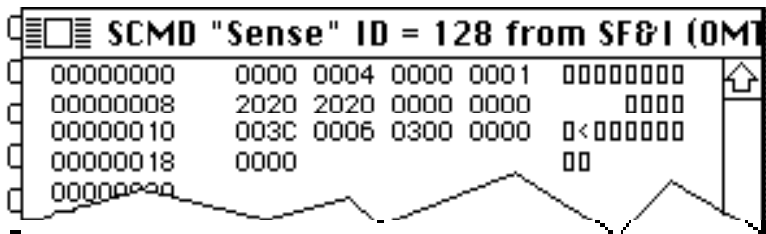


More About SF&I

This document is an addition to the SF&I documentation that was included with SF&I by the author. It is intended to help you further understand how to set up SF&I for your particular application by being a bit more specific in the explanation of each of the parts of SF&I and how they relate to a hard disk.

Hereafter you will find a look at each command from ResEdit and a description of each of the words it contains. The following descriptions are set up specifically for a Tulin TL226 drive and an OMTI 3127 RLL controller board. This configuration will yield 34,078,720 Bytes. (640 Cylinders * 4 Heads * 26 Sectors/Track * 512 Bytes/Sector)

The 'Sense' command:

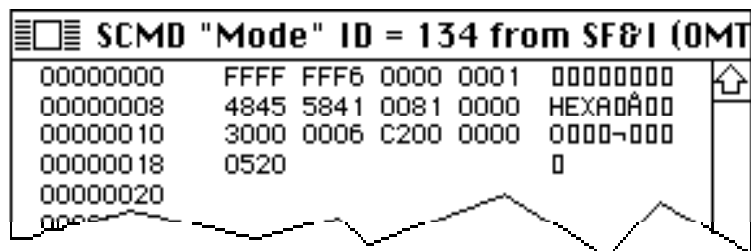


Data Transfer Length:	0000 0004	Read 4 bytes
Data Transfer Increment Size:	0000 0001	
Resource Type of Data:	2020 2020	"Spaces" None used
Resource Number of Data:	0000	None used
Tick Count:	0000 003C	1 Second
SCSI Command Length:	0006	6 Bytes
SCSI Command:	0300 0000	Request Sense
SCSI Command (cont):	0000	

SCSI Command breakdown (Binary):

Operation Code	0000 0011	03 Request Sense Command
Logical Unit Number	000	LUN=0
Reserved	0 0000	
Reserved	0000 0000	
Reserved	0000 0000	
Reserved	0000 0000	
Control Byte	0000 0000	

The 'Mode' Command (Used for Assign Disk Parameters):



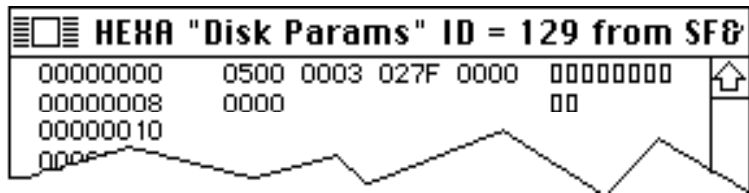
Data Transfer Length:	FFFF FFF6	Write 10 bytes
Data Transfer Increment Size:	0000 0001	
Resource Type of Data:	4845 5841	"HEXA" See below
Resource Number of Data:	0081	#129
Tick Count:	0000 3000	3 Minutes 25 Seconds±
SCSI Command Length:	0006	6 Bytes
SCSI Command:	C200 0000	Assign Disk Parameters
SCSI Command (cont):	0520	

SCSI Command breakdown (Binary):

Operation Code	1100 0010	C2 Assign Disk Parameters
Logical Unit Number	000	LUN=0
Reserved	0 0000	
Reserved	0000 0000	
Reserved	0000 0000	
Interleave	0000 0101	Interleave = 5
Control Byte	0010 0000	Must set 'F' bit

Note: The 'F' bit MUST be set for the 3127 controller. The 'F' bit in the control byte allows for the Assign Disk Parameters command to format the first track on the drive so that it contains the Drive Parameters in the ID field on that track. This is done so that the 3127 can determine what type of drive is attached to it on power up. This means that as soon as you turn on the drive the controller will configure itself for the drive thus alleviating the task from the driver upon startup of the Mac. This also allows you to use a generic device driver for any drive that you may use.

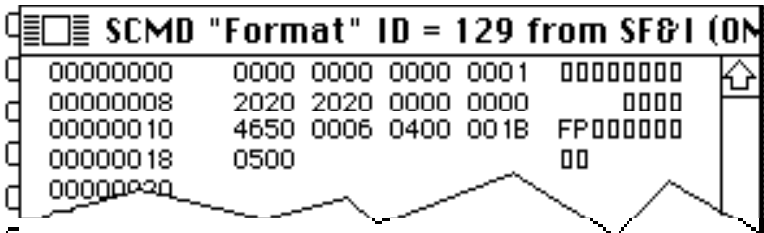
This is the disk parameters block sent out by the Assign Disk Parameters command described above.



