INTRODUCTION

The purpose of this Application Note is to assist the Quark user in the installation of floppy disk formats compatible with those of many manufacturers of personal computers. This will help the user to gain access to a wide variety of software and data, and transfer information between different computers and the Quark. The Note provides the specifications for 26 different floppy disk formats.

FLOPPY DISK FORMAT STANDARDS

The industry standard for 8-inch floppy diskette formats is the IBM 3740 format. All Megatel implementations of CP/M 2.2 and Plus now include the IBM 3740 format as one of their logical drives. This is beneficial in that most data can first be written to the IBM 3740 format and then read on the QUARK.

For 5.25-inch disks, there is unfortunately no industry standard format. All Megatel implementations of CP/M 2.2 and Plus now include the OSBORNE I single density format on one of its logical drives. Nevertheless, the information the user needs may not be available on OSBORNE I format. If this is the case, then this Application Note will assist the user in selecting and implementing an alternate interchange format.

USING THIS APPLICATION NOTE

This Application Note can be used as a guide when installing disk format specifications. Even if the formats described in the Application Note are not installed they can be used to better understand the flexibility of the QINSTALL installation procedure for disk formats.

The Note has been written with CP/M Plus in mind, since CP/M Plus provides more system flexibility than CP/M 2.2. If the user wishes to install any of the disk formats for CP/M 2.2, then an understanding of the Basic Input/Output System (BIOS) is required. The installation procedure for CP/M 2.2 does not allow as much flexibility for diskette format specifications, and thus changes to the BIOS must be made directly. A section called "INSTALLING DISK FORMATS FOR CP/M 2.2" can be found later in this Application Note.

INSTALLING DISK FORMATS FOR CP/M PLUS

Table 1 provides the specifications for 26 different floppy disk formats. The disk format definitions in CP/M Plus are flexible enough so that all but one parameter can be defined through the QINSTALL procedure. That parameter is the label for the first sector (FIRST SECTOR 0).

Certain parameters will depend on the characteristics of the disk drive used. An example of this is the number of tracks per side. Older 5.25-inch 48 tpi drives only had 35 tracks while newer ones have 40 tracks.

COLUMN HEADINGS IN TABLE 1

The following parameters are not part of the QINSTALL questions. These parameters are either modified before the QINSTALL procedure is done or they are used as a guide in determining other parameters in the QINSTALL questions.

FIRST SECTOR 0: This parameter defines the labeling of the first logical sector. The first logical sector is labeled either 0 or 1. The patch for this parameter will depend on the logical drive assigned to the specific format. All of the first logical sectors are assumed to be labeled 1. If a Y appears in this column for the format desired then the patch must be made. If a N appears for the format desired then no patch is required. Table 2 shows the patch for each logical drive.

Logical Drive	Patch
A:	STUFF \209\ 0
B:	STUFF \229\ 0
C:	STUFF \249\ 0
D:	STUFF \269\ 0
E:	STUFF \289\ 0

TABLE 2. Sector 0 Patch Information

The patch must be made before the QINSTALL procedure is run. First, the logical drive (A:,B:,C:,D:,or E:) that the diskette format

with the first sector as 0 to be installed on must be determined. Second, the diskettes to be used for the QINSTALL procedure should be inserted into the drives. Third, the patch must be done by entering in the patch obtained in Table 2. An example of this procedure is as follows:

Step 1.   Determine which logical drive will be used.

          DRIVE B:

Step 2.   Insert SYSTEM WORK disk in drive A and the SOURCE WORK disk in drive B.

Step 3.   Enter the following after the system has booted:

          B:STUFF \229\ 0

Step 4.   Now the QINSTALL procedure can be followed as outlined in the Quark Installation Manual. The parameters to be installed should be entered for the disk format questions for logical drive B:.

TPI: This parameter is used in determining if the double tracking feature should be invoked for a particular format. If the diskette format states a TPI of 48 and the physical drive that is to be used to read and write data to this format is a 96 TPI drive then the double tracking parameter should be set.

