

**POVERSOFT**  
Products from Breeze/GSD, Inc.

**MASTER MECHANIC SET**  
**for LDOS**



PowerSOFT's MASTER MECHANIC SET FOR LDOS(tm)OVERVIEW

The disk you have received contains the utility programs which make up PowerSOFT's Master Mechanic Set for LDOS operating systems versions 5.1.3 and later. These are a powerful set of utilities which enable you to do a variety of essential tasks on disk files and memory, such as direct modification of disk sectors (PMOD), checking and fixing directory errors (PCHECK and PFIX), testing your disks for CRC and other formatting errors (PVU), and reformatting your LDOS disks without losing any data already there (PREFORM).

If you need to know where on a diskette a certain file resides, PMAP will tell you. Conversely, if you want to know what file a certain sector on the disk has been assigned to, if any, PSS, the Sector Status utility, will provide the information.

Model I users know that a single-density LDOS disk can't be read by TRSDOS. This can be an annoying problem sometimes, especially when you want to send a diskette to someone who doesn't have LDOS. PUN, the UNREPAIR utility, will take care of that problem in a few seconds. It will write out the directory track of a single density Model I disk with the correct data address marks that will make it readable by TRSDOS. Now you don't have to bother installing patches in the operating system itself just to reverse the action of the REPAIR utility. Just UNREPAIR the disk!

Passwords can be removed from one or all files on a disk in one fell swoop by the PASSGO utility. Very handy for those cases when you don't want to keep typing the LDOS master password after each file. And this one won't even ask you for a master password!

Directories and unassigned sectors on your disk can be cleaned up with the use of PCLEAR. This utility will zero out the unused directory slots and unused sectors if desired. If you want to make sure absolutely no trace of a killed file remains on a disk for a hacker to find, use PCLEAR.

The following pages will give full detailed instructions on the use of each of these utilities and filters. Please read the instructions carefully before trying anything drastic.

### LOADING INSTRUCTIONS

The disk you have received does not have an operating system on them. It is, however, readable as an ordinary LDOS data disk. However, it also contains a special transfer system which will move the files onto your own disks. THE MASTER DISK CANNOT BE BACKED UP USING MIRROR-IMAGE BACKUP!! May we suggest that you move the files onto your own formatted diskettes and use those as your everyday working master. Put the original master disk away in a safe place against that inevitable time when all your working disks are bombed out.

To use the special transfer system, simply prepare a single density data disk to receive the files. Then boot up the master in drive 0. You will be shown which files are on the disk, and how much space is needed on the destination drive to hold them. Place the disk you just prepared in any drive and tell the program which drive it is on. It will transfer the files over one by one. Once the files have all been transferred, put the master away in a safe place.

**REMEMBER!** The destination disk must be formatted in single density!!

If you have only one drive, you may specify drive 0 as the destination disk and the file transfer system will tell you when to swap disks.

If you do NOT wish to use the transfer system, merely use the COPY command to move the files from the master onto your own disks. Or you may use BACKUP-by-class. Use the (VIS) parameter. Don't attempt a mirror-image backup - nothing will happen.

## USE WITH LDOS VERSIONS EARLIER THAN 5.1.3

The MASTER MECHANIC SET utilities are written for use with LDOS version 5.1.3. Under no circumstances should they be used with the LDOS 5.0 series. PowerSOFT will not take responsibility for damage arising from using these programs under LDOS 5.0.x.

Model I owners may use these programs on any 5.1 series LDOS system. Model III owners must apply corrective patches if they wish to use these programs under versions of LDOS earlier than 5.1.3. These patches are listed below.

PATCH PMOD/CMD (D00,6A=90)  
PATCH PCHECK/CMD (D01,03=90)  
PATCH PFIX/CMD (D01,69=90)  
PATCH PREFORM/CMD (D00,C6=90)  
PATCH PVU/CMD (D00,CA=90)  
PATCH PCLEAR/CMD (D01,CE=90)  
PATCH PSS/CMD (D01,2A=90)  
PATCH PMAP/CMD (D00,E7=90)  
PATCH PASSGO/CMD (D01,45=90)

Any file which does not appear on this list does not need patching. Remember, these patches are for MODEL III only.

PMOD

The PMOD Utility is a comprehensive Disk/File/Memory Modification Utility. It allows easy user interaction between memory and disk storage systems. All LDOS supported disk devices may be operated on, including Single/Double Density, Single/Double Sided, 5" and 8" floppies and fixed/removable rigid disk systems. It has a full screen display of 256 bytes at a time with both HEX and ASCII formats, and makes use of dual cursors for easy modification. The user can go to the heart of a disk and modify in HEX, ASCII, DECIMAL, BINARY, or OCTAL input. The syntax of the PMOD command is:

```

=====
!   PMOD,aaa                               !
!   PMOD,filespec,bbbb                     !
!   PMOD,:c,d,e                             !
!                                           !
!   aaaa = memory address to modify         !
!   filespec = any valid LDOS filespec      !
!   bbbb = relative file sector (optional)  !
!   :c = drive to modify (0-7, colon mandatory) !
!   d = cylinder number (defaults 0)       !
!   e - sector number (defaults 0)         !
!                                           !
!   abbr: NONE                             !
=====

```

NOTE: It is recommended that you SET \*KI KI/DVR (jkl) before using entering PMOD so the control keys and screenprinter will be active.

There are 3 modes of operation of the program as indicated by the command line:

Memory Modify

Enter the memory address where modification is to begin. You may enter the number in Hexadecimal, Decimal, Octal, or Binary by PRECEDING the number with H, D, O (or Q), or B respectively (for example, H4030). Decimal is the default value if none of the above are specified.

