



A
VERGECOURT
INTERFACE
PRODUCT

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INTRODUCTION

Ramex 16 is a printed circuit board that contains 16K bytes of additional random-access memory (RAM) for your Apple II, Apple II plus or ITT 2020 Micro Computer.

Ramex 16 is designed for an Apple II or ITT 2020 with 48K bytes of RAM already in place. If your Apple II or ITT 2020 has less than 48K RAM, you will need to purchase enough 16K memory modules to bring your Apple II or ITT 2020 up to 48K.

The Ramex 16K Memory Expansion Board is compatible with Microsoft Consumer Products Softcard, a circuit card for the Apple which contains a Z80 microprocessor and allows you to run the CP/M operating system. The Ramex 16 and Softcard together make a powerful combination that turns your Apple II into a full memory (56K), flexible (two microprocessors) microcomputer.

With the Ramex 16 and Z80 Softcard in place, you have 56K RAM available to run any of the languages available for the Softcard, including microsoft's BASIC-80, (included in the Softcard package), COBOL-80, FORTRAN-80, BASIC Compiler and Assembly Language Development System. You can also use Apple Pascal and Fortran applications programs supplied from your Apple Dealer.

The MILL made by Stellation Two is a circuit card for the Apple which contains the MC6809E processor. This revolutionary card now enables Pascal application programs to run at increased speed and also has a 16 bit capability. If the MILL is used with Pascal, you will need the Ramex 16 to provide the extra memory.

Ramex 16 contains 16K of memory. But, because only 12K of additional addressing space is available in the Apple, 4K of addressing space must be shared by two 4K memory banks. This means that only 12K of Ramex 16 is available to you at a given time.

CHAPTER 1

INSTALLATION & HANDLING

Installing the Ramex 16K Memory Expansion Board

To install the Ramex 16K Memory Expansion Board, you will simply plug the card into a socket, inside the computer as follows:-

1. Turn off the power switch at the back of the computer and also make sure any Disk Drive unit connected is turned off. This is important to prevent damage to the computer. If the power is left on, removal or insertion of any card could cause permanent damage to both the Ramex 16 and any other device connected to the computer.
2. Remove the top cover from the computer. This is done by pulling up on the cover at the rear edge (the edge farthest from the keyboard) until the two corner fasteners come apart. Do not continue to lift the rear edge, but slide the cover backwards until it comes free.
3. Inside the computer, across the rear of the circuit board, there is a row of eight long, narrow sockets, called "slots". The leftmost one (looking at the computer from the keyboard end), is slot 0, the Ramex 16K Memory Expansion Board will normally be placed in slot 0, the slot to the left of the computer. (See appendix D for other slots).
4. Most printed circuit boards contain IC's - Integrated Circuits, commonly called chips. It is possible to damage these chips by discharging "static" electricity through them. You can quite easily do this if you have static electricity on your hands. Thus it is essential to "earth" your hands, to remove any static before handling any PCB, including the Ramex 16. This is easily accomplished by touching the metal can of the power supply located to the left of the inside of the computer.

5. BE SURE THE POWER IS OFF TO THE COMPUTER AND ANY DISK DRIVE UNIT CONNECTED BEFORE YOU INSERT OR REMOVE ANY CARD FROM THE COMPUTER. Insert the "fingers" portion of the Ramex 16K Memory Expansion Board into slot 0. The "fingers" portion will enter the socket with some friction and will then seat firmly. Since the fingers make electrical contact, it is a good idea to keep your fingers from touching them. Before installation, you may wish to use rubbing alcohol to clean the fingers on the board.

6. Other Ram Extension Boards made by peripheral manufacturers, require you to remove the "48th K chip" on the Mother Board, and insert a chip connected to the Ram Card by a Ribbon Cable and Header. This is not necessary with the Ramex 16K Memory Expansion Board and is one of its great advantages.

7. Replace the cover of the computer, remember to start by sliding the front edge of the cover into place. Press down on the two rear corners until they pop into place.

8. The Ramex 16K Memory Expansion Board is now installed and you may now turn on the computer.

9. Keep the packaging in which your Ramex 16 was supplied, in a safe place. In the unlikely event of your having to return the card for service, its purpose designed packaging will keep it safe in transit.

CHAPTER 2

USING THE RAMEX 16

Dependant upon your configurations, the Ramex 16 may change some procedures you currently use to run your existing software.

The differences occur if you have installed either a 13 sector disk system with the Microsoft Softcard, or you are using an Apple Firmware Card in Slot 0.

The Apple Firmware Card (Integer or Applesoft) enables the Apple II and Apple II Plus computers, to use the alternate basic, which was not supplied with the computer. You would use the Applesoft Card with the Apple II (Integer Basic Standard) and the Integer Card with the Apple II Plus (Applesoft Basic Standard).

To install the Ramex 16, you have to remove the firmware card which means you will lose this alternate basic.

