## ROOT DIRECTORY DESCRIPTION TABLE Format of SINGLIX FS1, FS2 file systems

| Offset | Item | DATA | Type | Size | Description of Item |
|--------|------|------|------|------|---------------------|
| 0 | Directory Sign | 'DDT' | Char | 3 byte | TR-SINGLIX Directory Description Table |
| 3 | Reserved | XXh | Byte | 1 byte | Must be 0 for Current/This DDT Version |
| 4 | Sector Size | XXh | Byte | 1 byte | Bytes per Sector (FS1=512, FS2=2048) as shift count |
| 5 | Extent Allocation Type | XXh | Byte | 1 byte | 0 = direct, 1 = indirect |
| 6 | Root Directory Sign | 'RT' | Word | 2 byte | 'RT' as Root Directory Identifier |
| 8 | Directory Number | XXXXXXXh | Dword | 4 byte | (This) DDT Address of  Root Directory (Offset) |
| 12 | Sector Count | XXXXXXXh | Dword | 4 byte | Number of Sectors (belong to  root dir, except DDT) |
| 16 | Beginning Sector | XXXXXXXh | Dword | 4 byte | Volume Beginning Sector (LBA) Address (abs) |
| 20 | Parent Dir Serial | FFFFFFFFh | Dword | 4 byte | Must be FFFFFFFFh for root directory. |
| 24 | Directory Size | XXXXXXXh | Dword | 4 byte | Directory Size in bytes. |
| 28 | Sub Directory Level | XXXXh | Word | 2 byte | Sub directory level should be 0 for Root Directory |
| 30 | Attributes | 1 byte | Byte | 1 byte | (Dos type) Directory Attributes (0,0,A,D,V,S,H,R) |
| 31 | Extended Attributes | 1 byte | Byte | 1 byte | User, Group, Others Permission Flags |
| 32* | Reserved | 8 bytes | Byte | 8 byte | Reserved for TR-MULTIX (must be 0) |
| 40 | Country | XXh | Byte | 1 byte | Language, Date, Text Format (default = 0) |
| 41 | Time Zone | XXh | Byte | 1 byte | -11 to +12 (GMT = 0, default = 0) |
| 42 | Creating Century | XXh | Byte | 1 byte | Century in Binary Coded Decimal (BCD)  (20) |
| 43 | Creating Year | XXh | Byte | 1 byte | Year in Binary Coded Decimal (BCD)     (18) |
| 44 | Creating Month | XXh | Bute | 1 byte | Month in Binary Coded Decimal (BCD) |
| 45 | Creating Day | XXh | Byte | 1 byte | Day in Binary Coded Decimal (BCD) |
| 46 | Creating Hour | XXh | Byte | 1 byte | Hour in Binary Coded Decimal (BCD) |
| 47 | Creating Minute | XXh | Byte | 1 byte | Minute in Binary Coded Decimal (BCD) |
| 48 | Creating Second | XXh | Byte | 1 byte | Second in Binary Coded Decimal (BCD) |
| 49 | C. Time Mode | XXh | Byte | 1 byte | 0 = Standard Time, 1 = Daylight Saving |
| 50 | Last Modif. Date | XXXXXXXh | Dword | 4 byte | The Last Modification/Write Date (BCD) |
| 54 | Last Modif. Time | XXXXXh | Byte | 3 byte | The Last Modification/Write Time (BCD) |
| 57 | L. M. Time Mode | XXh | Byte | 1 byte | 0 = Standard, 1 = Daylight Saving Time |
| 58 | Volume Serial No. | XXXXXXXh | Dword | 4 byte | Volume (Root Directory) Serial No. (Tick Count) |
| 62 | Long Name Length | 00h | Byte | 1 byte | Length of unicode dir name  = 0 (for root dir) |
| 63 | Volume Name Type | XXh | Byte | 1 byte | 0 = Default, 12 = Msdos, 14 = Unix, 64 = Singlix |
| 64 | Volume Name | 64 chars | Char | 64 byte | FS Volume Name String (Zero Padded) |
| 128 | Extents Table | 16*(4+4) bytes | Dword | 128 byte | Table of 16 direct or indirect extent addresses |
| 256 | Reserved | 256 bytes | Byte | 256 byte | Reserved/Optional data for Root Directory |
| 512** | Reserved | ? | Byte | 1536 byte | Optional/Reserved Area for FS2 Directories/Files |

* Used by TR-MULTIX (Multiuser, Multitasking) Operating System, only!

