77314 CORVUS/REMEX (Z47) SOFTWARE INSTALLATION

in the

HEATH/ZENITH Z89/Z90 DIGITAL COMPUTER

supplementing
MMS CP/M 2.24 USER'S GUIDE
MMS MONITOR EPROMS
and
HARDWARE INSTALLATION - MMS DISK I/O BOARD
documentation

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(c) 1982
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MMS 77314 CORVUS/REMEX (Z47) I/O BOARD FOR THE '89 and '90

The MMS 77314 board functionally replaces the standard 3-port RS232 board in a Z89 or Z90 computer, and adds interfaces to both CORVUS (or IMI) winchester disk drives, as well as REMEX 4800 series intellegent floppy disk drives as used in the Z47. All Magnolia Microsystems' disk interface boards use a proprietary technique to expand the limited number of I/O port addresses available. This allows use of more than the five (3 serial ports and 2 disk) devices allowed by Heath/Zenith.

Software is available on 5" 10-sector or 5- or 8-inch Soft Sectored CP/M media (as specified when ordering the product). Contact your dealer if you recieved the wrong format media.

This document describes the installation of special BIOS software modules into a copy of MMS CP/M 2.2 running on a Heath or Zenith 89 or 90 computer. It is assumed that the computer is already 'ORG-0' CP/M compatible, that is, it is either:

1. Z89-FA, -GA, -80, or -81 (check label on back of computer),
2. Z90-80 or Z90-82
3. Has had the Heath/Zenith 89-7 Upgrade Kit installed,

(In all of these cases, the PROM at U517 will be marked '444-66')

or 4. Has Magnolia Microsystems' CP/M Modification Kit installed.

If the PROM at U517 is marked '444-42' your computer IS NOT compatible and must be upgraded. Purchase either the MMS or Heath/Zenith ORG-0 hardware kit from your dealer and install it according to the instructions furnished with it.

You must use the Magnolia implementation of CP/M 2.2 (as furnished with this package), not the Heath/Zenith implementation.

Install MMS CP/M 2.2 according to the instructions in the MMS CP/M USERS GUIDE before proceeding with the installation of the MMS I/O board hardware and this software. Even if you have been using an earlier release of MMS CP/M, update to the version included with this package, it may include new features required for satisfactory operation of your new disk subsystem.

DESIGN OF MAGNOLIA MICROSYSTEMS CP/M

Magnolia Microsystems' implementation of CP/M has been specially designed to allow end users to easily add new types of disk storage to their system. The BIOS portion of CP/M (see the Digital Research manuals) has been implemented in a modular fashion, with 4 types of modules used:

1. BASECPM.COM is a copy of the relocatable CP/M operating system which does not contain ANY disk I/O.
2. biosname.HEX is a relocatable BIOS module which can be LINKed into a MOVCPM file to add a specific type of disk I/O.
3. bootname.HEX is a relocatable BOOT module which can be LINKed into a MOVCPM file to allow a specific type of disk drive to be booted.
4. module.HEX is a non-disk linkable module such as the interrupt driven keyboard module.

The utility LINK.COM is used to merge these modules together to form the MOVCPM file which is executed to create the system image placed on a disk with SYSGEN.

OVERVIEW OF INSTALLATION

PLEASE READ ALL OF THESE INSTRUCTIONS BEFORE PROCEEDING

Most installations proceed in the following order. The document title (containing detailed instructions) is shown in **BOLDFACE** below:

1. Use the **MMS CP/M USERS GUIDE** to boot up and become familiar with the MMS release of CP/M for the '89 or '90. (In rare cases, steps 2 and 3 must be performed before CP/M can be booted.)

2. Install and test the **MMS MONITOR EPROM(s)** and I/O decode PROMS which support booting from the new drive type. MMS and/or Zenith CP/M should still boot and operate properly with the new EPROMS.

3. Perform the **HARDWARE INSTALLATION - MMS DISK I/O...** which supports your new drive type.

4. Install the new hardware-specific BIOS modules as described in **this manual.** Both CORVUS and REMEX (Z47) procedures are described, one or both may be used, depending on which drives are being installed.

POWER-ON AND POWER-OFF PROCEDURE

The following power on/off sequence minimizes the probability of having a power transient cause destruction of data on your winchester drive:

POWER-ON:
1. Turn-on the computer.
2. Turn-on the disk drive subsystem(s).
3. Follow the proper Boot procedure.