After entering the address and pressing <ENTER>, you will view the contents of 1 page of memory (256 bytes) starting at the specified address. Please refer to the following screen dump:

```

      3000.C35E 32C3 9B32 C374 32C3 DA32 C3C0 31C3..^2..2.t2..2..1.
HEX  3010.D131 C3AB 34C3 5534 C3C2 35C3 FB35 C35A..1..4.U4..5..5.Z
MEM  3020.36C3 8036 C38E 33C3 3937 C3F7 31C3 7B37.6..6..3.97..1.{7
      3030.C399 37C3 BB35 C3A0 35DB E4CB 6FC3 1C35...7..5..5...o..5
      3040.18D3 C3B5 3740 6162 6364 6566 6768 696A.....7@abcdefghij
      3050.6B6C 6D6E 6F70 7172 7374 7576 7778 797A.klmnopqrstuvwxyz
      3060.3AEA 37B7 C930 3132 3334 3536 3738 393A.:.7..0123456789:
      3070.3B2C 2D2E 2F0D 1F01 5B0A 0809 2021 DC05.;,-./...[... !..
      3080.22FF 41AF C960 4142 4344 4546 4748 494A."A..@BCDEFGHIJ
      3090.4B4C 4D4E 4F50 5152 5354 5556 5758 595A.KLMNOPQRSTUVWXYZ
      30A0.77AF C9AA AA00 2122 2324 2526 2728 292A.w.....!"#$%&'()*
      30B0.2B3C 3D3E 3F0D 1F01 1B1A 1819 203E 0121.+<=>?.....>.!
      30C0.1940 AE18 DB40 4142 4344 4546 4748 494A..@...@BCDEFGHIJ
      30D0.4B4C 4D4E 4F50 5152 5354 5556 5758 595A.KLMNOPQRSTUVWXYZ
      30E0.CDD9 01AF C930 3132 3334 3536 3738 393A.....0123456789:
      30F0.3B2C 2D2E 2F0D 1F01 5B0A 0809 2028 E1A6.;,-./...[... (..

```

The far left column of the screen indicates the current modification BASE (HEX, DECimal, ASCii, OCTal, BINary), and the MEM indicates that you are in the memory modify mode. The next column is the 4 character HEX address where the data is that you are viewing. The center columns of the display is the HEX representation of the 16 bytes starting at the address indicated at the row beginning. There is a space between each quad (2 bytes, 4 HEX ASCII characters) for easier viewing. On the far right is the representative ASCII character of the 16 bytes on that row. All bytes less than 20H (32 decimal) are displayed as a period (.) to indicate a non-printing character. Graphics characters are also printed as periods in this illustration, however they will show up as graphics on your screen. You are now in the memory paging mode. Several keys are active at this point:

```

BREAK - terminate the program
SHIFT CLEAR - prompt for a new address
M - enter MODIFY mode
A - set ASCII modify
B - set BINARY modify
D - set DECIMAL modify
H - set HEXIDECIMAL modify
O - set OCTAL modify
X - prompt for new source data
RIGHT ARROW - increment displayed address by 1 byte
LEFT ARROW - decrement displayed address by 1 byte
UP ARROW - increment displayed address by 1 page (256
           bytes)
DOWN ARROW - decrement displayed address by 1 page

```

Disk Modify

Enter a Drive, Cylinder, and Sector where modification is to begin. You must precede the drive number with a colon (:) to distinguish it from a memory address. The cylinder and sector numbers default to 0 if not issued. The cylinder may be answered with the at symbol (@) to page directly to the directory track.

After answering the prompt and pressing <ENTER> the specified sector will be read from disk and displayed on the video. Please refer to the following screen dump:

```

00.0300 FDCB 035E 2803 210C 62ED B0FD CB03.....^(!.b....
HEX 10.5E20 353E 53FD CB03 7628 023E 0102 0057.^ 5>S...v(>...W
DRV 20.4432 413F 3E44 3242 3F3E 53FD CB04 6E28.D2A?>D2B?>S...n(
0 30.023E 4432 813F 3E53 3282 3FFD CB03 7EC8...>D2.?>S2.?...~.
CYL 40.210F 6211 C03F 0103 00ED B0C9 1140 3F01!.b...@?.
11 50.0300 FDCB 0356 2192 6020 0321 9560 EDB0.....V!@ .!@...
SID 60.18D9 2104 3C11 4164 0140 003E 10F5 1A13...!<.Ad.@>....
0 70.FE3A 2816 FE03 2812 FE0D 280E FE2E 280A...((...((...
SEC 80.B728 0777 09F1 3D20 E4F5 F121 F461 1180...(.w...= ....!..a..
05 90.3C01 0300 EDB0 DD21 5F64 DD7E 06C6 3032.<.....! d.~..02
STD A0.C13C 21BA 6111 003F 0104 00ED B0DD 213F...<!..a..?.....!?
5" B0.3FDD 7E00 F52A C55E CDC9 54F1 323F 3F21.?..*..^...T.2??!
RIG C0.BE61 1180 3F01 0400 EDB0 DD21 BF3F DD7E..a..?.....!..?..~
FIX D0.00F5 2A65 5FCD C954 F132 BF3F C921 F857...*e...T.2.?..!..W
E0.1180 3C01 0300 EDB0 2AC0 5511 4000 FD21...<.....*..U.@..!
F0.033C 3E10 F57C CDB0 54FD 7100 FD70 017D..<>...|...T.q..p.}

```

The screen format is similar to Memory Modify except for the far left column of data, which indicates the source of the information. You are given the drive, cylinder, and sector being viewed. You are supplied with the size of the drive (5" or 8"), and if it is a Floppy or Rigid drive. If a floppy, you are given the density (single or double), and the number of sides (single or double). If a Rigid drive, you are told if it is Fixed or Removable. You are now in the sector paging mode. The following keys are active:

```

BREAK - terminate program
SHIFT CLEAR - prompt for new drive, cylinder, and
                Sector
M - enter MODIFY mode
A - set ASCII modify
B - set BINARY modify
D - set DECIMAL modify
H - set HEX modify
O - set OCTAL modify
X - prompt for new source data
0-9 - page to corresponding sector

```

@ - page to current sector on directory track  
 R - restore drive to cylinder 0, sector 0  
 RIGHT ARROW - increment sector  
 LEFT ARROW - decrement sector  
 UP ARROW - increment track  
 DOWN ARROW - decrement track  
 SHIFT RIGHT ARROW - page to highest sector on current track  
 SHIFT DOWN ARROW - page to lowest sector on current track  
 SHIFT UP ARROW - page to highest cylinder on disk, current sector