** 1536 byte extra description for 2048 bytes per sector File System (FS2), only ! Optional !

NOTE:  Root Dir. Entry: FFFFFFFFh is erased entry, 0 is end of root dir. entries. Root dir. entries are the FDT or DDT addresses of files or sub directories. (32 bit sector offset number which is > 0 and < FFFFFFFFh)

Root directory is the parent directory of all sub directory level 1 directories (of course if they are recorded in root directory entries.) Directory Description Table Offset  28 is for Sub Directory Level. The ZERO value at RDT Offset 28 indicates it is ROOT directory (also Parent Dir Serial Number 0FFFFFFFFh and  'RT' identifier in root directory signature field indicates that). The Operating System Software/Kernel or a program which uses this SINGLIX FS, must check the letter "DDT" letters at the beginning of directory descriptor table and then 0FFFFFFFFh in Parent Dir Serial Number field and 0 in Sub Directory Level field and 'RT' in Root Directory Identifier field. (At Offset 0, "D" is for directories, "F" is for files. "DE" shows that directory/files is actually deleted, cannot be undeleted because of it is removed from UNDELETE directory. And corresponding Disk Allocation Table/Bitmap bits are set to 1 and indicates to the sectors of that directory/file as DELETED/FreeForUse.)

Root/Parent Dir. Serial number is used for that purpose: When a dir or file is deleted, it will be removed from root/parent dir entries by replacing child directory or file number to FFFFFFFFh = deleted entry sign. And, it will be located in UNDELETE Directory as a new deleted file entry. When user want to undelete this file, if the directory (volume) serial number in the parent/root directory descriptor table is same with the number declared as parent dir serial number in child dir/file descriptor table, the deleted directory or file will be restored in the root directory. Directory serial number is just a tick count which always different by the computer's timer ticks. (as like as volume serial number.)

Directory serial number checkup is performed for preventing accidental/wrong restore operations. Because, a directory can be deleted, then, a new directory description table can be created on same disk sector, only serial number check (because of serial number is the timer tick count) will provide determining of that DDT is actually the parent directory's description table or a new directory description table. Also, Root Directory Serial Number is (same with) Volume (File System) Serial Number; Root Directory Serial Number is not needed for undelete procedure. (There is only one root directory in a FS and it cannot be deleted.)

Singlix FS file system uses extents which are contiguous/sequental sectors (like as variable size clusters) for file allocation on disk volume (partition). Length (sector count) of an extent may be 1 to File Size / Sector Size sectors. At the beginning, 16 direct extent fields/rows are used in FDT (in Extent Table space). Every direct extent field/row is 2 dwords. The 1st one is for file offset (as sector) and the 2nd is disk sector address (offset). When file grows beyond 16 extents . Indirect extents table is used. And 16 direct extent entries are changed to 16 indirect table entries. Each indirect table contains entries for 64 direct extents (if sector size is 512 bytes).

EXTENDED ATTRIBUTES byte:
Bit 0 = Owner's Read Only Flag [ 0 = Writable file, 1 = Read only file ]
Bit 1 = Owner's Executable File Flag (1 = executable file -in multitasking mode-)
Bit 2 = Group User's Invisible Flag (0=No, 1=Yes) [ 1 = This file is not visible except the owner ]
Bit 3 = Group User's Read Only Flag (0=No, 1=Yes) [ The result can be 'Writable' if Bit 0 is 0 ]
Bit 4 = Group User's Executable File Flag (1= executable by group user if also Bit 1 is 1)
Bit 5 = Other User's Invisible Flag (0=No, 1=Yes) [ 1 = This file is not visible except the group ]
Bit 6 = Other User's Read Only Flag (0=No, 1=Yes) [ The result can be 'Writable' if Bit 0 & Bit 3 is 0 ]
Bit 7 = Other User's Executable File Flag (1= executable by other users if also Bit 1 & Bit 4 is 1)

 (DOS) BASIC ATTRIBUTES byte:
Bit 0 = Read Only Flag (R)
Bit 1 = Hidden (Invisible) Flag (H)
Bit 2 = System File Flag (S)
Bit 3 = Volume Flag (V)
Bit 4 = Directory Flag (D)
Bit 5 = Archive Flag (A)
Bit 6 = Reserved  (0)
Bit 7 = Reserved (0)

DIRECTORY DATA (ENTRY) FORMAT:
Each directory entry is 1 dword (4 bytes) that points to the description table address of a file or directory.
If a directoy entry contains the value 0FFFFFFFFh, it is a deleted entry and should be skipped during the directory search.
If a directory entry contains a 0 (zero), it is the end of the directory entries and the directory search should be stopped there.