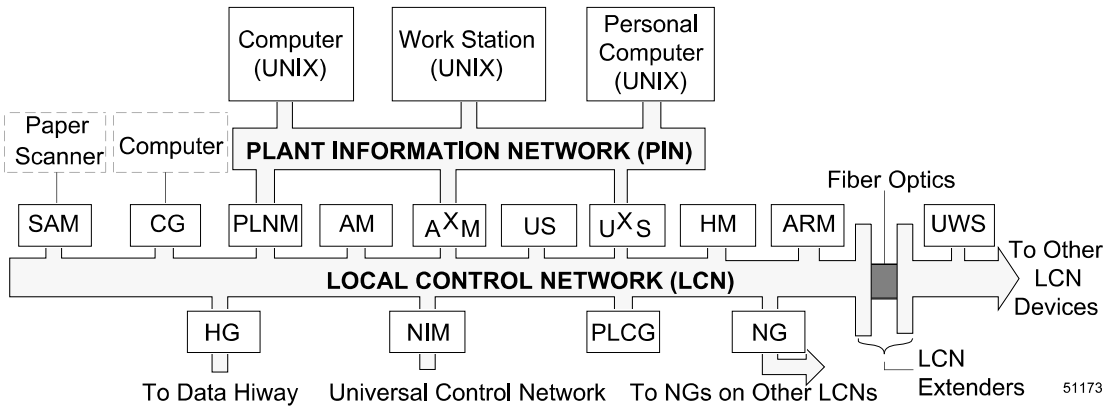

Figure 2-1 — TDC 3000^X Module Functions

The modules are designed to be mounted in the Honeywell TDC 3000^X system equipment cabinet and Universal Station console bays that conform to the industry standard 19-inch rack mount. If mounting racks other than Honeywell's are used, care must be taken to ensure that the cooling-fan air flow is not blocked and that adequate air filtration is provided.

2.1.1 CONTROLS AND FEATURES

The front of the Five/Ten-Slot Module has a single ON/OFF ac power switch that controls the alternating current to the power supply. This switch is shown in Figure 2-2. When the power switch is in the ON position, LED indicators can be seen through the see-through portion of the front cover panel.

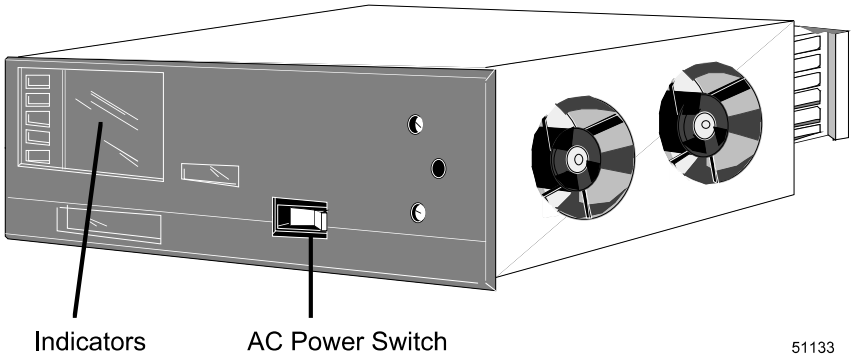

Figure 2-2 — Five-Slot Module Front View

The rear side of the module has several connectors that are used as shown in Table 2-1.

Table 2-1 — Five-Slot Module Connector Usage

CONNECTOR	USAGE
J2	Ac Power Cord
J5	Remote Reset
J7	Precision Clock Input
J8	+5 Vdc and +12 Vdc Power for Peripherals
J9	+5 Vdc and +12 Vdc Power for Peripherals
J10	24 Vdc for Fan Power on Cartridge/Floppy/History Module Assemblies

When a Five-Slot Module that is located in a Universal Station (US) that has a floppy drive or cartridge drive, the power supply (51201436) can be used as a power source to drive the floppy drive or cartridge drive and to power the cooling fan for the cartridge drive. Connector J8 is used for the drive power, but J9 provides the same power connection.