SIZE: This parameter is used to ensure that the format for a 5.25-inch diskette is to be assigned to a physical drive that is 5.25-inch and that an 8-inch format diskette is assigned to an 8-inch physical drive.

SYSTEM TRACK R/W: Some computers read and write to the system tracks (reserved tracks) in single density (FM) and to the rest of the diskette in double density (MFM). The Quark CP/M operating system requires that the entire diskette be in either single density or double density. Therefore if a diskette format is defined as double density but the the reserved tracks of the diskette are single density then the reserved tracks cannot be read or written. If a Y appears in this column then all of the diskette can be read or written on the Quark. If a N appears in this column then the reserved tracks cannot be read or written on the Quark.

The remainder of the information in Table 1 is the responses to the queries in the disk format section of QINSTALL. Some of the QINSTALL questions are not included in Table 1. Those not covered do not affect the diskette format but depend on the physical configuration of the of the users system. These question deal with the select line the Megatel diskette formats will be on (N:,O:, and P:) and the select line used for each logical drive (A:,B:,C:,D:, and E:).

Brief descriptions of the remaining headings in Table 1 are provided below. For a detailed description refer to the Quark Installation Manual.

DENS: Defines the recording format; either single density (FM) or double density (MFM).

SIDES: Defines the diskette format as either single or double sided.

TKS: The number of tracks used on each side of the diskette.

SECTOR SIZE: The number of bytes per sector on the diskette. The only acceptable values for this parameter are 128, 256, 512, and 1024 byte sectors.

PHY SPT: The number of physical sectors that each track will have. The size of the sectors is defined by the PHYSICAL SECTOR SIZE.

SKEW: The skew factor, or interlacing, is the number of physical sectors skipped between consecutive sectors. The purpose of this parameter in discussed in greater detail in both the Megatel Quark and CP/M manuals.

GAP: The number of bytes between the end of the data field and the ID mark of the next physical sector.

BLOCK SIZE: A block is the smallest unit of file storage recognized by CP/M. All data is written in blocks the size of which is defined by this parameter.

OFFSET: The reserved tracks are those tracks that are set aside for the operating system. Since the directory track follows the last reserved track, it is essential to set aside the reserved tracks even if no data is written to them, if installing one of the formats in this Application Note. If the user wishes to

