PMM-300

2/4 MHz PATCH INSTALLATION INSTRUCTIONS

for

Magnolia Microsystems CP/M PLUS

by
LIVINGSTON LOGIC LABS

Manufactured and sold by KRES Engineering
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The files contained on this diskette will allow generation of bootable CP/M Plus Systems which will operate reliably at either a 2 Mhz or 4 Mhz CPU clock speed. All information supplied with this product is supplied strictly on an AS IS basis, with NO WARRANTY as to its merchantability, fitness for sale or for any particular purpose. All risk associated with the use of this product, and any damages resulting from the use of this product will be the sole responsibility of the purchaser.

Due to the number of existing 4 Mhz conversions available for the H/Z-89/90 computers, no claims whatsoever are made as to what machines this product will work with. For the same reason, Livingston Logic Labs will provide NO assistance in converting any systems to operate at 4 Mhz, and NO assistance will be provided in tracking down problems which occur on any system having ANY 4 Mhz conversion installed. Livingston Logic Labs strongly recommends the Kres Engineering DSM-240 conversion as the most complete, professional, and technically competent version.

This software has been extensively tested on several different configurations, and has been found to work reliably on a properly functioning 4 Mhz system. This package WILL NOT work with the H/Z-17 disk controller on ANY system which DOES NOT supply a constant 2.048 Mhz clock to P512-13. This package WILL NOT make it possible to boot from the H-17 disk controller without a suitably modified MTR-88/MTR-89/MTR-90 ROM or H-17 ROM. This package WILL work with PROPERLY executed software switchable CPU clocks, such as the KRES Engineering DSM-240.
INCLUDED SOFTWARE -

This package includes the following software modules/programs:

2/4 Mhz Boot Loader Modules:

- LDRBZ17.REL - For H/Z-17
- LDRBZ37.REL - For H/Z-37
- LDRB8316.REL - For 8" Drives on Magnolia 77316 DD Controller
- LDRB5316.REL - For 5" Drives on Magnolia 77316 DD Controller
- LDRB320.REL - For Magnolia 77320 SASI Interface

2/4 Mhz System Loader Modules:

- LDRZ17.REL - For H/Z-17
- LDRZ37.REL - For H/Z-37
- LDR316.REL - For Magnolia 77316 DD Controller
- LDR320.REL - For Magnolia 77320 SASI Interface

2/4 Mhz Driver Modules:

- Z17'3.REL - For H/Z-17
- Z37'3.REL - For H/Z-37
- M316'3.REL - For Magnolia 77316 DD Controller
- M320'3.REL - For Magnolia 77320 SASI Interface

2/4 Mhz FORMAT.COM Patches:

- FMT+PTCH.COM - Patches FORMAT.COM for 2/4 Mhz Operation

SUBMIT Files:

- LDRGEN.SUB - To Generate Loader Operating System Modules
- BIOS3GEN.SUB - To Generate BNKBIOS3.SPR Files

CLOCK SWITCHING UTILITIES:

- SETCLK+.COM - Clock Switching Utility for KRES DSM-240

All of the above modules have been modified to allow proper operation with either a 2 Mhz or 4 Mhz CPU clock. The above .REL modules can be used in place of the standard Magnolia .REL modules in the standard CP/M Plus system generation procedures.
INSTALLATION OVERVIEW -

Installation of this package involves three steps:

1 - Generation of the patched FORMAT.COM to allow FORMATting of all available disk formats at either 2 or 4 Mhz.

2 - Generation of the required 2/4 Mhz loader operating systems (LDRxxx.COM) for all disk controllers from which CP/M Plus is to be booted, and placing the new loader operating system on the system tracks of all bootable disks using COPYSYS.COM.

3 - Generation of the required 2/4 Mhz CPM3.SYS operating system file(s).