### File Modify

Enter a filespec that you wish to view. You may optionally follow the filename with the relative sector that you wish to start with. After locating the file, the specified relative sector (default zero) will be read from the disk and displayed to the video. Please refer to the following screen dump:

```

D00.0506 4445 4C20 2020 1F18 5665 7273 696F...DEL ..Versio
HEX E10.6E20 3228 3130 2920 2D20 3039 2F32 382F.n 2(10) - 09/28/
DRV L20.3832 0102 0052 7EFE 0DCA B252 FE2F 2007.82...R....R./ .
0 /30.114E 5323 CD1C 44DD 214D 533A 4038 FE04...NS#...D.1MS:@8..
C40.CADD 5211 5153 CD1C 4428 0AFE 0D20 ECCD...R.QS..D(... ..
M50.E952 C32D 40CD 4252 CD24 44C2 BB52 CD2C..R.-@.BR.$D.R.,
D60.4420 7EDD 3400 18D3 3A4E 53B7 C8E5 CD70.D ~.4...:NS....p
70.5221 4E53 3A54 003D 2010 CD73 443A 4C53.R!NS:T.= ..sD:LS
80.B7C4 9052 E1AF 324C 53C9 CD4B 443A 4C53....R..2LS..KD:LS
90.B7C4 9052 18EE 2151 537E FE3A 2806 FE03....R...QS~:(...
A0.C823 18F5 3E01 324C 53D5 C511 4953 0102..#...>.2LS...IS..
B0.00ED B0C1 D1C9 D511 5153 1AFE 0328 07FE.....QS...(..
RSEC C0.3A28 0313 18F4 E5C5 2149 5301 0300 EDB0.:(!.....!IS.....
0000 D0.AF32 4C53 C1E1 D1C9 2110 53CD 6744 C330..2LS....!S.gD.0
EOFS E0.40E5 F53A 5153 CB7F 2803 CD28 4421 5153.@...:QS(..(D!QS
0002 F0.CD67 4421 2F53 CD67 44F1 F6C0 CD09 44E1..gD!/S.gD.....D.
  
```

The screen layout is similar to that of Memory Modify, except for the far left column. You are given the drive number that you are working on. The filename that you are viewing is displayed vertically starting just to the right of the cursor. Near the bottom you are given the relative sector you are viewing, and the end of file sector. Normally, you will only be able to view up to 1 less than the EOFs. You are now in the file paging mode. Several keys are active:

BREAK - terminate program  
 SHIFT CLEAR - prompt for a new relative sector  
 M - enter Modify mode

A - set ASCII modify  
 B - set BINARY modify  
 D - set DECIMAL modify  
 H - set HEX modify  
 O - set OCTAL modify (Q may also be used)  
 X - prompt for new source data  
 RIGHT ARROW - increment to the next relative sector  
 UP ARROW - same as right arrow  
 LEFT ARROW - decrement to next relative sector  
 DOWN ARROW - same as left arrow

NOTE: When using the FILE MODIFY option on DIR/SYS, the sectors will NOT be written as Read-Protected, making it unreadable to LDOS for all intents and purposes and requiring a "Repair (alien)" after updating back to the disk. Use the DISK MODIFY option to correctly handle the directory track.

#### Modify Mode

The MODIFY mode is common to all of the above 3 modes of operation, and is entered by pressing M when the desired data is being viewed in one of the above paging modes. The cursor will move into the HEX and ASCII portions of the display (dual cursors), and will flash very rapidly. Refer to the following screen dump:

```

00] D00.0506 4445 4C20 2020 1F18 5665 7273 696F...DEL ..Versio
HEX E10.6E20 3228 3130 2920 2D20 3039 2F32 382F.n 2(10) - 09/28/
DRV L20.3832 0102 0052 7EFE 0DCA B252 FE2F 2007.82...R~...R./ .
0 /30.114E 5323 CD1C 44DD 214D 533A 4038 FE04..NS#..D.1MS:@8..
C40.CADD 5211 5153 CD1C 4428 0AFE 0D20 ECCD...R.QS..D(... ..
M50.E952 C32D 40CD 4252 CD24 44C2 BB52 CD2C..R.-@.BR.$D..R.,
D60.4420 7EDD 3400 18D3 3A4E 53B7 C8E5 CD70.D ~.4...:NS....p
70.5221 4E53 3A54 003D 2010 CD73 443A 4C53.R!NS:T.= ..sD:LS
80.B7C4 9052 E1AF 324C 53C9 CD4B 443A 4C53....R..2LS..KD:LS
90.B7C4 9052 18EE 2151 537E FE3A 2806 FE03....R..!QS~:(...
A0.C823 18F5 3E01 324C 53D5 C511 4953 0102..#...>.2LS...IS..
B0.00ED B0C1 D1C9 D511 5153 1AFE 0328 07FE.....QS...(..
RSEC C0.3A28 0313 18F4 E5C5 2149 5301 0300 EDB0.:(...!IS.....
0000 D0.AF32 4C53 C1E1 D1C9 2110 53CD 6744 C330..2LS....!S.gD.0
EOFS E0.40E5 F53A 5153 CB7F 2803 CD28 4421 5153.@...QS{..(D!QS
0002 F0.CD67 4421 2F53 CD67 44F1 F6C0 CD09 44E1..gD!/S.gD.....D.

```

At the top left of the display, you are given the relative byte within the displayed data where the cursor lies. The following keys are active at this point:

BREAK - abort the modify mode, re-read the source data as it was before any changes were made, and return back to the paging mode you came from. NOTE: In the MEMORY mode, the changes are immediate, and cannot be re-read. In this case, the BREAK key is identical to pressing the ENTER key.

ENTER - terminate the modify mode, and write the modified data back to the source with all changes, and return to the paging mode you came from. NOTE: Changes are immediate in the MEMORY mode, and control is merely passed back to the paging mode.

SHIFT CLEAR - homes the cursor to the first relative byte being displayed.