POWER-OFF:
1. Remove all floppy disks
2. Turn-off the disk drive subsystem(s).
3. Turn-off the computer.

77314 HARDWARE INSTALLATION SUPPLEMENT

The following instructions supplement the general hardware installation manual **HARDWARE INSTALLATION - MAGNOLIA MICROSYSTEMS DISK I/O BOARD with 3 RS232 PORTS** and are specific to the 77314 board as used with CORVUS winchester drives and/or REMEX (Z47) intellegent 8" floppy disk drives.

CORVUS Drive Notes:

- The cable attached to a CORVUS drive should not exceed five (5) feet. Up to 50' cables may be used between individual computers and the Constellation Multiplexer.

- All four switches (below the LEDs) on the CORVUS front panel must be in the 'left' position for normal, single computer operation.

- Do not attempt to include a Constellation Multiplexer when bringing up a new system. After verifying proper system operation with one computer, see the separate section on installing the Constellation at the end of the CORVUS section of this document.

REMEX Drive Notes:

- MMS CP/M requires that the 'Track 0 density' option jumper on REMEX drives be in the "Z-F" position, move it to that position if necessary.

- Only the first 34 wires in the 40-conductor cable to the Z47 drives are used. If you have a Z47, simply plug it on (pin 1 to pin 1) to the 34 conductor REMEX connector on the 77314 board.

- Further details on configuring REMEX drives for use with MMS CP/M are given in Appendix B, if you are not using pre-configured Z47 drives.

77314 CORVUS/REMEX (Z47) SOFTWARE INSTALLATION

SUMMARY

After installing all required hardware, a new BIOS module is incorporated into your MMS CP/M system, allowing you to boot an augmented CP/M system that can recognize and communicate with the new drive type. The drive must then be formatted and tested.

Next, a new BIOS cold-boot module is merged into the augmented system, producing a system that is 'new-drive-bootable'. This system is written onto the system tracks of the newly formatted drive. Other utility programs are also copied from distribution media onto the new drive, creating a new (full-blown) CP/M system disk on the new type of drive.

Finally, MMS CP/M is booted from the new drive using the new system disk. The increased storage capacity of the new media will make operation much more convenient.

The following sections in this document detail the installation of the required support software.

DETAILED CORVUS SOFTWARE INSTALLATION

NOTICE: Whenever installing a new release of a winchester disk driver, **BACK UP ALL FILES ON THE WINCHESTER** BEFORE INSTALLING THE NEW MODULES. The new modules may change either the system track allocation and/or the directory structure of the drive, causing old files to become inaccessable.

1. Boot a copy of MMS CP/M:

The MMS EPROM Monitor allows booting from many different disk drive systems. Refer to your 'MMS MONITOR EPROM' manual if you need assistance in booting your system.

```
MMS: Boot (cr)

64K Z89/Z90 CP/M v2.241 (c) Magnolia Microsystems 1982
A0>
```

2. Copy the 77314 board CORVUS support software onto your system diskette:

The CORVUS installation procedure requires that the system diskette contain the following files:

MOVCPM.COM	BASECPM.COM	SETUP.COM	SYSGEN.COM
CORVGEN.COM	PIP.COM	LINK.COM	DRIVES.COM

Extraneous files can be erased if necessary to make room for the new files; they can be recovered from your distribution copy of MMS CP/M after the disk is configured.

If multiple floppy drives are available, PIP.COM may be used to transfer the new software onto the system work disk from the CORVUS/REMEX (Z47) distribution disk. If only one drive is available, then the single drive utility FILECOPY.COM must be used.

The MOVCPM.COM file must be one which will create a system bootable on your present floppy disk system.

The disk must also contain the BIOS and BOOT Modules required by your specific application. The following options presently exist, additional options may be listed in a 'READ.ME' file on your distribution disk:

Module Name	Drive and Configuration
CVSnMM	BIOS module for a MM MByte drive divided into 'n' partitions
CBOOT.HEX	BOOT module used with all of the above

In the remainder of this discussion, we will use the file CVS210 (which divides a 10MByte drive into two equal sections). However, you must substitute a BIOS module name from the available choices which describes how you want your drive configured.