The above steps are described in the following section. However, before attempting the actual installation, you should re-read the Magnolia CP/M Plus User's Guide Supplement, paying particular attention to the sections on COPYSYS.COM, SETUP.COM, Generating a New Boot Loader, and Generating a New CP/M Plus System. When following the directions in the following section, do not be concerned if some of the command lines shown do not agree exactly with those shown in the Users Guide Supplement, as some versions of the Supplement contain typographical errors.

Note that ALL of the following procedures MUST be carried out with a 2 Mhz CPU clock.

INSTALLATION -

1 - Prepare a bootable CP/M Plus disk, and copy the following files onto it from your CP/M Plus Distribution Disk(s):

```
LINK.COM - Digital Research Linking Loader
SETUP.COM - Magnolia System Configuration Program
GENCPM.COM - Digital Research CP/M Plus System Generator
GENCPM.DAT - Data File for GENCPM.COM
COPYSYS.COM - System Track Loader
SUBMIT.COM - Batch Command Processor
FORMAT.COM - Magnolia Disk FORMATter
CPM3LDR.REL - CP/M Plus Loader BDOS Module
RESBDOSS.SPR - CP/M Plus Resident BDOS Module
BNKBDOS3.SPR - CP/M Plus Banked BDOS Module
MBIOS3. REL - BIOS Root Module
CHRI03.REL - Character I/O Driver Module
END.REL - Driver String Termination Module
LPTBL.REL - Logical to Physical Mapping Table
GETDP.REL - Disk Parameter Locator Module
SCB.REL - System Control Block Module
```

2 - Decide which disk controllers are to be supported in the new CP/M plus system, and copy the driver files for each of those devices from the CPM+PTCH Distribution Disk onto the disk used in step 1 above. For example, to generate a system which supports the 77316 DD controller and the H/Z-17 controller, copy the following files:

```
M316'3.REL - 77316 Driver
```
3 - Copy the following files from your CPM+PTCH Distribution Disk onto the disk used in steps 1 and 2 above:

- **FMT+PTCH.COM** - Automatic Patch Program for FORMAT.COM
- **LDRGEN.SUB** - To Generate Loader Operating System Modules
- **B IOS3GEN.SUB** - To Generate BNKB IOS3.SPR Files
- **ALL LDRBxxx.REL Files** - Boot Loader Modules
- **ALL LDRxxx.REL Files** - Loader Operating System Modules

4 - Execute FMT+PTCH.COM by typing "FMT+PTCH" in response to the CP/M "A>" prompt. After a few seconds the "A>" prompt will return, and the patched FORMAT program will be on the disk as FORMAT+.COM. FORMAT+.COM will properly FORMAT disks with either a 2 Mhz or 4 Mhz CPU clock, and should always be used in place of FORMAT.COM.

5 - Generate the required loader operating system(s) for all disk devices. This is done by linking together CPM3LDR.REL, LDRxxx.REL, and LDRBxxx.REL. This is done automatically by LDRGEN.SUB. To execute LDRGEN, enter "SUBMIT LDRGEN" in response to the CP/M "A>" prompt.

This procedure will take some time to complete, since 6 loader operating systems will be generated. When the "A>" prompt finally returns, you should find 6 new files on the disk with file names in the format:

- **LDRxxx.COM**

Where xxx is the identifier for the disk device:

- Z17 => H/Z-17 Controller
- Z37 => H/Z-37 Controller
- 8316 => 8" Drive on Magnolia 77316 DD Controller
- 5316 => 5" Drive on Magnolia 77316 DD Controller
- 320 => Magnolia 77320 SASI Interface

6 - Generate the new BNKB IOS3.SPR file. This is done by linking together MB IOS3.REL, CHR IOS3.REL, END.REL, LPTBL.REL, GETDP.REL, SCB.REL, and all desired disk device drivers. This is done automatically by BIOS3GEN.SUB. To execute BIOS3GEN, enter a command line of the following format:

```
SUBMIT BIOS3GEN <diskio>
```

Where <diskio> is a list of the disk drivers to be included in the new BNKB IOS3, separated by commas.