CLEAR ENTER - allows you to change the current base you are modifying in without leaving the modify mode. You will have a new flashing prompt in the left column of the display. Enter A, B, D, H, or O (or Q) to set ASCII, BINARY, DECIMAL, HEX, or OCTAL bases respectively. Any other keys will be ignored. You will then return back to the modify mode at the same location you came from.

ARROW KEYS - move the cursor 1 byte in the corresponding direction without affecting any of the bytes.

SHIFT ARROW KEYS - move the cursor to extreme row or column ends in the associated direction without affecting any of the bytes.

NOTE: In the DISK MODIFY and FILE MODIFY modes you will not be able to move the cursor beyond the edges of the displayed data. In MEMORY modify, if you attempt to move the cursor beyond the edges, additional data is brought to the screen to supply the desired information.

If you are in the ASCII MODIFY mode, and the key you enter does not apply to any of the above conditions, then that character is entered at the current cursor location, and the cursor is advanced by one byte.

If you are NOT in ASCII modify, several additional features are available:

- G - followed by a number moves the cursor immediately to the relative byte in the page that you are viewing.
- L - followed by a number moves the cursor to the next occurrence of the specified byte. The cursor will move to the last byte on the screen if the requested byte is not located.
- P - followed by a number duplicates (propagates) the current byte located under the cursor to the following indicated number of bytes.
- < - will shift all bytes from the cursor to the page end by one byte, and place a zero at the last location on the screen. This allows you to delete text at the cursor.
- > - will shift all bytes from the cursor to the page end by one byte, and place a zero at the current cursor location. This allows you to insert text at the cursor.

The above five commands are disabled in the ASCII MODIFY mode, and will merely insert the character into the text.

If you are not in ASCII modify, and none of the above conditions are met, then the input is interpreted as numeric input. If you are in HEX mode, for example, you must enter two HEX digits (0-9,A-F) to change a single byte. Decimal mode expects 3 digits (0-9), Octal mode expects 3 digits (0-7), and Binary mode expects 8 digits (0-1). You may pre-terminate the numerical input by pressing ENTER. Thus, in HEX mode, 3 <ENTER> is the same as entering 0 3, in Binary mode, 1 1 1 <ENTER> is the same as entering 0 0 0 0 0 1 1 1. When you are in the middle of entering a number, the cursor will change to indicate that more input is required to complete the current operation. If you enter incorrect digits before completing the number, entering an invalid character will terminate the entry. Thus, in HEX modify, you type a 3, but meant to enter a 4, just hit an invalid key (X for example) to terminate the operation and leave the byte unchanged. In the above special commands, G, L, and P, the numeric input following the command must be in the current base. If you are in HEX modify, then G10 is a valid command to move the cursor to relative byte 10H, but in DECIMAL modify, you must enter G016 to achieve the same results.

Any key that does not meet any of the above conditions will be ignored.

When first entering this program, the data source information may be entered directly from the LDOS READY command line, or will be prompted for if not supplied with the command. If you wish to examine a file that could be interpreted as an address (for example, HAF0/CMD or D0123/TXT), you may precede the filename with an exclamation point (!) to force PMOD to interpret it as a filespec. For example, PMOD,HF000 will display memory address F000H, but PMOD,!HF000 will display the file HF000.

PCHECK

The PCHECK Utility is a comprehensive directory check utility. It allows the user to completely check the integrity of disk storage systems. All LDOS supported disk devices may be operated on, including Single/Double Density, Single/Double Sided, 5" and 8" floppies and fixed/removable rigid disk systems. This program will locate and report any inconsistencies in the directory information of a disk. In conjunction with PFIX, most directory problems can be easily corrected without extensive knowledge of how directories are formatted. The syntax of the PCHECK command is:

```

=====
!   PCHECK, *,:a                               !
!   PCHECK,*,filespec                          !
!                                               !
!   :a = drive number to check (colon optional) !
!   filespec = any valid LDOS filespec         !
!                                               !
!   an asterisk (*) preceding the parameters will !
!   send the output to the video and printer    !
!                                               !
!   abbr: NONE                                !
=====

```

After selecting the mode of operation (full disk or file), the entire directory of the indicated disk is read into memory. If not enough memory is available, it will be reported, and the program will abort. If any errors occurring during the directory read, they will be reported, and the program will pause and allow you to select a R>etry, S>kip, or A>bort. Although it is possible to check even an unreadable directory, unpredictable errors may be reported. For the normal operation of this program, it is assumed that all sectors of the directory are readable, even though the data contained therein may be incorrect.

Each file specified is passed through a three stage check. This will either be the single file specified, or all files if an entire disk is specified. In the first stage, the integrity of the files' directory entry is checked. In the second stage, the associated HIT table bytes are checked. In the third stage, the associated GAT table bytes are checked. When all specified files have been checked, and all errors have been reported, a total error count will be issued and the program will exit back to LDOS.

The utility PFIX/CMD is capable of fixing most errors that may be reported by PCHECK.

The following is a list of the possible error messages that PCHECK may report. A technical section will follow that will describe the logic used by PCHECK, and probable causes for the error conditions.

#### ERROR MESSAGES

1. Cylinder xxx has an invalid GAT table byte
2. HIT byte at xxH invalid or extraneous
3. Filename contains non-ASCII characters
4. End of File Sector beyond allocated sectors
5. No terminator for extent field
6. Directory links to record not linking back to it
7. Track assigned that is beyond diskette boundary
8. Extension assigned before end of extents
9. Forward link to inactive entry
10. Forward link to non-extension entry
11. Extension record not assigned to any files
12. Multiple files assigned to single granule
13. Directory record has invalid HIT byte
14. Directory record has a zero HIT byte
15. Extended directory record has invalid HIT byte
16. Extended directory record has a zero HIT byte

#### Directory Check Logic

This section contains the logic that PCHECK uses to determine the correctness of the directory. The novice user need not be concerned with this information as it is offered only as technical reference for the advanced user.

During passes 1-3, if an error is found, it is reported in the following format:

```
filename/ext      @ Directory Sector xx, Relative Byte xxH.  
"error message string"
```

If a non-ASCII character is found in the filename, its position will be highlighted with a graphic block. In all errors reported in the above format, the directory location will refer to the primary directory record, regardless of where the error occurred along the file.

