ZARC

FSCK USERS' GUIDE

Written by Merlin Skinner-Oakes, 1/11/2022

Last updated: 9/11/2022

1 REVISION HISTORY

1 – initial release (fsck V1.0)

2 – updated to include "/s" option (fsck V1.1).

3 – added section #4.

2 DESCRIPTION

"FSCK" is an abbreviation for File System Consistency checK), as commonly found on Unix and Linux systems. This programme scans a CP/M 2.2 file system, and reports any error it finds. It does not attempt any kind of repairs. FSCK.COM is intended to run under CP/M 2.2. It should run under any such system equipped with a Z80 processor.

In this document, the following style conventions are used:

```
Machine output
User commands
Comments
```

3 USAGE

The command format is:

```
fsck <drive>[:] [/s]
```

The colon after the drive letter is optional. The "/s" option enables a surface scan to be performed after the file system check. The option may also be entered as "$s" or "[s]". The entire command line is not sensitive to case. The following commands are all equivalent:

```
fsck b /s
fsck b:/s
fsck b: $S
FSCK b: [s]
```

The command “fsck” with no parameters will result in a terse reminder of the command format.

```
fsck
*** CP/M File System Checker V1.1 ***
Operand error. Expected format: fsck <drive>[:] [/s]
Returning to CP/M.
```

Example:

```
A>fsck b: /s
*** CP/M File System Checker V1.1 ***

Directory checks complete
Errors and warnings: 0
Files found: 32
Unused directory entries: 477
Blocks used: 100

Block map ('D': directory, 'F': file and '-': unused).
DDDDDDDDFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFFFF----------------------------------------------------------------
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
-------------------------------

Checking all blocks are readable (surface scan)
Track: 95
Scan complete
Returning to CP/M.
```

Each directory entry is scanned in turn, and a list (internally called files_info) is constructed with one entry per file. This contains a bitmap of physical extents encountered, so it is possible to discover "holes" (also known as sparse files) as well as duplicated extents. Once the directory scan is complete, a block map is displayed. This shows how blocks are distributed on the disk. Finally, an optional surface scan is performed to ensure that all sectors are readable. This includes sectors not allocated to any file.

4 CHECKS PERFORMED

fsck checks each directory entry for the following errors:

- User number out of range (>15)
- Illegal (unprintable) characters in the file name or file type (any character <0x20 or >=0x7f) *$_1$
- Extent count out of range (low byte >=32)
- S1 out of range (not zero)
- A file contains a duplicated physical extent
- Block number is out of range

Other errors detected are:

- "Sparse" files, i.e. ones with gaps in their allocations (warning) *$_2$
- Physical extents with no allocations at all (warning)
- Record count should be 0x80 for all but the last extent.
- A block is allocated more than once

Notes:

*$_1$ What constitutes an illegal character in CP/M seems to depend on where you look. fsck reports any unprintable character, which is a generous interpretation.

*$_2$ Spare files are not actually illegal in CP/M, but they are somewhat unusual and so worth warning about.

5 FURTHER DEVELOPMENT

So far, this programme has only been tested on ZARC. It would be interesting to try it on a period Z80 CP/M system.