For example, to generate a BNKB IOS3.SPR file containing drivers for the 77316 DD controller and the H/Z-17 controller, enter:

```
SUBMIT BIOS3GEN M316'3,Z17'3
```

7 - When BIOS3GEN.SUB is done, SETUP.COM will automatically be executed. Follow the Magnolia SETUP documentation for setting ALL system parameters. Be sure to exit each sub-menu by striking the <BLUE> key so that any changes you entered will be made to the BNKB IOS3.SPR file. Be sure to exit the program by
using the "Generate new CP/M system and exit" option of the main menu. This will cause GENCPM.COM to be executed automatically, which will generate a new CPM3.SYS file.

When running SETUP.COM, it is particularly important that you setup the logical/physical drive assignments such that logical drive A: corresponds to the physical drive from which you will be booting. For example, if you are booting from 8" drive 0 on the 77316 DD controller, logical drive A: MUST be assigned to physical drive 29. CAREFULLY read the Magnolia CP/M Plus User's Guide Supplement for details.

8 - When the "A>" prompt returns, the only step remaining is to place the new loader operating system onto the system tracks of the boot disk. To do this, enter a command line of the following format:

```
COPYSYS LDRxxx.COM A:
```

Where `xxx` is the identifier for the disk device:

- Z17 => H/Z-17 Controller
- Z37 => H/Z-37 Controller
- 8316 => 8" Drive on Magnolia 77316 DD Controller
- 5316 => 5" Drive on Magnolia 77316 DD Controller
- 320 => Magnolia 77320 SASI Interface

For example, if you have booted from 8" drive 0 on the 77316 DD controller, enter:

```
COPYSYS LDR8316.COM A:
```

9 - If you have correctly followed all of the above instructions, you should now be able to re-boot your disk at either 2 Mhz or 4 Mhz, and FORMAT new disks using FORMAT+.COM at either 2 Mhz or 4 Mhz.

You now have a set of LDRxxx.COM files for generating 2/4 Mhz bootable disks, and a BNKBIO3.SPR file for generating new CPM3.SYS files for all available drives. If any modifications are required, simply use the above files, and the CPM+PCTCH driver .REL modules in place of the Magnolia supplied modules, for linking together new systems.

GENERATING ADDITIONAL BOOTABLE DISKS -

Two things are required in order for a disk to be bootable.

1 - The system tracks must contain a properly configured loader operating system (LDRxxx.COM).

2 - The CPM3.SYS file must be properly configured for the system hardware, with logical drive A: assigned to the boot drive.

The ONLY time COPYSYS can be used to copy the system tracks of one disk to the system tracks of another, is when the two disks are IDENTICALLY FORMATted, and will be booted in the EXACT SAME PHYSICAL DRIVE. The DESTINATION disk should ALWAYS be placed IN THE DRIVE IN WHICH IT WILL BE BOOTED when COPYSYS is run.
Otherwise, you may end up with a disk which will not boot at all, or will only boot in some drive other than the one you wanted.

The safest way to ensure that the proper loader operating system is placed on the system tracks of a disk is to ALWAYS use the LDRxxx.COM file as the source for COPYSYS, rather than taking the loader from an existing drive. The correct loader to use is:

For ALL H/Z-17 Disks: LDRZ17.COM
For ALL H/Z-37 Disks: LDRZ37.COM
For 5" 77316 Disks: LDR5316.COM
For 8" 77316 Disks: LDR8316.COM
For SASI Winchester Disks: LDR320.COM

It is also important that COPYSYS properly configure the boot loader for the correct physical drive. The safest way to accomplish this is to ALWAYS place the disk IN THE DRIVE IT IS TO BE BOOTED IN when running COPYSYS.

The ONLY time a CPM3.SYS file can be copied directly from one disk to another is when the two disks are IDENTICALLY FORMATted, and are both bootable in the EXACT SAME PHYSICAL DRIVE. Under ANY other circumstances, it is necessary to run SETUP.COM and GENCPM.COM to reconfigure the BNKBIO3.SPR file for the new disk format and logical A: drive, and generate a new CPM3.SYS file to be placed on that disk before it will be bootable.