#### Pass #1

Check to be sure that all 11 bytes of the filename contain characters within the range of 20H to BFH (printable ASCII

characters). If any are found to be outside this range, report error 3. The offending characters are displayed as a graphic block to aid in identifying their positions.

The 5 extents of the associated record are each checked on a sector by sector basis. If any extent points to a track that is beyond the diskette boundary, an error is reported.

If all 5 extents have been parsed, and no terminator is found (FEH or FFH) then error 5 is reported and the program terminates.

If an extended record is found, and it is not at the 5th position in the extent field, error 8 is reported and the error scan continues.

If the extended record is found, locate its position in the directory. If bit 4 of the first byte in the record is not set (inactive file), error 9 is reported and the program terminates. If bit 7 is not set (not an extension), error 10 is returned and the program terminates. The second byte in the extended record is a link back to the previous record. If this byte is incorrect, error 6 is reported and the program terminates.

This process continues until an FFH terminator is reached, or a terminal error is found.

When processing is completed, the number of sectors assigned to the file is calculated and compared to the end of file sector in the directory record. If the end of file is larger than the allocated records, error 4 is reported.

### Pass #2

This pass checks the integrity of the associated HIT byte for the current file. Each file is traced from its primary directory entry through all extents until an FFH terminator or a terminal error is reached.

If the primary directory entry contains an invalid HIT byte, PCHECK returns error 13 and continues. If the primary directory entry contains a zero HIT byte, error 14 is returned.

If an extended directory record contains an invalid HIT byte, error 15 is returned. If an extended record contains a zero HIT byte, then error 16 is reported.

### Pass #3

This pass checks the integrity of the associated GAT bytes for the current file. As with pass 2, each file is traced through all of its extents.

If the current granule has already been allocated (either by itself or another file), then error 12 is displayed. NOTE: Only a single error 12 will be reported for a single file even though there may be several occurrences of it.

When these steps have all been completed, and a single file has been specified, the number of errors will be reported and an exit will be made back to LDOS. If an entire disk is specified, three additional checks are made on the directory.

#### Check #1

When Pass #1 is made in the above process, it checks every directory record that has bit 4 set and bit 7 NOT set (active primary directory record). As the current file is being checked, bit 5 of all the associated directory primary and extended records is set to indicate a completed file. During the Check #1 phase, the entire directory is re-scanned. If any files have bit 4 set, and not bit 5, then bit 7 MUST be set or error 11 is reported. This condition indicates an extended directory record that has not be linked to any primary record (an extraneous directory record). This condition could result if one of the above passes terminates on a fatal error and an extension is not checked. If no terminal type errors are reported, but error 11 was issued, then there is an extra record in the directory that is not associated with any files.

#### Check #2

As the program processes pass #2, it completely builds a second HIT table in another buffer. During the check #2 phase, the computed table is compared byte for byte with the HIT table as read from the diskette. If any of the bytes do not match, then error 2 along with the relative byte of the mismatch is displayed. If none of the pass #2 errors are reported, but error 2 is issued, then there is an extra byte in the HIT table at the corresponding location.

#### Check #3

As the program processes pass #3, it completely builds a second GAT table in another buffer. Before check 3 is made, the disk lockout table is overlaid onto the built GAT table so that locked out tracks will not be counted. During the check #3 phase, the computed table is compared byte for byte with the GAT table as read from the diskette for as many tracks as there are on the disk. If any of the bytes do not match, error 1 and the relative cylinder of the mismatch is returned. If none of the pass #3 errors are reported, but error 1 is issued, then there are extra grants allocated on the disk that are not assigned to any files.

Sometimes, one type of an error will inherently cause another type of error. In these cases, fixing even one error may correct several others. As an example, if there is no terminator for a record, chances are that error 12 will be reported also. If a terminal error is found in a directory link to an extension, error 2 may also be reported.

When using this utility on Rigid drives, there is one error that may be reported that should be considered normal. LDOS sets aside an extra track right next to the directory, and shows this track as allocated in the GAT table. This track is used by the Laredo system as overhead, and should not be used. PCHECK may report an invalid GAT Table Byte at this track location, and it should be considered normal. The Rigid drive user should be aware of this problem, especially as it relates to the PFIX utility, which may de-allocate this track, or allocate it to an unassigned file.

Similarly, using PCHECK on a Model I double density system disk with a SOLE track will result in an "Invalid GAT byte" error. This is because the SOLE modification system allocates track 0 to prevent the system from attempting to use non-existent sectors on it. This error should be considered normal and should not be fixed.

PFIX

The PFIX program is a comprehensive directory repair utility. It allows the user to completely repair most directory problems, and also has the ability to transfer a faulty boot sector from a good disk. All LDOS supported disk devices may be operated on, including Single/Double Density, Single/Double Sided, 5" and 8" floppies and fixed/removable rigid disk systems. This program will locate and repair most inconsistencies in the directory information of a disk. In conjunction with PCHECK, most directory problems can be easily located and corrected without extensive knowledge of how directories are formatted. The syntax of the PFIX command is:

```

=====
!   PFIX :a,G,H,F,B=:d,L,R,P           !
!                                     !
!   :a = drive number to fix (colon optional) !
!   G = repair GAT table                !
!   H = repair HIT table                !
!   F = repair missing/invalid File data !
!   B = repair BOOT sector              !
!   :d = take boot sector from this drive !
!       (mandatory if B is specified)    !
!   L = indicates a LAREDO rigid disk    !
!   R = indicates a RADIO SHACK rigid disk !
!   P = prompt for cyls, density, sides !
!       (should be last parameter specified) !
!                                     !
!   At least ONE parameter MUST be specified. !
!                                     !
!   abbr: NONE                           !
=====

```

After selecting the desired parameters, the entire directory of the indicated disk is read into memory. If the P option is not specified, the program will use the information supplied by LDOS defining the diskette cylinder count, number of sides, and density. This information is located in the GAT sector of the diskette at format time. If it is possible that this particular information is invalid, use the P option, and you will be prompted to enter these parameters. If, for example, the entire GAT sector is zeroed out, LDOS will report this to be a "xxxxxx density, single sided, 35 track" disk. If the GAT is fixed using these parameters, and the disk is REALLY a 40 track disk, the corrections will be inaccurate.