Assign Disk Parameters Data (Binary):

Step pulse width	0000 0101	05 1.2µsec * 5 = 6µsec
Step period	0000 0000	0 = 6.8µsec
Step Mode	0000 0000	Always 0
Number of heads -1	0000 0011	03 (4 actual)
Cylinder address High	0000 0010	02
Cylinder address Low -1	0111 1111	7F (640 actual cyl's)
Write Precomp	0000 0000	not used
More write precomp	0000 0000	not used
Sectors per track	0000 0000	0 defaults to 26
Block size	XXXX XX00	512 bytes per sector (X's are reserved and must be 0)

The 'Format' command:



Data Transfer Length:	0000 0000	none
Data Transfer Increment Size:	0000 0001	
Resource Type of Data:	2020 2020	"Spaces" No data used
Resource Number of Data:	0000	None used
Tick Count:	0000 4650	5 Minutes
SCSI Command Length:	0006	6 Bytes
SCSI Command:	0400 001B	Format Unit
SCSI Command (cont):	0500	

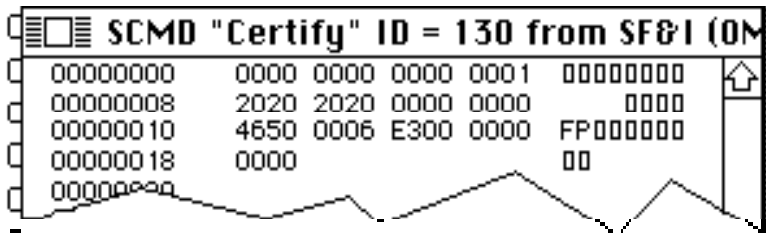
SCSI Command breakdown (Binary):

Operation Code	0000 0100	04 Format Unit Command
Logical Unit Number	000	LUN=0
Logical Block Address 2(MSB)	0 0000	00
Logical Block Address 1	0000 0000	00
Logical Block Address 0(LSB)	0001 1011	1B Start at sector 27
Interleave	0000 0101	5
Control Byte	0000 0000	00

Note: Remember that the Assign Disk Parameters command had the 'F' bit set in the

command byte which allowed formatting of track 0 with the drive parameters. When doing the Format Unit command you must start the format at sector 27, which is the first sector of track 1, so that the drive information in the ID fields of track 0 is not overwritten.

The 'Certify' Command (seeks to each track and reads sector 0 only):

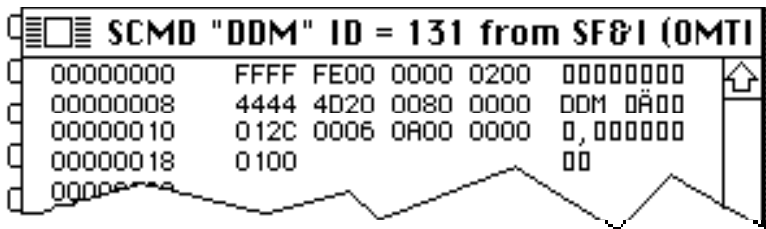


Data Transfer Length:	0000 0000	none
Data Transfer Increment Size:	0000 0001	
Resource Type of Data:	2020 2020	"Spaces" None used
Resource Number of Data:	0000	None used
Tick Count:	0000 4650	5 Minutes
SCSI Command Length:	0006	6 Bytes
SCSI Command:	E300 0000	Drive Diagnostics
SCSI Command (cont):	0000	

SCSI Command breakdown (Binary):

Operation Code	1110 0011	E3 Format Unit Command
Logical Unit Number	000	LUN=0
Reserved	0 0000	00
Reserved	0000 0000	00
Reserved	0000 0000	00
Reserved	0000 0000	00
Control Byte	0000 0000	00

The Write 'DDM' Command (Writes DDM to block 0 of drive):



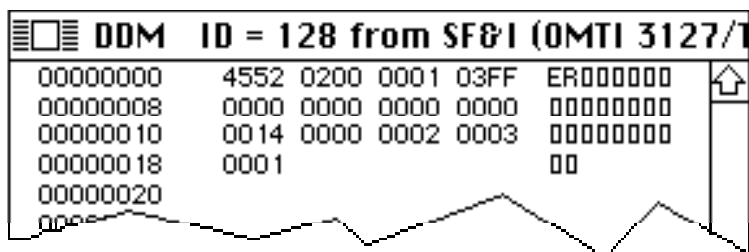
Data Transfer Length:	FFFF FE00	Write 512 bytes
Data Transfer Increment Size:	0000 0200	512
Resource Type of Data:	4444 4D20	"DDM "
Resource Number of Data:	0080	#128
Tick Count:	0000 012C	5 Seconds
SCSI Command Length:	0006	6 Bytes
SCSI Command:	0A00 0000	Write

SCSI Command (cont): 0100

SCSI Command breakdown (Binary):