As the Ramex 16 was designed with no strap and header to the "48th K chip", it is quite easy to remove it and replace your firmware card when required, but this solution, at best is clumsy and a more permanent solution would be to update your system to DOS 3.3. This would mean you would then have both basics on diskette and you would load the "other" basic onto your Ramex 16 at system boot. You could then change between basics by typing FP and INT as previously.

You would of course need to replace your 13 sector PROMS on your controller card which are supplied with the DOS 3.3 upgrade kit. If any of the above is unclear or you need help in carrying out the DOS 3.3 upgrade, consult your local Apple Dealer for further advice.

If you are using the Ramex 16 in conjunction with Microsoft Consumer Products Z80 Softcard, then you will need to use the CPM56 utility to make use of the extra memory contained on board the Ramex 16. This utility is only found on the 16 sector CP/M master supplied with the Microsoft Softcard and you will of course need your controller card configured for Apple DOS 3.3 (16 sector) to run CPM56.

The Ramex 16 is not supplied with the F8 autostart Rom as it uses the F8 Rom on the main computer board, and most Apples have been supplied with this version of the F8 Rom for some time. It is possible to purchase this Rom chip separately, and if you feel you require the autostart facility, you should consult your local Apple Dealer.

The Ramex 16 operates in a similar fashion to the Apple Language Card, and is completely compatible with the following software, and many other programs not listed.

Applesoft Basic
Integer Basic
Visicalc
Apple Pascal System
Apple Fortran
Apple Pilot

CP/M, which also allows you to use:
Microsoft's Cobol-80
Microsoft's Fortran-80
Microsoft's Basic Compiler
Microsoft's Assembly Language Development System.

CHAPTER 3

ADDRESSING THE RAMEX 16

We apologise if this section is incomprehensible to the layman, but it is only intended as a guide to those machine language programmers, who require more sophisticated detail as to the Ram addresses used by the Ramex.

The Ramex 16, like other Ramcards, contains 16K of additional memory, but because the Apple I/O uses addresses \$C000 through \$CFFF, only the 12K space from \$D000 to \$FFFF is available to address the additional 16K of Ram. Thus to address all of the Ramex 16 Ram, the lower 4K is used twice. You can decide under program command to select either of the two lower 4K banks to occupy the space from \$D000 to \$DFFF, but only one 4K bank at a time. This allows 8K of memory to be accessed in only 4K of address space.

The Apple on board Roms also share this memory space with the Ramex 16. You may choose under program command whether to read Rom or Ramex Ram, at memory addresses between \$D000 and \$FFFF and whether you wish this area of Ram to be write-enabled or write-protected. (Please refer to appendix D for other possible control addresses).

These functions are controlled by "Control addresses" which we shall now discuss:-

The control addresses are used to control the following functions:-

The write enabling and protecting of the Ramex 16's Ram, the Apple II on board Rom or Ramex 16 Ram read, and finally the selection of which 4K bank will be mapped into addresses \$D000 to \$DFFF.

The remaining Ram available on the Ramex 16 is directly addressable through \$E000 - \$FFFF.

The various control addresses and their functions are shown below, for a Ramex card fitted in its normal position ie. slot 0.

	Control Address	Function Selected	4K Bank Selected
HEX DECIMAL	\$C080 -16256	Ramex Read and Ramex Write protect	Bank 2
HEX DECIMAL	\$C081 -16255	On Board Rom Read	Bank 2
HEX DECIMAL	\$C082 -16254	On Board Rom Read and Ramex Write protect	Bank 2
HEX DECIMAL	\$C083 -16253	Ramex Read	Bank 2
HEX DECIMAL	\$C088 -16248	Ramex Read and Ramex Write protect	Bank 1
HEX DECIMAL	\$C089 -16247	On Board Rom Read	Bank 1
HEX DECIMAL	\$C08A -16246	On Board Rom Read and Ramex Write protect	Bank 1
HEX DECIMAL	\$C08B -16245	Ramex Read	Bank 1

Please note: On Board Rom refers the Rom found on the main Apple Motherboard.

If the following addresses are selected "twice consecutively", then the Ramex Ram is also write-enabled, as follows:-

	<u>Control Address</u>	<u>Function Selected</u>	<u>4K Bank Selected</u>
HEX	\$C081	Write enables Ramex	Bank 2
DECIMAL	-16255		
HEX	\$C083	Write enables Ramex	Bank 2
DECIMAL	-16253		
HEX	\$C089	Write enables Ramex	Bank 1
DECIMAL	-16247		
HEX	\$C08B	Write enables Ramex	Bank 1
DECIMAL	-16245		

At power on or by hitting reset (Cntrl Reset on some computers), on board Rom read is automatically selected, which disables Ramex 16 read. At the same time, the Ramex is write enabled with Bank 2 selected for mapping to \$D000 to \$DFFF. You will appreciate that this state is identical to that achieved by the double access of \$C081.