If not enough memory is available, it will be reported, and the program will abort. If any errors occurring during the directory read, they will be reported, and the program will pause and allow you to select a R>etry, S>kip, or A>abort. Although it is possible to repair even an unreadable directory, unpredictable errors may be generated. For the normal operation of this program, it is assumed that all sectors of the directory are readable, even though the data in them may be incorrect.

Each file of the directory is passed through a three stage process. In the first stage, the integrity of the files directory entry is fixed. In the second stage, the associated HIT table bytes are fixed. In the third stage, the associated GAT table bytes are fixed. When all specified files have been checked, and all errors have been corrected, the corrected data will be written back to disk per the command parameters. Either the GAT, HIT, file records, and/or BOOT sector will be updated to the disk. Although the entire directory is repaired in memory, only the requested data to be fixed is written back out to the disk. The utility PFIx/CMD is capable of fixing most errors that may be reported by PCHECK.

If only the GAT and/or HIT are specified, and an error is found in any of the files directory records, the fix will abort and a message will be returned requesting you to use the "F" option. This is because it would be unreliable to repair a GAT or HIT when the root information is invalid. This is to prevent a user from inadvertently destroying any relevant data.

The following is a list of the errors that PFIx can fix. A technical section will follow that will describe the logic used by PFIx, and probable causes for the error conditions.

1. Cylinder xxx has an invalid GAT table byte
2. HIT byte at xxH invalid or extraneous
3. Filename contains non-ASCII characters
4. End of File Sector beyond allocated sectors
5. No terminator for extent field
6. Directory links to record not linking back to it
7. Track assigned that is beyond diskette boundary
8. Extension assigned before end of extents
9. Forward link to inactive entry
10. Forward link to non-extension entry
11. Extension record not assigned to any files
12. Multiple files assigned to single granule
13. Directory record has invalid HIT byte
14. Directory record has a zero HIT byte
15. Extended directory record has invalid HIT byte
16. Extended directory record has a zero HIT byte

### Directory Repair Logic

This section contains the logic that PFI<sub>X</sub> uses to repair the directory. The novice user need not be concerned with this information as it is offered only as technical reference for the advanced user.

#### Pass #1

Check to be sure that all 11 bytes of the filename contain characters within the range of 20H to BFH (printable ASCII characters). If any are found to be outside this range, replace with an "X". (If this occurs, a HIT repair will be required to access this file from LDOS)

The 5 extents of the associated file record are each checked on a sector by sector basis. If any extent points to a track that is beyond the diskette boundary, a terminator (FFH) is entered at the current location.

If any granules are indicated in a file's extents, and the corresponding GAT bit is set (assigned to a previous file), the record will be terminated at the current location.

If all 5 extents have been parsed, and no terminator was found (FEH or FFH) then a terminator is entered at the last position.

If an extended record is found, and it is not at the 5th position in the extent field, the error is ignored and the program continues.

If the extended record is found, its position in the directory is located. If bit 4 of the first byte in the record is not set (inactive file), the extension is unlinked. If bit 7 is not set (not an extension), it is also unlinked. The second byte in the extended record is a link back to the previous record. If this byte is incorrect, the extension is unlinked.

The un-linking of the files is to protect against possible overlaying another file that does not in fact link back to the primary. By unlinking a file, data past the link will be lost, but the data will not accidentally be force-linked to an incorrect entry.

This process continues until an FFH terminator is reached, or a terminal error is found and a terminator is forced.

When processing is completed, the number of sectors assigned to the file is calculated and compared to the end of file sector in the directory record. If the end of file is larger than the

allocated records, then force the number of allocated records into the end of file sector.

### Pass #2

This pass constructs the HIT table. Each file is traced from its primary directory entry through all extents until an FFH terminator is reached. The entire HIT table will be reconstructed starting with a page (256 bytes) of zeroes. All active primary and extended directory records are logged correctly into this table.

### Pass #3

This pass constructs the GAT table. As with pass 2, each file is traced through all of its extents. The entire GAT table will be re-constructed starting with all null characters. All active primary and extended directory records are logged correctly into this table.

Sometimes, one type of an error will inherently cause another type of error. In these cases, fixing even one error may correct several others. As an example, if there is no terminator for a record, repairing this will sometimes correct a multiple files assigned to a single granule error.

When using this utility on Rigid drives, there is one error that may be repaired that the user should be made aware of. LDOS sets aside an extra track (the location varies), and shows this track as allocated in the GAT table. This track is used by the Laredo and Radio Shack rigid disk systems as overhead, and should not be used. The PFI utility will de-allocate this granule, as it is not assigned to any files. This is only on the Laredo or Radio Shack hard disk systems, and cannot be detected via the DCT parameters. Due to this situation, PFI will allocate this track if the following conditions are met:

1. The drive being fixed must be a Rigid drive.
2. The GAT fix option must have been specified.
3. The GAT entry for the cylinder immediately past the directory must be a null byte (not allocated to any files) after the GAT re-build.
4. The L or R option must have been specified.

If these conditions are met, then the extra track is automatically allocated. This could essentially lock-out an available track on a non-Laredo or non-Radio Shack system, but will cause no other problems. If you are not sure if your rigid system uses this cylinder or not, then please consult the manufacturer or Logical Systems Inc. It is better to lock out a cylinder than crash the system.

Using PFIX on a Model I double-density system disk with the SOLE modification will cause Track 0 to be de-allocated, which is undesirable. If this is the case, then the PMOD utility must be used to re-allocate Track 0 in the GAT table to prevent the system from attempting to use non-existent sectors in the single density track 0 created by SOLE. Using the command PMOD :d,@, the GAT table can be displayed. Change the first byte of the displayed sector to FFH and write the sector back to the disk.

