PROJECT: SINGLIX Operating System Issue: 1 Revision: 14 Date: 07/01/2018
OWNER: ERDOĞAN TAN / Istanbul / Turkiye

BOOT SECTOR PARAMETERS of SINGLIX FS1, FS2 file systems

Offset	Item	DATA	Type	Size	Description of Item
0	Jmp to Offset 65 (or 66)	EB3Fh	Word	2 byte	"Jump to boot code" / OPCODE (EB40h)
2	Nop	90h	Byte	1 byte	Reserved (90h for this FS version)
3	FileSystem ID	'FS'	Char	2 byte	SINGLIX ATA(PI) File System Identifier
5	Terminator	0	Byte	1 byte	Zero String Terminator
6	Bytes Per Sector	XXXXh	Word	2 byte	FS1 = 512 (ATA), FS2 = 2048 (ATAPI)
8	Media Attributes	XXh	Byte	1 byte	Media Attributes Byte
9	Partition ID	XXh	Byte	1 byte	SINGLIX, FS Hard Disk = A1h, FD = 0
10	FS Version Major	XXh	Byte	1 byte	File System Version – Major = 1
11	FS Version Minor	XXh	Byte	1 byte	File System Ver. – Minor/Revision = 0
12	Beginning Sector	XXXXXXXXh	Dword	4 byte	Volume Beginning (Boot) Sector (LBA)
16	Volume Size	XXXXXXXXh	Dword	4 byte	Volume/Partition Size in Sectors
20	Startup File Address	XXXXXXXXh	Dword	4 byte	OS Startup File/Code/Program Location
24	MAT Location	XXXXXXXXh	Dword	4 byte	Master Allocation Table Location
28	Root Directory Location	XXXXXXXXh	Dword	4 byte	Root Directory Descriptor Address
32	Registry File Address	XXXXXXXXh	Dword	4 byte	System Configuration File Descriptor Location
36	Swap File Addr.	XXXXXXXXh	Dword	4 byte	Swap File/Space Descriptor Location
40	Undelete Dir Address	XXXXXXXXh	Dword	4 byte	Undelete/Restore Directory Location
44	Drive Number	XXh	Byte	1 byte	Boot Drive Number (80h)
45	LBA yes	01h	Byte	1 byte	LBA mode yes/no signature (1= LBA, 0= CHS)
46	Magic Word (CHS)	01A1h	Word	2 byte	TR-SINGLIX Boot Code Sign (CHS parameters)
48	Operating System	16 chars	Char	16 byte	'TR-SINGLIX v1.0b' etc.
64	Terminator	0	Byte	1 byte	Zero String Terminator
65	Boot Code	445 bytes	Byte	445 byte	OS Boot (Startup File Loader) Code (90h & 444 bytes)
510	Boot Sign	AA55h	Word	2 byte	Boot Sector Identifier

NOTE: Volume Beginning Sector is LBA address of Boot Sector. Startup File/Code Address, MAT Location, Root Dir. Descriptor Location, Registry File Location, Swap File Descriptor Location are offset addresses (from beginning of the FS/volume, boot sector); these are NOT absolute addresses.

Volume Beginning Sector (LBA) value is needed for passing it to operating system; because, operating system will use it to convert offset addresses to absolute/physical disk addresses. (It points boot sector's itself. Bootstrap code cannot know boot sector LBA address as default, because boot code runs after INT 19h loads Boot Sectors at the 0:7C00h memory address. ROMBIOS INT 19h code does not pass Boot Sector LBA address to bootstrap code as default. TR-SINGLIX disk format program will assign that 32 bit boot sector address for fixed/partitioned disks in LBA format. For removable/non-partitioned disks, it is ZERO as default.)

Master Allocation Table keeps location and free sector counts of the Volume and it is the header of the Disk Allocation Table.

Root Directory and sub directories may not include OS Startup File; that file (with maximum 512 K size) may be a boot block file, which initializes Operating System. Also, root directory and sub directories may not include Registry (System Config.) File, that file may be a boot block file which reserves OS configuration like GUI settings etc. Also, swap file (instead of a separate swap partition/volume) is for memory extension and it may not be appeared in root or subdirectories. Shortly, we can say that: we cannot make, delete boot (super) block files in directory tree. (File System formatting programs are responsible for that.)

Remember that: in SINGLIX FS, directory and file data is just after their/its description table sector. (For example: If the first FDT Address is 00006E00h, file data starts from sector 00006E01h.)

This FS project is for INTEL x86 CPU models, but compatible for other CPU models.

Media Attributes Byte:

Bit 0 => If Bit 0 is '0', file system is read only. (CD-ROM etc.) WRITE flag
Bit 1 => If Bit 1 is '1', file system is on removable media. REMOVABLE flag
Bit 2 to Bit 7 => Reserved. Must be '0' for This FS Version. (These BITs may be assigned in future.)

FS on ATAPI CD-ROM = xxxxxx10b = 02h
FS on ATA Hard/Fixed Disk = xxxxxx01b = 01h
FS on USB Virtual/Flash Disk = xxxxxx11b = 03h

Disk Parameters for CHS mode:

Offset	Item	DATA	Type	Size	Description of Item
45	LBA yes	00h	Byte	1 byte	LBA mode yes/no sign ('NO' for CHS mode)
46	Sectors Per Track	XXh	Byte	1 byte	(17 or 63 for Hard Disks, 18 for 1.44MB Floppy Disk)
47	Heads	XXh	Byte	1 byte	(2 to 255 for Hard Disks, 2 for Floppy Disks)

Different Boot Sector Parameters for CHS mode hard disks:

Offset	Item	DATA	Type	Size	Description of Item
0	Jmp to Offset 48	EB2Eh	Word	2 byte	"Jump to boot code" / OPCODE
48	Boot Code	462 bytes	Byte	462 byte	OS Boot (Startup File Loader) Code
510	Boot Sign	AA55h	Word	2 byte	Boot Sector Identifier

Different Boot Sector Parameters for file systems with two (double) boot sectors:

Offset	Item	DATA	Type	Size	Description of Item
0	Jmp to Offset 66	EB40h	Word	2 byte	"Jump to boot code" / OPCODE
65	Nop	90h	Byte	1 byte	Nop (90h)
66	Boot Code	444 bytes	Byte	444 byte	OS Boot (Startup File Loader) Code
510	Boot Sign	AA55h	Word	2 byte	Boot Sector Identifier