When the Ramex is in this write enabled state, only one further access of a write enabling control address is needed to stay in this state eg. \$C081, until the Ramex is write protected by access to one of the control addresses eg. \$C088.

APPENDIX A

USING THE RAMEX 16 WITH INTEGER DOS 3.2 SYSTEM ONLY

To save Integer (or applesoft) from your firmware card to Disk, prior to removal and replacement with the Ramex 16, try the following:-

1. Boot DOS in the normal way and then type INT to get into Integer.
2. Now save the Integer program held in the firmware cards Rom, to an initialised Diskette by typing:-
BSAVE INTEGER, A\$D000, L\$3000.
3. In accordance with the instructions contained in Chapter 1 switch off the computer and remove the firmware card and install the Ramex 16.
4. With the Ramex 16 installed, use the Diskette with the "Integer Program" and boot DOS.
5. Now try writing the following program.

```

10  REM LOAD RAMEX 16 WITH INTEGER
20  HOME: VTAB10:HTAB3
30  PRINT "(LOADING INTEGER BASIC IN RAMEX 16)"
40  A = PEEK (-16255) + PEEK (-16255): REM WRITE
    ENABLES RAMEX.

50  D$ = CHR$(4)
60  PRINT D$: "BLOAD INTEGER, A$D000".
70  A = PEEK (-16254): REM WRITE PROTECTS RAMEX
80  REM P.G.J. 11.06.81 VERGECOURT LTD.
100 REM TYPE INT FOR INTEGER OR FP FOR APPLESOFT:
    END.
```

Now save this program to Disk as the Hello program or any other name you choose. Now run it and good luck.

APPENDIX B

VERGECOURT PRODUCT RANGE

Ramex 128: A 128K Ram Extension Board, which carries its own Ram Refresh on Board allowing its installation in any slot. The Ramex 128 is fitted with 6 LED indicators for instant confirmation of 'Bank Status' and is supplied as standard with Disk Emulation Software.

Ramex Softlock: Identical in operation to the Ramex 16 but with a PROM containing a 10 digit alphanumeric number, which software can be made to access and will prevent unauthorised distribution.

VC 50: A Software utility to enable the professional Visi-calc user to expand the available memory to 50K. (Requires 64K Apple System and one additional Ramex).

The Manager: A sophisticated DOS Relocation program utilising either 1 or 2 Ramex 16 Boards. With two Ramex, Integer can be relocated in slot 0 and the DOS moved to the Ramex in any other free slot, to make available 46K of Motherboard Ram. The utility programs on the DOS System Master, can also be updated to work with relocated DOS.

Standard Interface Drive: Specifically designed to interface with the Apple II and ITT 2020 range of microcomputers, supplied in 2, 3 and 4 pack configurations, complete with case, power supply, security key (2 & 3 packs only) and LED power indicator, and interface card and cable. Each drive has a formatted capacity of 311K (610 Blocks Pascal) in one volume, giving a total of 622, 933 and 1244K bytes or 1220, 1830 and 2440 Blocks Pascal in the 2, 3 and 4 pack drive units respectively.

For more information or Telephone orders, please ring the Vergecourt Hot Line on - 0268-728484 or Telex 995323 DDP UK.

APPENDIX C

SERVICE INFORMATION

If your Ramex requires repair, please return it to the dealer from whom it was purchased. If it is not possible to return the Ramex to your dealer, you may send it directly to Vergecourt Ltd.

If the repair is required during the warranty period, please enclose proof of purchase. During warranty, we will replace or repair your Ramex 16 without charge.

If the Ramex requires service after the warranty period expires, it will be repaired for a flat fee of £25.00p. This service charge does not cover damage due to negligence misuse, or inadequate packaging on return to Vergecourt Ltd.

To return your Ramex 16 for service, please mail it post-paid to Vergecourt Ltd. Package the card securely and we advise using the original packaging, as we cannot be responsible for damage due to shipping. BE SURE to enclose proof of purchase for warranty work or a cheque or money order for £25.00p + VAT for non-warranty repairs.

Mail post-paid to:-

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APPENDIX D

USING RAMEX 16 IN OTHER SLOTS

Although Ramex 16 will normally be fitted in slot 0, for compatibility with existing software, it will function as a Ram extension board, if fitted into any slot. However, the control addresses (see chapter 3), will vary according to the slot used:-

<u>Ramex 16 in slot</u>	<u>Control Addresses</u>
0	C080 - C08F
1	C090 - C09F
2	C0A0 - C0AF
3	C0B0 - C0BF
4	C0C0 - C0CF
5	C0D0 - C0DF
6	C0E0 - C0EF
7	C0F0 - C0FF

In each case the last digit of each control address will be as given in chapter 3.

More than one Ramex 16 may be fitted, to expand beyond 64K Ram, limited only by the number of slots available and the power unit capacity. In this situation, care must be taken to ensure that only one of the Ramex 16 boards is selected for Ram read at any time - the other Ramex 16 board(s), should be set to the 'Rom Read' state.