PREFORM

The PREFORM utility is a disk Re-Formatter program. It allows the user to easily repair "sector not found" and "CRC errors". Only 5" Floppy Disks may be operated on, including Single/Double Density, Single/Double Sided disk systems. The syntax of the PREFORM command is:

```

=====
!   PREFORM,:a,b,c                               !
!   !                                              !
!   :a = drive to be re-formatted (0-7)          !
!   b = Y or N (pause on faulty sectors)         !
!   c = starting cylinder (default 0)            !
!   !                                              !
!   abbr: NONE                                    !
=====

```

When the desired parameters have been selected, the specified drive will be read to determine the diskette type (cylinders, density, sides). If there is not enough memory for the re-format utility to operate, the program will abort with an error message. If memory is sufficient, then the re-format operation will proceed as follows:

The current track will be read into memory sector by sector.  
 The track will be formatted.  
 The track will be re-written back sector by sector.

If any errors occur during any of the 3 steps, and the Y option was specified, you will be issued an error message, and allowed to R>etry, S>kip, or A>bort. If the N option was specified, processing will continue with no error messages. When the entire disk has been re-formatted, the directory track will be read into memory, and written back with the proper read-protect data address marks.

If you wish the program to abort, you may press the BREAK key, and the routine will terminate after the current track has been completed. This will allow normal termination of the program. Pressing the RESET button to abort the program is not recommended, as the current track may be totally lost. If the program is aborted, and the directory track has already been re-formatted, it will not be read-protected. In this case, you must issue a "repair (alien)" command to gain access back to the diskette.

If any CRC errors existed on the diskette, they will be corrected (if the media is OK). If any NOT FOUND errors existed

on the diskette, they also will be corrected, but the previous contents of the sector will be completely lost. This will allow the diskette to be reused with minor losses. If the faulty sector was on the directory track, it is possible that some files records may have been lost also. It is strongly recommended that the user make frequent backups of valued data in order to minimize losses resulting from disk errors. If sectors are lost during the re-formatting process, it is advised that the user recopy the programs that were assigned to the faulty sectors. The PSS utility will assist the user in resolving this.

This program will also "freshen" a diskette. Formatted diskettes have a "shelf" life of about 5 years according to most manufacturers. By re-formatting a diskette, the data will be strengthened, and the shelf life will be extended. If all sectors are readable before re-formatting, then no loss of data will occur.

PVU

The PVU program is a comprehensive disk verification utility. It allows the user to easily locate and identify faulty sectors on a disk. All LDOS supported disk devices may be operated on, including Single/Double Density, Single/Double Sided, 5" and 8" floppies and fixed/removable disk systems. The syntax of the PVU command is:

```

=====
!      PVU,:a,b,c                                !
!                                              !
!      :a = drive to be verified (0-7)          !
!      b = Y or N (pause on faulty sectors)    !
!      c = starting cylinder (default 0)        !
!                                              !
!      abbr: NONE                                !
=====

```

When the desired parameters have been selected, the specified drive will be read to determine the diskette type (cylinders, density, sides). Each cylinder will then be read sector by sector. If any errors are found, and the Y (pause) option was given, you will be given the option to R>etry, S>kip, or A>bort.

When the disk verification process has been completed, you will be given the number of sectors checked, and the number of sectors that were not read successfully. If there were bad sectors, you will be prompted to press ENTER for the list of faulty sectors. Each bad sector will then be listed to the video.

PCLEAR

The PCLEAR program is a comprehensive disk clean-up utility. It allows the user to easily erase unassigned granules and directory records. All LDOS supported disk devices may be operated on, including Single/Double Density, Single/Double Sided, 5" and 8" floppies and fixed/removable disk systems. The syntax of the PCLEAR command is:

```

=====
!   PCLEAR,:a,D,S,b                               !
!   PCLEAR,filespec,b                             !
!                                                    !
!   :a = clear this drive (colon optional)          !
!   D = clear unused directory records              !
!   S = clear unassigned sectors                   !
!   filespec = any valid LDOS filespec              !
!   b = fill command (default 00H)                 !
!   fill = #cc (numeric value)                     !
!           = "cc" (ASCII string)                   !
!           (numbers and ASCII can be mixed)        !
!                                                    !
!   abbr: NONE                                     !
=====

```

After selecting the desired parameters, one of the following routines will be executed.

If a disk was specified to be cleared:

If the S option was given, the directory GAT table will be read into memory. All non-allocated sectors will be written to with the defined fill data. If the D option was given, then all directory records that do not have bit 4 set (i.e., inactive records) will be set to all zeroes.

If a file was specified to be cleared:

All sectors assigned to the file will be written to with all the defined fill data. This will destroy all data belonging to the file.

The user may optionally define what data is to be written into the empty sectors. The default value is zero (00H). A single pound sign (#) followed by a one byte numerical value (0-255) to be used as the fill byte. The number may be entered in Binary, Decimal, Hex, or Octal by preceding the number with B, D, H or O respectively (default decimal). A quotation mark (") followed by

a string will copy this string repetively into the empty sectors. Numerical values and strings may be intermixed.

Examples:

PCLEAR,:0,d,s,#h40

Fill all unassigned granules with the string filled with the byte 40H, and clear all unused directory records.

PCLEAR,deadfile/cmd:3,"message"

Fill all sectors currently assigned to file "deadfile/cmd" with the repetitive string "message".

PCLEAR,:7,s,#95,"Kim was here"

Fill all unassigned granules with the string "Kim was here" preceded by the cursor character (ASCII 95 decimal). The terminating quote may be left out if it is the last character on the line.

When a file is killed with LDOS, several actions occur. First the first byte of all primary and extended directory records is set to 00H. All granules assigned to the file are released and made available in the GAT table. All primary and extended directory records have their corresponding HIT bytes set to 0.

This will KILL a file, and make it inaccessible to LDOS, but all the information is still there. The directory record is still in the directory, but it is indicated as inactive by the system. All data that was assigned to the file is also still on the disk. Only the directory record has been changed, none of the data has been touched. At this point, a couple of minor changes to the directory can reinsatate the file and make it totally available again with full access to the data.