ADDITIONAL PATCHES/ENHANCEMENTS -

The following section contains some additional patches that can be made to the MBIOS3.ASM file to add additional capability to the Magnolia CP/M Plus BIOS. In order to install any of these patches, you must first CAREFULLY make the changes indicated to the MBIOS3.ASM file from your CP/M Plus Distribution Disk(s), then re-assemble it using RMAC.COM to generate the new MBIOS3.REL module, by entering:

RMAC MBIOS3 $SZPZ

in response to the CP/M "A>" prompt. This assembly will take several minutes. The file Z80.LIB must also be on the default disk before RMAC is run. When RMAC has finished, repeat steps 6-8 above to generate a new CPM3.SYS file.

In the patches given below, locate the code given under the heading "ORIGINAL CODE", and CAREFULLY modify it to read EXACTLY as shown under the heading "REPLACEMENT CODE".

PATCH 1 - D-G SUPER-89 PATCHES

These patches will allow the Magnolia CP/M Plus to be run on a D-G Super-89 CPU at either 2 Mhz or 4 Mhz.

ORIGINAL CODE:
bnkerr: db 13,10,7,'No 77318$'

REPLACEMENT CODE:
bnkerr: db 13,10,7,'No Banked Memory$'

ORIGINAL CODE:

bnksel:
  sta cbnk ; remember current bank
  push b ; save register b for temp
  push h ;
  lxi h,table ,
  mov c,a ;
  mvi b,0 ;
  dad b ,
  mov b,m ,
  lxi h,intby ;
  mov a,m ;
  ani 1001011b ;
  ora b ;
  mov m,a ;
  out port ,
  pop h ,
  pop b ; restore register b
  ret

IF bnksiz EQ 56

bnktop equ 0e000h

table: db 20H ; select code for bank 0
       db 14H ; bank 1 (56K)
       db 34H ; bank 2 (56K)

endif

IF bnksiz EQ 48

bnktop equ 0c000h

table: db 20H ; select code for bank 0
       db 10H ; bank 1 (48K)
       db 30H ; bank 2 (48K)

endif

time: time is kept by tick interrupt
xmove: ret , can't perform interbank moves

REPLACEMENT CODE:

bnksel:
  sta cbnk ; remember current bank
  push b ; save register b for temp
  push h ;
  lxi h,table ,
  mov c,a ;
  mvi b,0 ,
  dad b ,
  mov a,m ,
  lxi b,07c0h , Get base port and count
dglp: outp a , Select a block
inr c ; Update the port
djnz dglp , Do next block
lda intby
out port
pop h ;
pop b , restore register b
ret

bnkttop: equ 0e000h
table: db 000H
db 011H
db 022H
time: ; time is kept by tick interrupt
xmove: ret ; can't perform interbank moves

ORIGINAL CODE:

boot: lxi sp,stack
lda 13
ani 11111101b ; we must be in bank 0
sta intby
out port
, Verify that we have banked RAM...
xra a
sta bkflag ; assume 77318 not installed (error)
lxi h, intby
lxi d,40h
mvi a,1
stax d , put bank number in 40h
mov a,m
ani 11001011b
ori 04h
out port
mvi a,2
stax d
mov a,m
ani 11001011b
ori 24h
out port
mvi a,3
stax d
mov a,m
out port
ldax d
cpi 1
jnz noram
mov a,m
ani 11001011b
ori 04h
out port
ldax d
cpi 2
jnz noram
mov a,m
ani 11001011b
ori 24h
out port
1dax d
   cpi 3
   jnz noram
   mvi a,true
   sta b nkflg

noram: mov a,m
      out port

; Initialize all modules and build tables.
   1xi h,thread
     thread our way through the modules,

REPLACEMENT CODE:

boot: 1xi sp,stack
      lda 13
      ani 11111101b ; we must be in bank 0 now
      sta intby
      out port