Refer to your MMS CP/M USER GUIDE if you need further details on standard MMS utilities such as LINK and SETUP.

3. Merge the BIOS module into MOVCPM.COM using LINK.COM:

The BIOS module provides the communication link to the disk controller for CP/M. The CORVUS driver must be linked into the MOVCPM image using the LINK utility. To merge the new module, type:

```
A0>LINK CVS210 MOVCPM(cr)

LINK version 2.240
Linking 'A:CVS210  .HEX' module into 'A:MOVCPM  .COM'
Link completed
```

4. Write the CORVUS-augmented system onto your system floppy disk:

Changes or module additions to the system program MOVCPM.COM are not implemented until the program is executed and relocated, written onto the system diskette by SYSGEN.COM, and cold-booted back from the diskette into memory. At CP/M command level, type:

```
A0>MOVCPM(cr)
CONSTRUCTING 64K Z89/Z90 CP/M v2.241 (c) Magnolia Microsystems 1982
READY FOR 'SYSGEN' OR
'SAVE xx CPM64.COM'
```

Followed immediately by:

```
A0>SYSGEN(cr)

SYSGEN version 2.242 (c) 1982 Magnolia Microsystems

NOTE: if you just ran MOVCPM (or a similar function) system is in memory.

Get System from Memory (RETURN) or disk (Drive name) ?(cr)

Put System to what Drive (RETURN to quit) ?A
Insert disk in Drive A: and push RETURN (^C aborts) (cr)
System Successfully written to drive A:

Put system to what Drive (RETURN to quit) ?(cr)

You must SHIFT RESET and re-Boot after SYSGENing drive A:
```


5. Make a Copy of MOVCPM.COM and insert the CORVUS cold-boot routine:

Press SHIFT-RESET as instructed and re-boot:

```
MMS: Boot (cr)

64K Z89/Z90 CP/M v2.241 (c) Magnolia Microsystems 1982
A0>
```

DO NOT attempt to access the CORVUS drive yet. You must wait until after executing the CORVGEN utility below.

The CP/M system that will eventually reside on the system tracks of the winchester drive must contain the CORVUS cold-boot routine, not the floppy disk cold-boot routine in the existing MOVCPM program.

The CORVUS-augmented MOVCPM.COM, containing the CORVUS BIOS I/O module and the normal floppy cold-boot routine should be preserved for generating floppy system disks. The expedient procedure is to make a copy of MOVCPM.COM before overwriting the floppy cold-boot routine. The utility PIP.COM is used to make the copy; at CP/M command level, type:

```
A0>PIP MOVCPM15.COM=MOVCPM.COM[V](cr)
```

The '15' suffix on the filename will serve to remind us that this is a 'MOVCPM' program which will create a system that must booted from physical drive number 15, the first partition on the CORVUS drive.

Now replace the floppy cold-boot routine with the CORVUS-bus cold-boot code:

```
A0>LINK CBOOT MOVCPM15(cr)

LINK version 2.241
Linking 'A:CBOOT   .HEX' module into 'A:MOVCPM15.COM'
Link completed
```

6. Declare the winchester as the new cold-boot drive:

MOVCPM15 still refers to a floppy disk drive as 'A:'. The logical/physical drive assignments table must now be rearranged so logical drive 'A:' references the CORVUS, not the present floppy drive. Enter:

```
A0>SETUP MOVCPM15(cr)
```

Select the 'SET LOGICAL/PHYSICAL DRIVE ASSIGNMENTS' function and rearrange the table so that 15 is logical drive 'A:'.

Start by setting drive A: to be the winchester by entering '15' within the first parentheses. This will produce a 'DUPLICATE ENTRY' message which can be ignored for the moment. Enter your other drive numbers in the desired order, omitting any not physically present in your system. Finally, press 'f3' to clear any error messages.