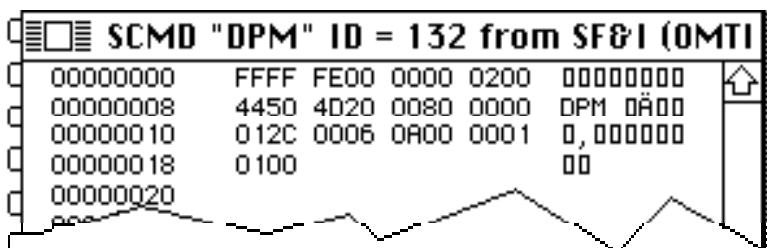
Operation Code	0000 1010	0A Write Command
Logical Unit Number	000	LUN=0
Logical Block Address 2(MSB)	0 0000	00
Logical Block Address 1	0000 0000	00
Logical Block Address 0(LSB)	0000 0000	00
Transfer Length	0000 0001	1 block of 512 bytes
Control Byte	0000 0000	00

The 'DDM' (Driver Descriptor Map):



Signature	4552	MUST be 4552
Block Size	0200	512 bytes
Block Count	0001 03FF	66560 blocks
Device Type	0000	Disk
Device ID	0000	0
Data (not used)	0000 0000	
Driver Count	0014	
Block Size	0000 0002	first block of driver
Size	0003	driver size in blocks
Type	0001	System type(1=Mac Plus)

The write 'DPM' Command (writes DPM to block 1 of drive):



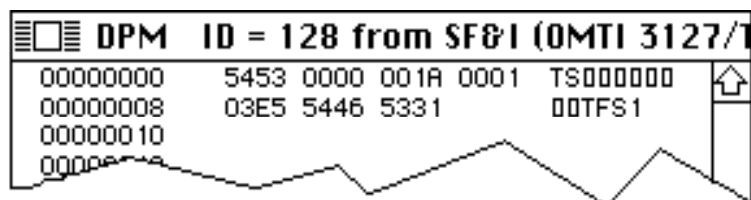
Data Transfer Length:	FFFF FE00	Write 512 bytes
Data Transfer Increment Size:	0000 0200	512
Resource Type of Data:	4450 4D20	"DPM "
Resource Number of Data:	0080	#128
Tick Count:	0000 012C	5 Seconds
SCSI Command Length:	0006	6 Bytes

SCSI Command: 0A00 0001 Write
 SCSI Command (cont): 0100

SCSI Command breakdown (Binary):

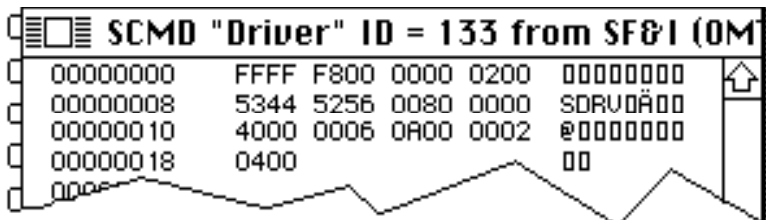
Operation Code	0000 1010	0A Write Command
Logical Unit Number	000	LUN=0
Logical Block Address 2(MSB)	0 0000	00
Logical Block Address 1	0000 0000	00
Logical Block Address 0(LSB)	0000 0001	01 Physical block 1
Transfer Length	0000 0001	1 block of 512 bytes
Control Byte	0000 0000	00

The 'DPM' (Device Partition Map):



Signature	5453	MUST be 5453
Start	0000 001A	Starting block for Volume
Size	0001 03E5	# of blocks in Vol. (66533)
File System ID	5446 5331	'TFS1' Mac Plus

The Write Driver Command:



Data Transfer Length:	FFFF F800	Write 2048 bytes
Data Transfer Increment Size:	0000 0200	512
Resource Type of Data:	5344 5256	"SDRV "
Resource Number of Data:	0080	#128
Tick Count:	0000 4000	4 Minutes 30 Seconds±
SCSI Command Length:	0006	6 Bytes
SCSI Command:	0A00 0002	Write
SCSI Command (cont):	0400	

SCSI Command breakdown (Binary):

Operation Code	0000 1010	0A Write Command
Logical Unit Number	000	LUN=0
Logical Block Address 2(MSB)	0 0000	00
Logical Block Address 1	0000 0000	00

Logical Block Address 0(LSB)	0000 0010	02 Physical Block 2
Transfer Length	0000 0004	4 blocks of 512 bytes
Control Byte	0000 0000	00

I hope that this has increased the usefulness of this program. There are a few more things that you should be aware of when using this particular drive and controller setup. First of all the certify command of the 3127 does not read the entire drive to check for errors. It only checks the first block of each track. This means that if there is a serious defect in the media it may not be detected. Although when using high quality drives that are designed for RLL operation there should be only minor defects if any. A minor defect is 1 to 5 bits in error per megabyte. The OMTI 3127 controller will correct up to 11 bit errors per sector in the header and data fields. It uses a 48 bit ECC code to accomplish this. Due to this fact you will see very reliable operation of this controller even when others will fail. In any event, Keep Current Back-Ups!

Also, I have chosen an Interleave of 5 for this setup because it seemed to have the best balance of read and write speed. You can choose any interleave value from 1 to 26. You will have to change the value, reformat, and test to see what is best for your application.

If you use this info I would like to know with what drives etc that have worked for you. Or if I can be of any assistance please drop me a note. Thanks and have fun.

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