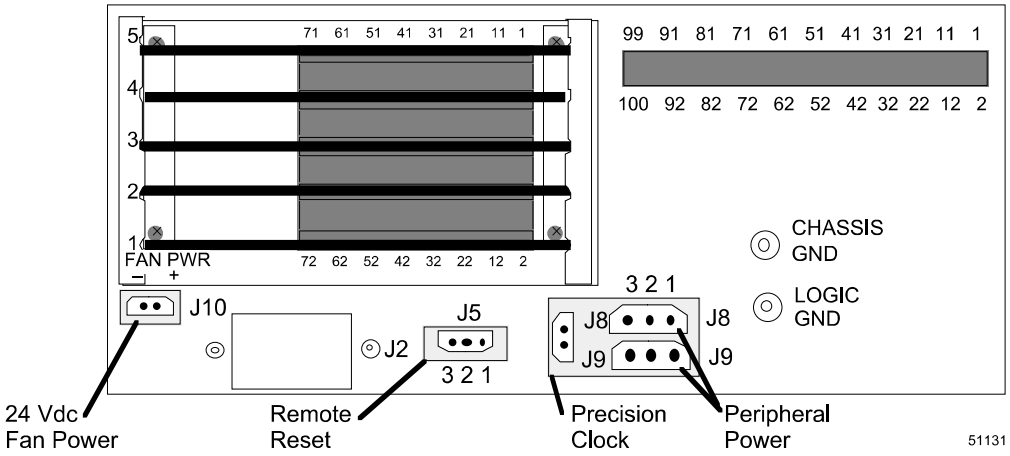

Figure 2-3 — Five-Slot Module Rear View

The CE compliant Five-Slot Module is capable of holding both I/O board designs.

- The original design I/O boards function as they always have.
- The CE compliant I/O boards mount to the card file with screws. This grounds the I/O board face plate and the cable shields that connect to the face plate.

The CE compliant cardfile is the same in all other respects.

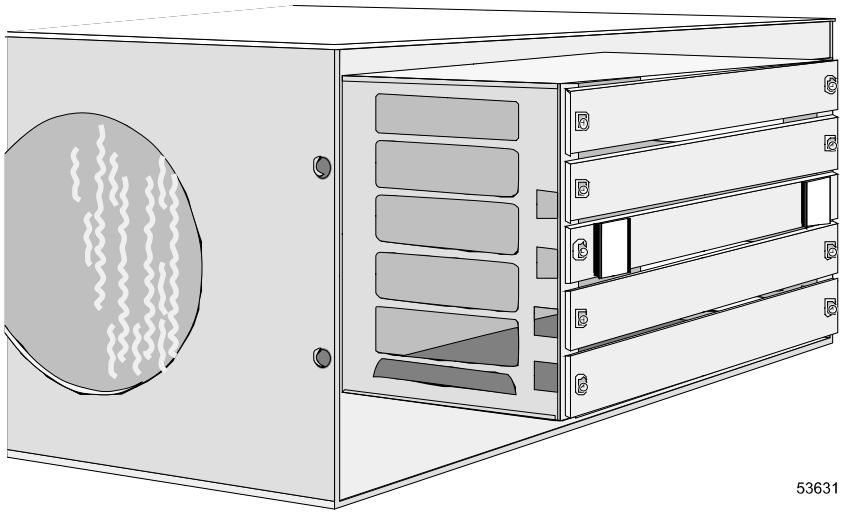

Figure 2-4 — CE Compliant Five-Slot Module I/O Card File

2.2 MODULE CONFIGURATIONS

Module functions are determined by the board complement assigned to them. The board slots on both the front and rear of the unit are numbered from 1-to-5 or 1-to-10 with slot number one at the bottom. Tables 2-7 through 2-25 (odd numbered) show the board arrangements for the various factory-built module types configured to run with the latest software release, R400. Tables 2-8 through 2-26 (even numbered) show the various modules that can be upgraded to the R400 release. Please note that some module types may occur in either Five- or Ten-Slot Module configurations.