The resulting table might look similar to the following:

```
A: = (15) 77314 Corvus Interface (10MB, 2 partitions) v1.201
B: = (16) 77314 Corvus Interface (10MB, 2 partitions) v1.201
C: = (00) Z17 Hard Sector controller v2.240
D: = (01) Z17 Hard Sector controller v2.240
E: = (40) 77318 Invisible Disk w/ System Space v2.242
F: = (--) ...NOT ASSIGNED...
G: = (--) ...NOT ASSIGNED...
H: = (--) ...NOT ASSIGNED...
I: = (--) ...NOT ASSIGNED...
J: = (--) ...NOT ASSIGNED...
K: = (--) ...NOT ASSIGNED...
L: = (--) ...NOT ASSIGNED...
M: = (--) ...NOT ASSIGNED...
N: = (--) ...NOT ASSIGNED...
O: = (--) ...NOT ASSIGNED...
P: = (--) ...NOT ASSIGNED...
```

Return to the main menu, and make any other necessary changes to the system configuration.

When complete, press the command key to update MOVCPM15.COM and to return to CP/M command level.

7. Write the new CORVUS-bootable system onto the drive:

The system program file MOVCPM15.COM now contains the CORVUS BIOS I/O module, the CORVUS boot module, and a logical/physical drive assignments table with the winchester drive as 'A:'. To initialize the CORVUS drive (and create a bootable system) type:

```
A0>MOVCPM15(cr)

CONSTRUCTING 64K Z89/Z90 CP/M v2.241 (c) Magnolia Microsystems 1982
READY FOR 'SYSGEN' OR
'SAVE xx CPM64.COM'
```

Followed immediately by:

```
A0>CORVGEN(cr)

CORVGEN version 2.231
Did you execute MOVCPM ? (Y or N) Y
Do you want to initialize the directories? (Y or N) Y

Function complete
A0>
```

The winchester drive has now been initialized and may be accessed via CP/M.
You will not normally need to repeat the CORVGEN process. Once the drive has been initialized, you may simply SYSGEN it as with any other. You must, however, re-CORVGEN the drive if you wish to use a different partitioning of the drive.

8. Boot MMS CP/M from the CORVUS

The winchester drive now contains a bootable CP/M system. RESET the computer, and re-boot from the new drive. At the MMS: prompt, enter either:

```
MMS: Boot 15(cr)      or

MMS: Boot HH(cr)
```

where the '15' or 'H' designate 'CORVUS' as the boot drive. The computer should boot and sign on with:

```
64K Z89/Z90 CP/M v2.241 (c) Magnolia Microsystems 1982
A0>
```

Execute the DRIVES utility and verify that the logical-physical table is as you defined it with SETUP MOVCPM15 above. Enter:

```
A0>DRIVES(cr)

A: = (15) 4750K 77314 Corvus Interface (10MB, 2 partitions) v1.201
B: = (16) 4750K 77314 Corvus Interface (10MB, 2 partitions) v1.201
C: = (00)   90K Z17 Hard Sector controller v2.240
D: = (01)   90K Z17 Hard Sector controller v2.240
E: = (40)   98K 77318 Invisible Disk w/ System Space v2.242
```

After testing the system, you may wish to re-configure SW501 so that simply entering a Boot (cr) will boot from the winchester drive. Refer to your **MMS MONITOR EPROM** manual for details.

9. Copy your files onto the winchester:

All your standard MMS CP/M system utilities should be be moved from the system floppy to the winchester for user convenience. The utility PIP.COM can be used to facilitate this transfer; at CP/M command level, type:

```
A0>PIP A:=C:*.*[V](cr)
```

Note: 'C:' is from DRIVES utility in step 5, use the correct letter for your particular configuration.

If some extraneous system utilities were deleted from the floppy to provide work space during the 77314 (CORVUS) software installation procedure, they can be copied from your MMS CP/M distribution diskette (after the new CP/M system is booted from the winchester).

10. Installing other BIOS modules

After testing system operation, you may LINK other BIOS modules into your MOVCPM15.COM file to allow access to other types of drives. Remember to use PIP to create new MOVCPM files with unique names every time you change the boot module.

11. Use with CORVUS Constellation Multiplexer

The 'Constellation Multiplexer' allows several computers to share access to a single CORVUS drive. The following notes will assist you in configuring a system, contact your dealer if you need further assistance. Magnolia Microsystems can provide assistance at our standard consulting rates.