; Verify that we have banked RAM...
   xra a
   sta b nkflg ; assume no banked RAM (error)
   1xi h,40h
   mvi m,1
   mvi a,011h
   out 0c0h
   mvi m,2
   mvi a,022h
   out 0c0h
   mvi m,3
   xra a
   out 0c0h
   mov a,m
   cpi 1
   jnz noram
   mvi a,011h
   out 0c0h
   mov a,m
   cpi 2
   jnz noram
   mvi a,022h
   out 0c0h
   mov a,m
   cpi 3
   jnz noram
   mvi a,true
   sta b nkflg

noram: xra a
      out 0c0h
      lda intby
      out port

; Initialize all modules and build tables.
   1xi h,thread
     thread our way through the

PATCH 2 - TICCNT PATCHES

The standard Magnolia CP/M Plus BIOS does not provide a 2 mSec TIC counter at locations 000BH-000CH in the TPA bank. Many programs written specifically for the H/Z-89/90 REQUIRE this TIC counter to operate properly. These patches setup a TIC counter at locations 000BH-000CH in the TPA bank.
PATCH 3 - CONSOLE INTERRUPT PATCHES

The standard Magnolia CP/M Plus BIOS does not allow transient programs which setup their own console interrupt handlers in the TPA. Many commonly available text editors and word processors use their own console interrupt handlers and, therefore, will not work under CP/M Plus. These patches modify the console interrupt
processor so that transient programs CAN setup their own console interrupt processors.

ORIGINAL CODE:

call bnksel ;
jmp ccp ; then reset jmp vectors and exit

set$jumps:
reset$pg0:
di
lda intby
ori 10b
sta intby
xra a ; redundant for Cold-Start
call bnksel ; select bank 0
mvi a,(JMP)
sta cpm ! sta bdos ; set up jumps in page zero
sta RST1
1xi h,BIOS$0+3 ! shld cpm+1 , BIOS warm start entry
1h1d mxtpa ! shld bdos+1 ; BDOS system call entry
1xi h,clock ! shld RST1+1 ; bank 0 is all set...
1xi h,0 ;
1ded bnkbf ;
1xi b,64 ;
1dir ;
mvi a,2
call bnksel
1h1d bnkbf ;
1xi d,0 ;
1xi b,64 ;
1dir ;
mvi a,1
call bnksel
1h1d bnkbf ;
1xi d,0 ;
1xi b,64 ;
1dir ,
ei
ret

xxmove: exaf , save number of records

REPLACEMENT CODE:

call bnksel ;
jmp ccp ; then reset jmp vectors and exit

super89: set FALSE ; Set to TRUE if using Super-89
RST3: equ 8*3

set$jumps:
reset$pg0:
di
lda intby
ori 10b
sta intby
out port
xra a ; , redundant for Cold-Start
call bnksel ; select bank 0,
mvi a,(JMP)
sta cpm ! sta bdos , set up jumps in page zero
sta RST1
lxix h,BIOS$0+3 ! shld cpm+1 ; BIOS warm start entry
lhld mxtpa ! shld bdos+1 ; BDOS system call entry
lxix h,clock ! shld RST1+1 ; bank 0 is all set...
lxix h,inttrp
sta RST3
shld RST3+1
lxix h,0 ;
ded bnkbf ;
lxix b,64 ;
dir ,
mvi a,2
call bnskesl
lhld bnkbf ;
lxix d,0 ;
lxix b,64 ;
dir ,
mvi a,1
call bnskesl
lhld bnkbf ;
lxix d,0 ;
lxix b,64 ,
dir ,
lhld RST3SAV
shld RST3+1
ei
ret

inttrp: ssdp trpsav
lxix sp,trpstk
push psw
if super89
push b
in Oc0h
push psw
mvi a,011h
else
push h
lxix h,table+1
endif
call trpsel
ei
if super89
pop psw
nop
di
call trpsel
pop b
else
lda intby
nop
di
out port
pop h
endif
pop psw
lsdp trpsav
ei
ret

trpsel:
    if super89
    lxi b,07coh

trplp: outp a
    inr c
djnz trplp
else
    lda intby
    ani 10001011b
    ora m
    out port
endif
ret

