Classic R-Series Platforms
User-Installable Upgrades

PERFORMANCE UPGRADES

There are several CPU upgrade paths. If you have an i486 SX processor, you can upgrade it with an Intel487 SX, an i486 DX processor or an OverDrive Processor (through Pentium processor-based OverDrive components, when available). Systems with an i486 DX can be upgraded with the OverDrive components. Upgrading requires removing the current CPU from the 238-pin socket, U46, on the system board. The upgrade processor is plugged into the socket and jumpers are reconfigured at locations U18, U19, and U22 thru U25. The jumpers at U18 and U19 adjust the clock speed and the jumpers at U22 thru U25 select the CPU type. Intel487 and OverDrive components are available from Intel's Personal Computer Enhancement Division. For the location of the nearest Intel dealer, phone 1 (800) 538-3373.

SYSTEM MEMORY

Table A-1 shows the total system memory based on the listed combinations of SIMMs in the two banks. Note that starting in August 1993 (PBA revision -004), all Classic R-Series systems shipped with non-parity (x32) SIMMs. System BIOS versions 1.00.04.AC0 and higher provide support for both parity (x36) and non-parity (x32) SIMMs. If the BIOS detects a non-parity SIMM in either memory bank during startup, parity is disabled.

Bank 0 - SIMM Type (Size)	*Bank 1 - SIMM Type(Size)*	*Total System Memory*
512K (2 MB)	Empty	2 MB
512K (2 MB)	512K (2 MB)	4 MB
512K (2 MB)	1M (4 MB)	6 MB
512K (2 MB)	2M (8 MB)	10 MB
512K (2 MB)	4M (16 MB)	18 MB
1M (4 MB)	Empty	4 MB
1M (4 MB)	512K (2 MB)	6 MB
1M (4 MB)	1M (4 MB)	8 MB
1M (4 MB)	2M (8 MB)	12 MB
1M (4 MB)	4M (16 MB)	20 MB
2M (8 MB)	Empty	8 MB
2M (8 MB)	512K (2 MB)	10 MB
2M (8 MB)	1M (4 MB)	12 MB
2M (8 MB)	2M (8 MB)	16 MB
2M (8 MB)	4M (16 MB)	24 MB
4M (16 MB)	Empty	16 MB
4M (16 MB)	512K (2 MB)	18 MB
4M (16 MB)	1M (4 MB)	20 MB
4M (16 MB)	2M (8 MB)	24 MB
4M (16 MB)	4M (16 MB)	32 MB

Table A-1. Possible SIMM Memory Combinations

QUALIFIED SIMM VENDORS

The following tables list SIMMs that are known to be compatible with the specified Intel platforms. SIMMs that are not listed also should function properly as long as their specifications are compatible with the devices listed below. In general, SIMM devices that are faster than those specified for a given platform will work although no extra performance will be realized. The SIMM devices shown are categorized according to three levels of qualification:

1. Intel Approved and Tested: The device has been electrically tested by Intel and is known to be compatible with the specified platform(s). In addition, the vendor has met or exceeded Intel's product change, quality control, and availability requirements and is listed on our Approved Manufacturing List.

2. Intel Tested: Samples of the device have been electrically tested by Intel across voltage and temperature margins ("four corners") and is known to be compatible with the specified platform(s).

3. Customer Tested: The device has been electrically tested by a customer and is reported to be compatible with the specified platform(s).

Intel recommends that SIMMs listed as (1) *Intel Approved and Tested* or (2) *Intel Tested* be used to ensure reliable system operation. SIMMs not listed or listed as (3) *Customer Tested* can be used; but, in the event of unreliable system operation, the SIMMs should be replaced with SIMMs tested by Intel (1 or 2) to determine whether the SIMMs are causing the problem.

IMPORTANT NOTE: SIMM devices with gold contacts should NOT be placed into SIMM sockets with tin-lead contacts or vice-versa. Mixing dissimilar metal contact types has been shown to result in unreliable memory operation.

Vendor Contacts (phone numbers are provided for convenience and may change without notice. Current as of 7/94).

Centon	516-471-7700
Fujitsu	408-922-9000
Hyundai	408-473-9200
Kelly Micro Systems	800-854-3900
Micron	208-368-3900*
MPM	800-899-4676
NEC	415-960-6000
Samsung	408-954-7000
Simple Technologies	714-558-1120
Smart Modular	510-623-1231
Texas Instruments	214-644-5580
Toshiba	503-629-0818*

*ask for the number of a representative in your area

1M X 32 (4MB PER SIMM)

Tin-lead contacts, 70 ns (no-parity)

Texas Instruments	1	TM124BBK32S-70	
Samsung Corning Co.	1	KMM5321000BV-7	
Samsung Corning Co.	1	KMM5321000CV-7	
Micron Tech.	1	MT8D132M-7	
Hyundai	1	HYM53200M-70NT	
Fujitsu Ltd.	1	MB85341A-70PS	
PNY Electronics, Inc.	2	32100070-8T	OKI M514400A-70SJ
Smart Modular	1	SMI5321000-7	

2M X 32 (8MB PER SIMM)

Tin-lead contacts, 70 ns (no-parity)

Micron Tech.	1	MT16D232M-7	1.0" SIMM height
Texas Instruments	1	TM248CBK32	1.0" SIMM height
Fujitsu Ltd.	1	MB85342A-70	1.0" SIMM height
PNY Electronics, Inc.	2	32200070-16T	Hitachi HM514400AS7

4M X 32 (16MB PER SIMM)

Tin-lead contacts, 70 ns (no-parity)

PNY Electronics, Inc.	2	32400070-32	Hitachi HM514100BS7
Samsung Corning Co.	1	KMM5324100AV-7	