- o Build a unique MOVCPMnn file for each computer on the multiplexer, for instance, MOVCPM16.COM with partition 16 as drive A:.
- o Each partition should be allowed READ/WRITE access from only one computer.
- o Partitions can be excluded from specific computer's logical-physical table for complete privacy.
- o After installing the multiplexer, flip the second switch from the left (third from the right) under the LEDs on the CORVUS drive to the 'right' position.
- o Up to 50' of cable may be used between each computer and the multiplexer. Only five (5) feet are allowed between the drive and multiplexer.
- o Each computer on the multiplexer should boot from a different partition, use the 'default boot' switch/jumper options provided by the MMS MONITOR EPROM to force this.
- o The sample file 'LOGON.ASM' on the distribution disk shows another technique which may be used to restrict access. Assistance is available from MMS, Inc., at our standard consulting rates if required.

This completes the 77314/CORVUS software installation.

DETAILED REMEX (Z47) SOFTWARE INSTALLATION

NOTE: This procedure also covers installation of MMS CP/M when the Zenith Z89-47 interface is used in place of the MMS 77314. Be sure to set SW501 as described in the MMS Monitor EPROM manual to indicate if a Z89-47 board is installed at either allowable address. Also, substitute the 'BZ89-47' boot module for the 'B314RMX' specified below in step 7.

1. Boot a copy of MMS CP/M:

The MMS EPROM Monitor allows booting from many different disk drive systems. Refer to your 'MMS MONITOR EPROM' manual if you need assistence in booting your system.

```
MMS: Boot (cr)

64K Z89/Z90 CP/M v2.241 (c) Magnolia Microsystems 1982
A0>
```

2. Copy the 77314 board REMEX (Z47) support software onto your system diskette:

The REMEX (Z47) installation procedure requires that the system diskette contain the following files:

MOVCPM.COM	BASECPM.COM	SETUP.COM	SYSGEN.COM
PIP.COM	LINK.COM	REMEX.HEX	BZ89-37.HEX
DRIVES.COM	B314RMX.HEX		

Extraneous files can be erased if necessary to make room for the new files; they can be recovered from your distribution copy of MMS CP/M after the new disk is configured.

If multiple floppy drives are available, PIP.COM may be used to transfer the new software onto the system work disk from the CORVUS/REMEX (Z47) distribution disk. If only one drive is available, then the single drive utility FILECOPY.COM must be used.

The MOVCPM.COM file must be one which will create a system bootable on your present floppy disk system.

Refer to your MMS CP/M USER GUIDE if you need further details on standard MMS utilities such as LINK and SETUP.

3. Merge the BIOS module into MOVCPM.COM using LINK.COM:

The BIOS module provides the communication link to the disk controller for CP/M. The REMEX (Z47) driver must be linked into the MOVCPM image using the LINK utility. To merge the new module, type:

```
A0>LINK REMEX MOVCPM(cr)
LINK version 2.240
Linking 'A:REMEX.HEX' module into 'A:MOVCPM  .COM'
Link completed
```

4. Write the REMEX (Z47)-augmented system onto your system floppy disk:

Changes or module additions to the system program MOVCPM.COM are not implemented until the program is executed and relocated, written onto the system diskette by SYSGEN.COM, and cold-booted back from the diskette into memory. At CP/M command level, type:

```
A0>MOVCPM(cr)
CONSTRUCTING 64K Z89/Z90 CP/M v2.241 (c) Magnolia Microsystems 1982
READY FOR 'SYSGEN' OR
'SAVE xx CPM64.COM'
```

Followed immediately by:

```
SYSGEN Version 2.242

A0>SYSGEN(cr)

SYSGEN version 2.242 (c) 1982 Magnolia Microsystems

NOTE: if you just ran MOVCPM (or a similar function) system is in mem

Get System from Memory (RETURN) or disk (Drive name) ?(cr)

Put System to what Drive (RETURN to quit) ?A
Insert disk in Drive A: and push RETURN (^C aborts) (cr)
System Successfully written to drive A:

Put system to what Drive (RETURN to quit) ?(cr)

You must SHIFT RESET and re-Boot after SYSGENing drive A:
```

5. Cold boot the new REMEX (Z47)-augmented system:

The system diskette now contains a system capable of communicating with the new disk drive; RESET and cold-boot:

```
MMS: Boot (cr)

64K Z89/Z90 CP/M v2.241 (c) Magnolia Microsystems 1982
A0>
```

Execute the DRIVES utility to verify that the new REMEX (Z47) driver is present:

```
A0>DRIVES(cr)

A: = (00)   90K Z17 Hard Sector controller v2.240
B: = (01)   90K Z17 Hard Sector controller v2.240
C: = (40)   98K 77318 Invisible Disk w/ System Space v2.242
D: = (05) 1210K 77314/Z89-47 REMEX Interface v2.241
E: = (06) 1210K 77314/Z89-47 REMEX Interface v2.241
```

Your display may appear different, however, note that the new driver is positioned just past any other drives in your system.

