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