RST3SAV:dw 0
trpsav: dw 0
ds 16
trpstk: equ $

xxmove: exaf ;save number of records

ORIGINAL CODE:

    lda civec-10 ;location of search type flags
    ani 111$00$111b
    ora c
    sta civec-10
    jmp boot$l

REPLACEMENT CODE:

    lda civec-10 ;location of search type flags
    ani 111$00$111b
    ora c
    sta civec-10
    lhl RST3+1
    shl RST3SAV
    jmp boot$l

.EOF.
NOTES ON 4 MHZ OPERATION -

A number of 4 MHz conversions have become available in the past several months for the H-89 computer. Unfortunately, they vary widely in their completeness and technical correctness. For the most part, these are poorly executed "quick and dirty" conversions, and little or no consideration has been given to any compatibility problems which might arise with existing hardware and software.

Because of this, Livingston Logic, as well as many other vendors, have been experiencing a large increase in the number of complaints from customers who have installed these conversions. To date, NOT ONE of these complaints has proved valid. Tracking down such problems has begun taking up a great deal of our time, when, in fact, the problem is NOT ours! With the wide variety of different conversions and clock switching schemes available at the present time, it is simply not possible to provide software which will work in all cases. For this reason, we are forced to take the following position:

1 - LLL CANNOT and WILL NOT provide ANY assistance, either hardware or software, to anyone converting ANY system to 4 MHz operation.
2 - LLL CANNOT and WILL NOT provide ANY support for any customer experiencing ANY problems with our products when operated in any system with ANY 4 MHz conversion installed, whether the problem also occurs at 2 Mhz or not.

For the benefit of those who STILL wish to convert their systems to 4 Mhz, we would strongly recommend the KRES Engineering conversion as the most complete, professional and technically competent conversion. All LLL products have been verified as working with the KRES conversion. However, the above policies STILL apply.

IN CASE OF DIFFICULTY -

If you experience any difficulties in setting up and running the CP/M PLUS patches and utilities, PLEASE do the following BEFORE requesting assistance:

1 - READ and RE-READ ALL DOCUMENTATION, including the Heath/Zenith CP/M documentation. Be sure you understand EVERYTHING you are doing.
2 - Start the proceduere over again FROM THE BEGINNING. Be VERY SURE that you follow all directions TO THE LETTER!! DON'T SKIP STEPS!! DON'T ASSUME THAT YOU KNOW ENOUGH TO LEAVE OUT OR MODIFY ANY STEPS!!
3 - If you are still experiencing trouble, have someone else try the procedure, preferably someone with more CP/M experience and knowledge.
4 - If, at this point you're STILL having trouble, GO BACK TO STEP 1 AND DO IT ALL ONE MORE TIME!!
5 - If you've made it this far and you're STILL having trouble, then write down, in as much detail as possible, EXACTLY what the problem is, any symptoms or problems, EXACTLY WHEN and HOW the problem manifests itself, and EXACTLY what the configuration of your system is, including both HARDWARE and SOFTWARE. Mail this letter, and, if possible, a bootable disk exhibiting the problem, to the vendor that sold you this product, whose address is on the front page of this document. Include a postage paid return envelope.

Livingston Logic has established a reputation as a supplier of high
quality, reasonably priced hardware and software for Heath/Zenith computers. It is our policy to provide as much support as is practical, and we are always happy to receive any comments or suggestions which our customers may have regarding the quality of our products or documentation, as well as any suggestions as to possible new products or improvements to existing products. We will also do whatever we can, within reason, to solve any problems which may occur, provided the customer has read and understood ALL supplied and suggested documentation, has followed all instructions faithfully, has made a reasonable effort to verify and isolate the problem, and has supplied enough information about any such problem for us to attempt to duplicate the problem on our systems. Most importantly, DO NOT phone for assistance unless you have BOTH your computer and our documentation in front of you when you call.