6. Format Media in your new REMEX drive

8-inch media must be formatted to M47 double density format before it can be used. Remember that you must use media CERTIFIED for double sided usage if you want to use the second side of double-sided drives, as the drives will detect that the media is incorrect and cause an error message to appear. Enter:

```
A0>FORMAT D:(cr)

    FORMAT v2.245 (c) Magnolia Microsystems 1982

    Selected Configuration:
                Drive - D: (05) 8-inch floppy
           Controller - 77314/Z89-47 Interface
    Recording Density - Double
                Sides - 2
      Tracks per inch - 48
            Step Rate - 6 milliseconds
          Format type - M47 Double Density

    Is this the format you want? (Y/N) Y
```

Verify that the proper configuration is described. If so, just press (cr) to accept the default answer of "Yes" and skip to "FORMATTING DISKETTES" below.

OTHERWISE, press No(cr) and define the configuration needed. All bootable disks must be formatted as 'M47' double density.

FORMATTING DISKETTES

The program will display:

```
Insert BLANK disk in DRIVE D:.  Push RETURN to begin, ^C to quit> (cr
```

The following bar graph will appear on your CRT, where each "-" represents a track on the media to be formatted (track numbers are shown every 10 tracks). The "SIDE 1" message and data will not appear if you have single-sided drives.

```
SIDE 0

0---------1---------2---------3---------4---------5---------6---------7---

SIDE 1
```

Because of the REMEX intelligent drives, the program can not advise you of its exact progress in formatting the media. Instead, the message "REMEX Drive is formatting this side of diskette" will appear. When a side is completely formatted, that side of the bar graph will be changed to a 'f' display.

The program will then verify that each track can be read properly, indicating its progress by replacing the "f" with a "." as each track is read. A "v" will appear after satisfactory verification:

```
SIDE 0
ffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffff
0---------1---------2---------3---------4---------5---------6---------7---
vvvvvvvvv.fffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffff
SIDE 1
```

If any tracks fail to verify properly, the track will be flagged with an "E", together with the message "An error has been found. To Quit verifying this diskette, type 'Q'. When verification is finished, whether you typed 'Q' or not, the program will display the message "Disk did NOT format! - Try again or discard this diskette".

DO NOT ATTEMPT to use a diskette if this program reported an error -- since at the most inopportune time your system will advise "BDOS Error: Bad Sector", an unrecoverable error condition which will indicate the loss of a significant amount of data.

The program will ask "Do you have more media to FORMAT? Y

Answer (cr) to accept the default "YES", and format a supply of new disks. The program will increment the "Disk Number" and update the bar graph display as each piece of media is successfully formatted.

When through, answer N(cr) to exit to the CP/M command level. Verify that the media count displayed by the program matches the number of disks you successfully formatted, to insure that you do not attempt to use a defective diskette.

7. Make a Copy of MOVCPM.COM and insert the REMEX (Z47) cold-boot routine:

The CP/M system that will eventually reside on the system tracks of the REMEX drive must contain the REMEX (Z47) cold-boot routine, not the cold-boot routine in the existing MOVCPM program.

The REMEX (Z47)-augmented MOVCPM.COM, containing the REMEX (Z47) BIOS I/O module and the old cold-boot routine should be preserved for generating floppy system disks. The expedient procedure is to make a copy of MOVCPM.COM before overwriting the existing cold-boot routine. The utility PIP.COM is used to make the copy; at CP/M command level, type:

```
A0>PIP MOVCPM05.COM=MOVCPM.COM[V](cr)
```

The '05' suffix on the filename will serve to remind us that this is a 'MOVCPM' program which will create a system that must booted from physical drive number 05, the first REMEX drive.