NAME	FIRST SECTOR 0	TPI	SIZE	SYSTEM TRACK R/W	DENS	SIDES	TKS	SECTOR SIZE	PHYS SPT	SKEW	GAP3	BLOCK SIZE	OFF SET	DIR
ACCESS MATRIX	N	48	5	Y	2	1	40	512	9	3	80	1024	2	64
BASIC 4/AOS/DIRECT	N	96	5	Y	2	2	80	256	16	1	51	2048	3	128
BMC IF800	N	48	5	Y	2	2	40	512	10	2	39	2048	3	128
CP/M DSDD (STANDARD)	N	48	8	N	2	2	77	256	26	1	52	4096	2	128
CROMEMCO Z-2	N	48	5	Y	2	1	40	512	10	4	39	1024	2	34
DEC RAINBOW 80 TKS	N	96	5	Y	2	1	80	512	10	2	39	2048	2	128
DEC VT180 ROBIN	N	48	5	Y	2	1	40	512	9	2	80	1024	2	64
HEATH W/MAGNOLIA	N	48	5	Y	2	1	40	512	9	7	80	2048	3	96
IBM 3740	N	48	8	Y	1	1	77	128	26	6	25	2048	2	64
IBM PC CP/M-86 (SSDD)	N	48	5	Y	2	1	40	512	8	1	119	1024	1	64
KAYPRO II	Y	48	5	Y	2	1	40	512	10	7	39	1024	1	64
MEGATEL CP/M 2.2 8"	N	48	8	Y	2	1	77	128	48	4	20	2048	2	128
MEGATEL CP/M 2.2 5",48	N	48	5	Y	2	1	35	128	30	3	20	1024	3	64
MEGATEL CP/M 2.2 5",96	N	96	5	Y	2	1	70	128	30	3	20	1024	3	64
MEGATEL CP/M 3.0 8"	N	48	8	Y	2	1	77	512	17	2	20	2048	3	128
MEGATEL CP/M 3.0 5",96	N	96	5	Y	2	1	80	512	10	2	20	2048	4	128
MORROW MICRO DECISION	N	48	5	Y	2	1	40	1024	5	3	107	2048	2	128
NEC PC-8001A	N	48	5	Y	2	1	40	256	16	1	51	1024	2	64
OSBORNE EXEC	N	48	5	Y	2	1	40	1024	5	1	107	1024	3	64
OSBORNE I (DD)	N	48	5	Y	2	1	40	1024	5	1	107	1024	3	64
OSBORNE I(SD)	N	48	5	Y	1	1	40	256	10	2	17	2048	3	64
SUPERBRAIN JUNIOR	N	48	5	Y	2	1	35	512	10	2	39	2048	2	64
XEROX 820-II (128)	N	48	5	Y	2	1	40	128	18	6	11	1024	3	64
XEROX 820-II (256)	N	48	5	Y	2	1	40	256	17	6	38	1024	3	64
ZENITH Z-100	N	48	5	Y	2	1	40	512	8	1	126	1024	2	128
ZENITH Z-90	N	48	5	Y	2	1	40	256	16	11	51	1024	2	128

TABLE 1. Diskette Format Specifications For CP/M Plus QINSTALL Questions

install his own defined format, then reserved tracks are only necessary on logical drive A: for booting the operating system.

DIR: The maximum number of directory entries allowed. This number must be reasonable because the data area of the disk immediately follows the directory area.

NOTE ON DOUBLE TRACKING

If double tracking is invoked for a particular logical drive, then two step pulses will be issued every time the heads are moved in or out one track. This feature should be used if a diskette format for 48 TPI is to be accessed on a 96 TPI drive.

INSTALLING DISK FORMATS FOR CP/M 2.2

To install any of the disk formats described in this Application Note in a CP/M 2.2 system, various parts of the BIOS must be changed directly. The simplest formats to install for CP/M 2.2 are those with a physical sector size of 128 bytes. This is because no blocking or deblocking is required. Deblocking is a way of reading in a sector of a size greater than 128 bytes (256, 512, or 1024) and then extracting the logical sector required. Blocking is a way of writing the logical sector to the proper place on the proper physical sector. The blocking and deblocking code is in various parts of the BIOS and only supports a physical sector size of 256 bytes. For a further explanation on blocking and deblocking see the CP/M system manual.

The information in Table 1 can be used to calculate the interlace table for a particular format. The physical sectors per track and the skew factor can be used to calculate the interlace of the physical sectors. From this the interlace table for the logical sectors can be calculated. The following example shows how this is done for the OSBORNE I.

From Table 1:

Physical Sectors per Track   10
Sector Size   256 bytes
Skew Factor   2

Since there are 10 physical sectors per track and the skew is 2, the physical interlace table starts at sector 1 and then skips every other sector but does not exceed the maximum sector of 10. Therefore the physical sector interlace table is as follows:

1,3,5,7,9,2,4,6,8,10

Since the physical sector size is 256 bytes, each physical sector has 2 logical sectors (a logical sector is 128 bytes). Therefore:

Physical Sector 1 has Logical Sectors 1, 2
Physical Sector 2 has Logical Sectors 3, 4
Physical Sector 3 has Logical Sectors 5, 6
Physical Sector 4 has Logical Sectors 7, 8
Physical Sector 5 has Logical Sectors 9, 10
Physical Sector 6 has Logical Sectors 11, 12
Physical Sector 7 has Logical Sectors 13, 14
Physical Sector 8 has Logical Sectors 15, 16
Physical Sector 9 has Logical Sectors 17, 18
Physical Sector 10 has Logical Sectors 19, 20