Table 2-2 — Configurations and Peripherals

Configuration/ Peripheral	Description	Boards Used
Standard Performance	68000 Processor	EMPU
High Performance	68020 Processor	HMPU or HPK2-x
Interlaced Monitor	"Standard" 19 inch color monitor mounted in the Universal Station and driven by separate red, green, and blue signals on coaxial cables.	PIC, VDG, & VDG I/O or PDG & PDG I/O* or EPDG & PDG I/O**
13" Monitor	A stand-alone color monitor, smaller but electrically similar to the interlaced monitor. Driven by three TTL signals. Used in the Universal Workstation (UWS).	PDG & PDG I/O^{TTL*}
Noninterlaced Monitor	An "Enhanced Display" 19 inch color monitor mounted in the Universal Station offering a sharper, clearer picture than the interlaced monitor. It is driven by a ribbon cable.	EPDG & EPDG I/O or EPDGP I/O
14" Monitor	A stand-alone color monitor, smaller but electrically similar to the noninterlaced monitor. Used in the Enhanced UWS.	EPDG & EPDG I/O or EPDGP I/O
Lower Tier	A part of the Universal Station cabinet containing a monitor. It is mounted in front of the operator, just above the keyboard.	
Upper Tier	An additional location on the Universal Station for a monitor to be mounted above the lower tier. No keyboard is available. A separate Five-10 slot module is required.	
21" FST Monitor	Monitor for Universal Station^{X} that is a flat square tube with high resolution graphics (1280 x 1024 pixels).	TPDG TPDGX TPDG I/O
Hard Disk Drive Tray (HDDT)	Holds one or two disk drives (525 MB or 1 GB) for WSI2 coprocessor.	WSI WSI2 I/O

* There are 2 different types of PDG I/O boards—see Table 2-5.
** If an EPDG board drives a PDG I/O board, it may drive an interlaced monitor.

Module configurations change for several reasons, some of which are:

- Hardware components (such as processors, hard disk drives, cartridge drives, and others) are introduced which offer faster operation, more storage, or more functionality.
- The basic design of peripherals (such as monitors, drives, keyboards, and others) may change, requiring modifications in the electrical circuits servicing them.
- A new software release containing greater functionality may require more execution speed or more memory.

Table 2-2 describes hardware configurations and peripherals which you may encounter in this manual.

2.2.1 Board Application Notes

The board types listed in Tables 2-2 through 2-5 are the current production board types. Table 2-3 briefly describes the features of the newest boards and the minimum software releases that they require.

Many boards, in addition to those listed in Table 2-3, still operate satisfactorily with R400. All of these boards, including brief descriptions and part numbers, are listed in Tables 2-4 and 2-5.

Table 2-4 lists the functional boards that are installed at the front of the 5/10 slot module. Table 2-5 lists the I/O and special-purpose paddle boards that are installed in the back of the module. An I/O board is normally installed directly behind the functional board it serves, as shown in the configuration tables in subsections 2.2.2 through 2.2.11. Special-purpose boards can generally be installed in any unused I/O slot, but check the appropriate service manual if you don't know where a board will operate satisfactorily.

NOTE

Under certain circumstances, the K2LCN OR K4LCN processor board can be used to replace HPK2 and EMPU processors. In the case of EMPU replacement, there may be a performance enhancement. The restrictions and procedures involved in this replacement are covered in detail in Appendix B.