Now install the cold-boot routine for REMEX drives on the MMS 77314 board (Substitute the boot module 'BZ89-47' if you are using the Zenith interface board for the REMEX drives):

```
A0>LINK B314RMX MOVCPM05(cr)

LINK version 2.241
Linking 'A:B314RMX    .HEX' module into 'A:MOVCPM05.COM'
Link completed
```

8. Declare the REMEX as the new cold-boot drive:

MOVCPM05 still refers to your old disk drive as 'A:'. The logical/physical drive assignments table must now be rearranged so logical drive 'A:' references the REMEX (Z47), not the present floppy drive. Enter:

```
A0>SETUP MOVCPM05(cr)
```

Select the 'SET LOGICAL/PHYSICAL DRIVE ASSIGNMENTS' function and rearrange the table so that 05 is logical drive 'A:'.

Start by setting drive A: to be the REMEX by entering '05' within the first parentheses. This will produce a 'DUPLICATE ENTRY' message which can be ignored for the moment. Enter your other drive numbers in the desired order, deleting drives which are not physically present in your system. Finally, press 'f3' to clear any error messages.

The resulting table should look similar to the following; compare it to the table generated by the DRIVES utility above and note the differences:

```
. A: = (05) 77314/Z89-47 REMEX Interface v2.240
  B: = (06) 77314/Z89-47 REMEX Interface v2.240
  C: = (00) Z17 Hard Sector controller v2.240
  D: = (01) Z17 Hard Sector controller v2.240
  E: = (40) 77318 Invisible Disk w/ System Space v2.242
  F: = (--) ...NOT ASSIGNED...
  G: = (--) ...NOT ASSIGNED...
  H: = (--) ...NOT ASSIGNED...
  I: = (--) ...NOT ASSIGNED...
  J: = (--) ...NOT ASSIGNED...
  K: = (--) ...NOT ASSIGNED...
  L: = (--) ...NOT ASSIGNED...
  M: = (--) ...NOT ASSIGNED...
  N: = (--) ...NOT ASSIGNED...
  O: = (--) ...NOT ASSIGNED...
  P: = (--) ...NOT ASSIGNED...
```

9. Configure the BIOS module to match your drives

Select the '77314/Z89-47 REMEX Interface' option from the main menu. The following display will appear:

LOGICAL NAME	PHYSICAL NUMBER	DISK SIZE	NO OF SIDES	TRACK DENSITY	RECORDING DENSITY	STEP RATE	MEDIA FORMAT	SECTOR SIZE
A	05	8.00"	2	48 tpi	Double	10ms	M47	1024
E	06	8.00"	2	48 tpi	Double	10ms	M47	1024
.	07	8.00"	2	48 tpi	Double	10ms	M47	1024
.	08	8.00"	2	48 tpi	Double	10ms	M47	1024

```
<RED>   = QUIT (NO UPDATE)                XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
<BLUE>  = END AND UPDATE "B:MOVCPM"       XX                              XX
<WHITE>= RESTART WITH ORIGINAL DATA       XX   display of allowable       XX
ARROWS  = MOVE TO NEXT FIELD              XX   options (listed below)     XX
<HOME>  = JUMP TO START OF LINE           XX                              XX
          AND THEN TO TOP LINE            XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

Allowable Entries include:

NO OF SIDES: 1 or 2 sides

RECORDING DENSITY: Single or Double, must be 'DOUBLE' for 'bootable' diskettes.

MEDIA FORMAT: (code letter) from option table, must be 'M47' for REMEX or Z47 'bootable' diskettes.

Press the BLUE key to update MOVCPM05.COM and return to CP/M command level.

10. Write the new REMEX (Z47)-bootable system onto the drive:

The system program file MOVCPM05.COM now contains the REMEX (Z47) BIOS I/O module, the REMEX (Z47) boot module, and a logical/physical drive assignments table with the REMEX drive as 'A:'. (Remember, however, that the CP/M system now running is still using the original logical/physical drive assignments table observed in step 4.) To create a system disk which may be booted on the REMEX (Z47) drive type:

```
A0>MOVCPM05(cr)

CONSTRUCTING 64K Z89/Z90 CP/M v2.241 (c) Magnolia Microsystems 1982
READY FOR 'SYSGEN' OR
'SAVE xx CPM64.COM'
```

Followed immediately by:

```
A0>SYSGEN(cr)

SYSGEN version 2.242 (c) 1982 Magnolia Microsystems

NOTE: if you just ran MOVCPM (or a similar function) system is in memory.