512K X 36 (2MB PER SIMM)

Tin-lead contacts, 70 ns

Samsung Corning Co.	1	KMM536512C-7	**Obsolete**
Samsung Corning Co.	1	KMM536512AW-7	
Texas Instruments**	1	TM512LBK36B-70	**Obsolete**
Toshiba Corp.	1	THM365120AS-70	**Obsolete**
Micron Tech.	3	MT18D51236M-7	**Obsolete**
Micron Tech.	3	MT20D51236M-7	**Obsolete**
Centon Electronics	3	CE51236-LT-7/8	

1M X 36 (4MB PER SIMM)

Tin-lead contacts, 70 ns

Fujitsu Ltd.	1	MB85346A-70PS	
Fujitsu Ltd.	1	MB85323A-70PS	
Hyundai	1	HYM536100AM-70NT	
Samsung Corning Co.	1	KMM5361000B-7	Obsolete
Samsung Corning Co.	1	KMM5361003-7	
Smart Mod. Tech. Inc	1	SMI5361000-7	
Texas Instruments**	1	TM124MBK36A-70	Obsolete
Texas Instruments**	1	TM124MBK36B-70	Obsolete
Texas Instruments**	1	TM124MBK36R-70	**must specify tin-lead contacts in order
Texas Instruments**	1	TM124MBK36T-70	**must specify tin-lead contacts in order
Toshiba Corp.	1	THM361010AS-70	
Toshiba Corp.	1	THM361020AS-70	
Micron Tech.	3	MT9D136M-7	Obsolete
Kelly Micro Systems	2	KMS1000SD36-60	
Centon Electronics	3	CE1036LT-7	
MPM	3	1MX3670T	

2M X 36 (8MB PER SIMM)

Tin-lead contacts, 70 ns

Fujitsu Ltd.	1	MB85347A-70PS	
Samsung Corning Co.	1	KMM5362000B1-7	Obsolete
Samsung Corning Co.	1	KMM5362000B2-7	Obsolete
Smart Mod. Tech. Inc.	1	SMI5362000-7	
Toshiba Corp.	1	THM362040AS-70	
Micron Tech.	3	MT18D236M-7	Obsolete
Micron Tech.	1	MT24D236M-7	
Kelly Micro Systems	2	KMS2000SD36-60	
Samsung Corning Co.	1	KMM5362000B-7	
Samsung Corning Co.	1	KMM5362003C-7	
Texas Instruments	1	TM248NBK36R-70	
Centon Electronics	3	CE2036LT-7	
MPM	3	2MX3670T	

4M X 36 (16MB PER SIMM)

Tin-lead contacts, 70 ns

Kelly Micro Systems	2	KMS4000SD36-70	
Samsung Corning Co.	3	KMM5364100-07	
Samsung Corning Co.	1	KMM5364100A-07	
Centon Electronics	3	CE4036LT-7	
Micron	1	MT12D436DM-7	
Toshiba	1	THM364020S-7	
MPM	3	4MX3670T	

CACHE SRAM

The Classic R-Series can be upgraded with a second level cache by adding industry-standard SRAM components to DIP sockets on the baseboard. Possible combinations are listed in Table A-2. The design requires 15 ns or 20 nS data SRAM and 12 ns TAG bit SRAM. A jumper change may be required when installing secondary cache.

	SRAM Size		
Cache Size	*Bank 0 U23,U26,U29,U35*	*Bank 1 U10,U14,U15,U20*	*Tag Bit U40*
64 K	(4) 8Kb x 8	(4) 8Kb x 8	(1) 8Kb x 8
128K	(4) 32Kb x 8	none	(1) 32Kb x 8
256K	(4) 32Kb x 8	(4) 32Kb x 8	(1) 32Kb x 8

Table A-2. Possible Second Level Cache Combinations.

The following cache SRAM vendors and part numbers have been approved by Intel for use in the Classic R-Series platforms.

	8K x 8, 12 ns (TAG)	*8K x 8, 15/20 ns (DATA)*	
MOTOROLA		MCM6264CP15	
CYPRESS		CY7C185-15PC	
IDT	71B64S12TP	7164S15TP	
SAMSUNG		KM68685BP-15	

	32K x 8, 12 ns (TAG)	*32K x 8, 15/20 ns (DATA)*	
AT&T	ATT7C199-P12		
ALLIANCE SEMI.			
CYPRESS	CY7C199-12PC	CY7C199-15PC	
HYUNDAI	HY658256S-12	HY658256S-15	
IDT	IDT71256SA12TP	71256SA15TP	
MICRON TECH.		MT5C2568-15	
MOTOROLA		MCM6206CP-15	
PARADIGM	PDM41256SA12P	PDM41256A15P	
SAMSUNG		KM68257BP-15	
TOSHIBA	TC55B328P-12	TC55328AP-15	
WINBOND ELEC.		WY24257AK-15	

Table A-2. Cache SRAM Component Vendors

VIDEO DRAM

The Classic R systems can be upgraded to 1 MB of video DRAM by installing four 70 ns 256 K x 4 page mode DIP DRAM components into socket locations U22, U25, U28, and U34. Table A-3 lists several vendors and their part numbers.

Vendor	*Part Number*
Texas Instruments	TMS44C256-70N
Hyundai	HY534256ALJ-60
Hyundai	HY534256ALJ-70
Mosel/Vitelic	V53C104F-60
Mosel/Vitelic	V53C104F-70
Sanyo	LC324256BP-70
Siemens	HYB514256B-70
Toshiba	TC514256AP-70
NEC	uPD424256

Table A-3. Sampling of Video DRAM Component Vendors

TITLE:	Classic R-Series User-Installable Upgrades
DATE/VER:	7/25/94, Ver. 8.0