Table 2-3 — Board Replacement Notes

Board Type	Description	Minimum Software Release
EMEM	1 MB memory board used as main memory with MCPU and EMPU boards. This board also is used as additional memory with HMPU and HPK2 boards.	200
EPDG	With the PDG I/O board, operates as a PDG with the interlaced monitor, and can replace the PDG or VDG/PIC.	200
EPDG	With the EPDG or EPDGP I/O board, operates as an EPDG with the noninterlaced monitor. Also has a Cartridge Disk interface.	210M1
EPDGP I/O	EPDGP I/O board (Tab-300) with jumper (J11) for DIRECT or INVERT of vertical sync signal. Vertical sync for 21" FST monitors in XC3000 consoles require inverted sync signal.	300
HMPU	68020 processor and memory (2 MB) board replaced by HPK2 in current production (except in redundant AMs). The HMPU board also contains a floating-point coprocessor.	200 (HG) 210 (All)
HPK2-2	68020 processor with 2 MB of on-board memory that replaces an HMPU, EMPU, and MCPU in all modules except redundant AMs (MCPU is not recommended for R400).	210M1
HPK2-3	68020 processor and memory (same as HPK2-2 with 3 MB).	230
K2LCN-x	68020 combined processor, memory and LCN interface (eliminates LCN board and external memory boards). Available with x = 2, 3, 4, 6, or 8 MB of on board memory.	320
K4LCN-x	68040 combined processor, memory and LCN interface (eliminates LCN board and external memory boards). Available with x = 4, 8, or 16 MB of on board memory, ordered separately.	R500
LLCN	Replacement for LCN board. Uses low power consumption circuits. Operates with LCN I/O board.	Any
QMEM-1	This board type has been withdrawn. Use EMEM for additional memory of 1 megaword increments.	200
QMEM-2, 3, 4	Quad Memory board of 2, 3 or 4 MB capacity. Memory capacity cannot be increased in the field. Each has a unique ID.	300
TPDG	With TPDG I/O drives a 21" FST monitor in a Universal Station^X.	410/U^{X}S R100
TPDGX	With TPDG I/O drives a 21" FST monitor in a Universal Station^X requires WSI2.	410/U^{X}S R200
WSI	Release 100/110 Workstation Interface for Universal Station^X.	410/U^{X}S R100
WSI2	Release 200 Workstation Interface for Universal Station^X. Board has replaceable memory daughter boards in sizes = 2-16 MB, 3 2 MB, 2-32 MB, 64 MB, or 2-64 MB.	410/U^{X}S R200
WSI2R I/O	Replaces WSI I/O in R100 units updated to R200 with WSI2 board.	R200
WSI2 I/O	Used with WSI2 board in new build units and units upgraded from US to UXS (R200) by upgrade kits MP-ZUXCC2 or MP-ZUXNC2.	R200

Table 2-4 — Functional Board Types

Board Type	Description	Part Number
AMR	Redundant AM Interface	51401070-100
CLI	Communications Line Interface	80360206-001
CNI	Communications Network Interface	51401088-100
DHI	Data Hiway Interface	51400700-100
EAMR	Enhanced Application Module Redunancy	51401996-100
EMEM	1 MB Enhanced Memory	51400910-100
EMPU	Enhanced Microprocessor board	51400901-100
EPNI	Enhanced Network Interface	51401583-100
EPDG EPDG-2	Enhanced Peripheral Display Generator	51401286-100 51402089-100
FDC	Floppy Disk Controller	51400669-100
HDDT	Hard Disk Drive Tray	51402176-100
HMPU	High Perf. Module Processor Unit (incl: Coprocessor, 2 MB mem.)	51400978-100
HPK2-2	High Perf. Module Proc. (incl: 2 MB memory, no coprocessor)	51401288-100
HPK2-3	High Perf. Module Proc. (incl: 3 MB memory, no coprocessor)	51401288-200
K2LCN-x	68020 High Density Kernel (2, 3, 4, 6, 8 MB of memory)	51401551-x01
K4LCN-x	68040 High Density Kernel (4, 8, or 16 MB of memory) Separate 4 MB of memory Separate 8 MB of memory Separate 16 MB of memory	51401946-100 51201645-400 51201645-800 51201645-160
LCN	Local Control Network Interface	51400667-100
LLCN	Low Power LCN Interface	51401291-100
MMEM	Memory Board, 1 MB	8036211-100
MMEM	Memory Board, 3/4 MB	8036211-200
NGI	Network Gateway Interface	51401583-200
PDG	Peripheral Display Generator Interface	51400926-100
PLCI	Programmable Logic Controller Interface	51400997-100
PMEM	2 MB Memory	51400903-100
PNI	Process Network Interface	51400955-100
PNM	Process Network Modem	51401163-100
QMEM-x	2 to 4 MB Quad Enhanced Memory (x = 2, 3, or 4 MB)	51401072-x00