Get System from what drive (RETURN to get from memory) ?(cr)

Put System to what Drive (RETURN to quit) ?D ;use appropriate drive name
Insert disk in Drive D: and push RETURN (^C aborts) (cr)
System Successfully written to drive D:

Put system to what Drive (RETURN to quit) ?(cr)

A0>
```

11. Copy your files onto the REMEX diskette:

All your standard MMS CP/M system utilities should be moved from the system floppy to the REMEX for user convenience. The utility PIP.COM can be used to facilitate this transfer; at CP/M command level, type:

```
A0>PIP D:=A:*.*[V](cr)
```

If some extraneous system utilities were deleted from the system floppy to provide work space during the 77314 (REMEX (Z47)) software installation procedure, they can be copied from your MMS CP/M distribution diskette after the new CP/M system is booted from the REMEX.

12. Boot MMS CP/M from the REMEX (Z47)

The 8" diskette now contains a bootable CP/M system. RESET the computer, and re-boot from the new drive. At the MMS: prompt, enter either:

```
MMS: Boot 5(cr)      or   (use Boot DD(cr) if you are
                            using a Zenith Z89-47 interface)
MMS: Boot GG(cr)
```

where the '5', 'G', or 'D' designate the REMEX (Z47) drive. The system should boot and sign on with:

```
64K Z89/Z90 CP/M v2.241 (c) Magnolia Microsystems 1982
A0>
```

Execute the DRIVES utility and verify that the logical-physical table is as you defined it with SETUP MOVCPM05 above. Enter:

```
A0>DRIVES(cr)

A: = (05) 1210K 77314/Z89-47 REMEX Interface v2.240
B: = (06) 1210K 77314/Z89-47 REMEX Interface v2.240
C: = (00)   90K Z17 Hard Sector controller v2.240
D: = (01)   90K Z17 Hard Sector controller v2.240
E: = (40)   98K 77318 Invisible Disk w/ System Space v2.242
```

After testing the system, you may wish to re-configure SW501 so that simply entering a Boot (cr) will boot from the REMEX drive. Refer to your 'MMS MONITOR EPROM' manual for details.

13. Installing other BIOS modules

After testing system operation, you may LINK other BIOS modules into your MOVCPM05.COM file to allow access to other types of drives. Remember to use PIP to create new MOVCPM files with unique names every time you change the boot module.

This completes the 77314/REMEX (Z47) software installation.

APPENDIX

REMEX DRIVE CONFIGURATION FOR USE WITH MMS CP/M

Heath/Zenith Z47 Drives

- o Only one jumper must be changed from 'Zenith standard' on the 'Master' Remex drive in a Z47 for use with MMS CP/M: The Z-F-G (Track 0 Density) selector must be moved to the Z-F (double density) position.
- o Note that Zenith uses the 'Master' drive as device 1, and the 'Slave' as device 0, thus the system is usually BOOTed from the 'Slave' drive with a Z47.
- o Only the first 34 wires in the 40-conductor Z47 cable are active. Simply plug it onto the REMEX connector on the 77314 board with pin-1 to pin-1 orientation.

REMEX Drives from other sources

- o Master Drive (RFS4810) Configuration:
  - o Default Density: H-J-Y (double) (jumper J to H, not Y)
  - o Door Lock: U-T-S (enabled)
  - o Top Head: V-W-X (enabled, double-sided drives only)
  - o Track 0 Density: Z-F-G (double density)
  - o Drive Select: R-P-N-M-L-K (device 0, MMS drive 05)
  - o -5 volt Regulator: AA-BB-CC (depends on Power Supply used)
- o First Slave Drive (RFS4820) Configuration:
  - o Door Lock: A-B-C (enabled)
  - o Top Head: K-L-M (enabled, double-sided drives only)
  - o Drive Select: D-E-F-G-H-J (device 1, MMS drive 06)
  - o -5 volt Regulator: N-P-R (depends on Power Supply used)
- o 2nd and 3rd Slave drives - same except for device select
- o Earlier releases of MMS CP/M required that 5 volts DC be connected to pin 17 (conductor 33) of the ribbon cable between the Drive and Interface. This release does not, however, existing drives need not have the jumper removed.

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