By running PCLEAR on a drive, you may safely remove all traces of both the files data, and it's associated directory record. If you have a disk that has been used several times, chances are that several "killed" files are still on the disk. If this disk was given to a programmer, chances are that the data could be "unkilled". PCLEAR will make sure that even the best programmer cannot access any of the killed files on your disk, because the information has been completey removed from the disk.

The FILE option of PCLEAR is a very powerful feature, but could be disastrous if you are not careful. This will totally erase all data assigned to the file. Each sector will contain the specified fill data. This routine could be useful to set all bytes of a file to a known initial value to be used as a data file.

PSS

The PSS program is a Sector Status Utility. It allows the user to easily identify which file is assigned to any sector on a disk. All LDOS supported disk devices may be operated on, including Single/Double Density, Single/Double Sided, 5" and 8" floppies and fixed/removable disk systems. The syntax of the PSS command is:

```

=====
!   PSS,:a,b,c                               !
!                                           !
!   :a = drive number (0-7, colon optional)  !
!   b = cylinder number                     !
!   c = sector number                       !
!                                           !
!   abbr: NONE                              !
=====

```

When the specified parameters have been entered, PSS will read the designed directory. If not enough memory is available, PSS will abort with an error message. Otherwise, the drive type will be displayed along with the name, date, and number of free granules on the mounted diskette. If the sector is not assigned to any files, an appropriate message will be displayed, and an exit made back to LDOS. If it is assigned, the filename, and the relative sector number in the file will be returned.

PMAP

The PMAP utility is a comprehensive disk/file mapping program. It allows the user to easily locate files' sectors, and determine the status of all granules on a disk. All DOS supported disk devices may be operated on, including Single/Double Density, Single/Double Sided, 5" and 8" floppies and fixed/removable disk systems. The syntax of the PMAP command is:

```

=====
!   PMAP,*,a                               !
!   PMAP,*,filespec                         !
!                                           !
!   * = send output to printer             !
!   :a = map this drive                    !
!   filespec = any valid filespec          !
!                                           !
!   abbr: NONE                             !
=====

```

Mapping a drive:

The GAT table of the specified diskette will be read into memory. Each cylinder will be mapped granule by granule. The display will show the cylinder number, and a list of all the granules on a sector basis. An example of a single density, single sided disk could be:

Cylinder 00: 00-04xx 05-09xx

The first x position will indicate the status of the Allocation Bit associated with gran, and the sectors 00-04 indicate the range of sectors in the first gran. This position will display a graphic block if the corresponding granule is assigned, and a period if the granule is currently available. The second x position indicates the status of the corresponding Lockout Bit for the gran. This position will display an X if the corresponding granule is locked-out, or a space if it is available. All granules indicating locked-out status should also have the corresponding allocation bit set.

NOTE: Rigid drives do not have a lockout table, so that information will not given.

The display will pause each screenful and wait for you to press a key to continue. Press BREAK to abort at any time, or SHIFT @ to pause the display manually. This procedure will continue till all cylinders have been displayed.

Mapping a File:

The associated directory record for the given file will be read into memory. All sectors assigned to the file will be traced through the directory manually. The current sector that is being operated on will be displayed to the video (or printer if specified). An attempt will be made to read each sector as it is computed. If the sector was read successfully, it will be surrounded by a thin line (ASCII 95). If a read error was issued by the system, the cylinder and sector number will be surrounded by graphic blocks. At any time, you may abort by pressing BREAK, or pause by pressing SHIFT @. This procedure will continue until the end of file is reached, and an exit is made back to LDOS.

PASSGO

The PASSGO program is a comprehensive password removal utility. It allows the user to easily remove passwords on a single file or an entire diskette. All LDOS supported disk devices may be operated on, including Single/Double Density, Single/Double Sided, 5" and 8" floppies and fixed/removable disk systems. The syntax of the PASSGO command is:

```

=====
!   PASSGO,:a,V,I,S,N                               !
!   PASSGO,filespec                                  !
!                                                     !
!   :a = remove all passwords this drive             !
!   V = include VISIBLE files (default)              !
!   I = include INVISIBLE files                      !
!   S = include SYSTEM files                         !
!   N = exclude visible files                        !
!   filespec = any valid LDOS filespec                !
!                                                     !
!   abbr: NONE                                       !
=====

```

Once the specified parameters have been entered, one of the following 2 routines will be performed:

If an entire disk is specified, all files that are included by the command will have both their ACCESS and UPDATE passwords set to nil (8 spaces), and the protection level will be set to 0. The diskette master password will also be set to PASSWORD. The user should note that if the file CONFIG/SYS is affected by this command, it will no longer be loaded by the system. This may be corrected by:

```
ATTRIB CONFIG/SYS(acc=ccc,upd=ccc,inv)
```

If a single file has been specified, then that file will have its ACCESS and UPDATE passwords set to nil, and the protection level will be set to 0 (full access). If a password currently exists for the file, it must be supplied with the command for the password to be stripped off. In this case the following two commands would be identical:

```
PASSGO filename/ext.password:d
ATTRIB filename/ext.password:d (acc=,upd=,prot=full)
```

PUN

The PUN utility is a Diskette Un-Repair program. It allows the user to easily reverse the effects of a "repair (alien)" command that was used to convert the data address marks used by TRSDOS to that used by LDOS. This will allow TRSDOS I to access a directory written to by LDOS. This program will only work in a Model I (the Mod III cannot reproduce the desired address mark), and will only operate on a single density, single sided, 5" floppy disk. The syntax of the PUN command is:

```
=====
!   PUN,:a                               !
!                                       !
!   :a = drive number to un-repair      !
!                                       !
=====
```

When the appropriate parameter has been specified, the directory will be read into memory, and immediately written back with the Mod I read-protect data address marks. This will allow TRSDOS I to access the directory again.

In order to gain compatibility between the models I and III, LDOS has chosen to write the single density directories on a Mod I using the User Defined Address Mark. This will cause TRSDOS to report a read error on the directory, or at least cause a lot of thrashing while the system does a re-seek 10 times for each sector. One pass through PUN, and no more problems. The diskette will become readable to a TRSDOS I system, and will also remain readable to LDOS.

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