(Continued)

Table 2-4 — Functional Board Types (Continued)

Board Type	Description	Part Number
SIO	Serial Input Output Interface	51400655-100
SPC	Smart Peripheral Controller	51401052-100
TPDG	Turbo Peripheral Display Generator	51402000-200
TPDGX	Turbo Peripheral Display Generator (high speed)	51402610-200
VDG	Video Display Generator	51400665-100
WSI	Workstation Interface (16 MB memory)	51304791-300
WSI	Workstation Interface (32 MB memory)	51304791-400
WSI2	Workstation Interface (64 MHz PA-RISC) memory separate	51402083-100
WSI2	Workstation Interface (100 MHz PA-RISC) memory separate	51402083-200

I/O boards with the letters "EC" in the description are EC compatible designs that provide grounding for shielded cables.

Table 2-5 — I/O Board or Paddle Board Types

Board Type	Description	Part Number
AMR I/O	Redundant AM Interface I/O	51304159-100
AMR I/O	AM Redundancy I/O EC	51304159-200
CLCN-A	LCN I/O Board (Dual Node LCN Coax A I/O Board) EC	51305072-200
CLCN-A	LCN I/O Board (Dual Node LCN Coax A I/O Board) Replaces KLCN-CA	51305072-500
CLCN-A	LCN I/O Board (Dual Node LCN Coax A I/O Board) EC	51305072-800
CLCN-A/B	LCN I/O Board EC	51305072-100
CLCN-A/B	LCN I/O Board	51305072-400
CLCN-A/B	LCN I/O Board EC	51305072-700
CLCN-B	LCN I/O Board (Dual Node LCN Coax B I/O Board) EC	51305072-300
CLCN-B	LCN I/O Board (Dual Node LCN Coax B I/O Board)Replaces KLCN-CB	51305072-600
CLCN-B	LCN I/O Board (Dual Node LCN Coax B I/O Board) EC	51305072-900
CLI I/O	Communications Line Interface I/O (RS-232C)	80360209-001
CLI I/O	Communications Line Interface I/O (RS-449)	80360230-001
CLI/A	Communications Line Interface (RS-449) EC	51196701-100
CNI I/O	Communications Network Interface	51304537-100
CNI I/O	Communications Network Interface I/O Board EC	51304537-200
CS/R	Clock Source/Repeater	51109919-100
CS/R	Clock Source/Repeater (with Precision Clock also called PCS/R)	51304286-100
CS/R	Clock Source/Repeater EC	51304286-200
DHI I/O	Data Hiway Interface I/O	51108088-100
DHI I/O	Data Hiway Interface I/O Board EC	51108088-200
EPDG I/O	Enhanced Peripheral Display Generator I/O	51304270-100
EPDGC-1	Enhanced Peripheral Display Generator I/O Board-1 EC	51402447-100
EPDGC-2	Enhanced Peripheral Display Generator I/O Board-2 EC	51402447-200
EPDGP I/O	Enhanced Peripheral Display Generator I/O (replaces EPDG I/O)	51304584-300
EPLCI I/O	Enhanced Programmable Logic Controller Interface I/O	51304812-100
EPLCI I/O	Enhanced Programmable Logic Controller Interface I/O EC	51304812-200