Our experience with customer complaints/problems has been:

1 - Over 60% simply did not take the time to read and understand the documentation, and made little or no effort to isolate or verify the problem before calling for help. In many cases, we have been called upon to provide VERY BASIC information about the operation of the computer or the operating system. This is NOT our responsibility!
2 - Roughly 30% have problems with hardware, other software, or simply have not properly configured the hardware or software correctly.
3 - In the last year, an increasing number of problems have centered around 4 Mhz operation. In EVERY case, the problem has been found to be either a hardware caused malfunction due to an improperly executed conversion violating one or more hardware timing requirement, or some feature of the conversion which by it's very nature makes it incompatible with ANY standard disk driver.
4 - Far less than 1% have legitimate problems with "bugs", defective distribution media, or other manufacturing problems.

Because of the recent increase in the number of calls falling into the first three categories above, we have been forced to adopt the following policy regarding alleged "bugs":

1 - Reports of suspected "bugs" MUST be made in writing, stating the exact nature of the bug, ALL hardware and software in use at the time of the problem, and all pertinent system configuration information (step rates, drive makes and models, etc).
2 - The original distribution disk MUST BE RETURNED for inspection, along with the selling dealers name and purchase date.
3 - If possible, a bootable disk which exhibits the problem should also be returned with the report.
4 - Should we determine that a bug or problem does exist, we may or may not provide a correction, as we see fit. We may or may not incorporate any such fixes in future releases of the software. Any such updates may or may not be available at a reduced rate. Any such updates may or may not be announced in such publications as H-SCOOP, BUSS, and local club newsletters.

LLL has always tried very hard to maintain compatibility with other existing products, both hardware and software, and we have often updated our products to take advantage of some new products features, or enhance compatibility. Unfortunately, this attitude is not shared by most sellers, and, as a result incompatibilities may arise, particularly with products developed AFTER the release of ours. For this reason, we DO NOT provide ANY products on a trial basis, and we further make NO warranties as to compatibility or suitability of any
of our products for any purpose whatsoever. All products are sold strictly on an "as is" basis. When incompatibilities are found, we may or may not update our product to provide compatibility, and we may or may not offer any such updates at a reduced rate.

LLL CANNOT and WILL NOT provide ANY of the following services, except on a prepaid hourly basis at our current consulting rate:

1 - Assistance in the installation, configuration debugging, or operation of ANY other company's products.
2 - Assistance in the location and identification of general system hardware or software problems.
3 - Assistance in the modification of any of our products for any purpose.
4 - General advice, technical information, or any other information not directly related to the operation of one of our products.

Further, any correspondence relating to the following subjects will not be acknowledged:

1 - Conversion of any system to 4 Mhz operation.
2 - Hardware or software problems which occur with 4 Mhz operation.
3 - Operation of ANY 80 track drive within the H-89 enclosure.
Magnolia Micro Systems CP/M+ Patches
Additional Information

Extra Included Files

Two additional files have been included on the supplied CP/M+ patches distribution disk. These files are not mentioned elsewhere in the documentation. These files are.

```
FORMAT.COM
FORMAT+.COM
```

The FORMAT+.com file is complete and ready to be used. When operating at 4 MHz use this program **DO NOT** use the one that comes with your system.

When Livingston Logic Labs originally wrote these patches they were designed around the most current version of CP/M+ available from Magnolia. Since that time Magnolia has made changes to some files and utilities. The format utility is the one most effected. The new version of format will not work with the CP/M+ patches installed. For this reason KRES is supplying the original FORMAT.COM already modified for 4 MHz operation.

Winchester Operation

There is a bug in the original version of LDR320 for CP/M+. This file will not work properly on the winchester. The LDR320 files supplied by Magnolia in the CP/M+ package will operate properly at 4 MHz.

Thank-you
Kres Engineering

Information courtesy Ray Livingston and Henry Fale.

02/5/86