By substituting the logical sector numbers for the physical sector numbers in the physical interlace table, a logical interlace table can be created. The logical interlace table that will be used in the BIOS is:

1,2,5,6,9,10,13,14,17,18,
3,4,7,8,11,12,15,16,19,20

COLUMN HEADINGS IN TABLE 3

Table 3 contains information for the disk parameter block. This information is only required if any of the formats in this Application Note are to be installed for CP/M 2.2. A brief explanation of the column headings is as follows.

SPT: Total number of logical sectors per track.

BSH: The data allocation block shift factor. This is determined by the data block allocation size.

BLM: The data allocation block mask.

EXM: The extent mask, which is determined by the data block allocation size and the number of disk blocks.

DSM: Used to determine the total storage capacity of the disk drive.

DRM: A number equal to the maximum number of directory entries less one.

AL0, AL1: Used to determine reserved directory blocks.

CKS: The size of the directory check vector.

OFF: The number of reserved tracks at the beginning of the logical disk.

A NOTE ON COMPATIBILITY

The data contained in this Application Note has not been completely tested by Megatel, but is believed to be correct. If any of the data for a format specification is found not to be correct, please report it to Megatel so that this Application Note can be updated accordingly.

FLOPPY DISKETTE FORMAT	SPT	BSH	BLM	EXM	DSM	DRM	AL0	AL1	CKS	OFF
ACCESS MATRIX (DD)	36	3	7	0	170	63	192	0	15	2
BASIC 4 / AOS / DIRECT	32	4	15	0	313	127	192	0	16	3
BMC IF8000	40	4	15	1	191	127	192	0	16	3
CP/M DSDD	52	5	31	3	246	127	128	0	16	2
CROMEMCO Z-2 (DD)	40	3	7	0	189	63	128	0	8	2
DEC RAINBOW 80 TRK (DD)	40	4	15	1	194	127	192	0	32	2
DEC VT180 ROBIN (DD)	36	3	7	0	170	63	192	0	16	2
HEATH W/MAGNOLIA (DD)	36	4	15	1	82	95	192	0	24	3
IBM 3740	26	3	7	0	242	63	192	0	16	2
IBM PC CP/M-86 (DD)	32	3	7	0	155	63	192	0	16	1
KAYPRO II (DD)	40	3	7	0	194	63	128	0	16	1
MEGATEL CP/M 2.2 8 INCH	48	4	15	1	224	127	192	0	32	2
MEGATEL CP/M 2.2 5.25 48	30	3	7	0	119	63	192	0	16	3
MEGATEL CP/M 2.2 5.25 96	30	3	7	0	250	63	192	0	16	3
MEGATEL CP/M 3.0 8 INCH	68	4	15	0	313	127	192	0	32	3
MEGATEL CP/M 3.0 5.25 96	40	4	15	1	189	127	192	0	32	4
MORROW MICRODECISION (DD)	40	4	15	1	94	127	192	0	32	2
NEC PC-8001A (DD)	32	3	7	0	151	63	192	0	16	2
OSBORNE EXEC (DD)	40	3	7	0	184	63	192	0	16	3
OSBORNE I (DD)	40	3	7	0	184	63	192	0	16	3
OSBORNE I (SD)	20	4	15	1	45	63	128	0	16	3
SUPERBRAIN JUNIOR	40	4	15	1	81	63	128	0	16	2
XEROX 820-I (SD)	18	3	7	0	81	31	128	0	16	3
XEROX 820-II (DD)	34	3	7	0	156	63	192	0	16	3
ZENITH Z-100 (DD)	32	3	7	0	147	127	240	0	32	2
ZENITH Z-90 (DD)	32	3	7	0	151	127	240	0	32	2

TABLE 3.   Disk Parameter Block Data