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Table 2-5 — I/O Board or Paddle Board Types (Continued)

Board Type	Description	Part Number
FDC I/O	Floppy Disk Controller I/O	51109336-100
FOC/RCVR	Fiber Optic Link Receiver Board EC	51304161-400
FOC/XMTR	Fiber Optic Link Transmitter Board EC	51304161-300
FOCR	Fiber Optic Clock Receiver	51304161-200
FOCT	Fiber Optic Clock Transmitter	51304161-100
HDDT I/O	Hard Disk Drive Tray I/O	51402176-100
HDDT I/O	Hard Disk Drive Tray I/O Board EC	51304913-200
LCN I/O	Local Control Network Interface I/O	51107403-100
LCNE	Local Control Network Extender	51109881-100
LCNE2	Newer version of LCNE	51304540-100
LCNE2	LCN Extender EC	51304540-200
LCNFL	Local Control Network Fiber Optic Link	51108899-100
LCNFL	LCN Fiber Optic Link EC	51108899-200
MCPU I/O	Processor "typer" I/O (with clock source and RS-232C interface)	51107754-100
MCPU I/O	Processor "typer" I/O (with RS-232C interface only)	51107954-100
NG FOM	Network Gateway Fiber Optic Modem EC (Order from CD Networks as part number 2005A-Honeywell Special)	
NGIO	Network Gateway I/O Board	51304472-100
NIM MODEM	NIM Modem I/O board (put in PNI I/O slot)	51304511-100
NIM Modem	NIM Modem I/O EC	51304511-200
PLCG Relay	Programmable Logic Controller Gateway Relay Board	51304421-100
PLCG Relay	Programmable Logic Controller Gateway Relay Board EC	51304421-200
PLCI I/O	Programmable Logic Controller Interface I/O	51195096-100
PLCI I/O	Programmable Logic Controller Interface I/O Board EC	51195096-200
PNI I/O	Process Network Interface I/O	51303944-100
PNM I/O	Process Network Modem I/O	51303947-100

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Table 2-5 — I/O Board or Paddle Board Types (Continued)

Board Type	Description		Part Number
SIO I/O	Serial Input Output Interface I/O		51108843-100
SIOI-OE	Serial Input Output I/O Enhanced		51304814-100
SIOI-OE	Serial Input Output I/O Enhanced	EC	51304814-200
SPC I/O	Smart Peripheral Controller I/O		51304156-100
SPC-2	Smart Peripheral Controller I/O Board		51304907-100
SPC-2	Smart Peripheral Controller I/O Board	EC	51304907-200
SPC-3 I/O	Smart Peripheral Controller I/O Board	EC	51305088-100
TP485	TP485 LCN Interface Board		51304776-100
TP485	TP485 LCN Interface Board		51304776-200
TP485-3	TP485 LCN Interface Board	EC	51304776-300
TP485-4	TP485 LCN Interface Board	EC	51304776-400
TPDG I/O	Turbo Peripheral Display Generator I/O		51304831-200
TPDGC I/O	Turbo Peripheral Display Generator I/O Board	EC	51305075-100
WDC I/O[W1]	Winchester Disk Controller I/O (for WREN I)		51108678-100
WDC I/O[W2]	Winchester Disk Controller I/O (for WREN II)		51108676-100
WDI	Winchester Drive Interface	EC	51304903-200
WDI	Winchester Drive Interface		51304903-100
WSI I/O	Workstation Interface I/O		51304791-100
WSI2 I/O	Workstation Interface 2 I/O		51304924-200
WSI2 I/O	Work Station Interface I/O Board	EC	51304924-200
WSI2R I/O	Workstation Interface 2 I/O (R100 to R200 retrofit)		51304947-100