SUBJECT

The purpose of this Application Note is to assist in the selection of floppy disk drives for use with the Megatel Quark family of single-board computers. It should also be of assistance when installing the CP/M 2.2 or CP/M Plus operating systems to best suit your drives' hardware specifications.

"MEGATEL-TESTED" DRIVES

The Quark family of microcomputers is designed to interface easily with most 8-, 5.25-, and 3.5-inch floppy disk drives. You should be aware, however, that disk drive specifications vary widely from manufacturer to manufacturer.

Megatel has tried and tested a variety of floppy disk drives with the Quark. These drives are indicated in Table 1 by a "YES" in the "MEGATEL TESTED" column. If you have no particular preference for a floppy disk drive, then picking one of these would be a safe choice.

DRIVES NOT TESTED BY MEGATEL

If you have a preference as to which floppy drive to use, then the Quark is probably compatible with it as long as it conforms to industry standards. Many types of drives which have not been tested by Megatel are being used quite successfully by Quark customers and distributors.

For those drives which Megatel has not tested in-house, Table 1 shows specifications taken from the manufacturer's literature or operating manual. To help avoid potential difficulties, notes are included or the parameter values have been adjusted to those recommended for the installation.

DISK DRIVE INSTALLATION

For information on how to connect the drives to the the Quark, refer to the Installation section of the Megatel Quark Manual. Further information helpful in making these connections can be found on the data sheet for the Quark Transition Board you are using.

After the drives have been correctly connected to the Quark, the operating system may be installed. Although the installation process, (in which drive characteristics, diskette formats, and I/O configurations are set up) is explained thoroughly in the Quark Manual, you will need some special information about the drives you intend to use on the installed system.

To assist you, Table 1 provides some brief information on a variety of different floppy disk drives. The left half of Table 1 contains general information on the various drives, and the right half provides suggested parameter values to use when installing these drives. The values in Table 1 are the suggested responses to the queries presented in QINSTALL for the disk drive hardware parameters. The floppy disk format parameters, which are also part of QINSTALL, are not discussed in this Application Note.

Each version and release of operating systems for the Quark requires its own set of installation values. The parameters in Table 1 apply to the CP/M Plus 3.01 release, but a subset of them are also applicable to CP/M 2.22.

Before running QINSTALL, you should obtain copies of the manufacturers' manuals for the disk drives that you will be using. Note that Table 1 may suggest values different from those appearing in the manual for a particular drive. These differences may reflect our experience in using that drive, differences in interpretation of the names given to various parameters, or limitations imposed by the general-purpose nature of the Quark hardware or software. The explanations of the Column Headings, Drive Type Codes, Pinout Codes, and Notes on the several pages following Table 1 explain the reasoning behind many of the suggested values.

When QINSTALL is run, it will display along with each query a "default" value. If you enter only a carriage return, the default value will be accepted as the reponse to that query. If you enter some other value, and if it is a legal response and within the range indicated in the query, your new value will be accepted instead of the default value shown.

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The default values displayed by QINSTALL are read from the file QSYS.DAT, which must be on the diskette used during the installation. QSYS.DAT contains the current set ofresponses to all of the queries used in QINSTALL, along with other information regarding the allowable ranges for values, type of response expected for a query, and so on. After you have finished entering drive, format, and I/O information, your new values, together with any default values you have selected, will be saved in QSYS.DAT, replacing the previous values. These values thus become the new default values. If you start back to the beginning of QINSTALL, or run it later with that particular copy of QSYS.DAT on the diskette, the default values displayed will be the values you selected earlier.

The copy of QSYS.DAT which is shipped with the Quark System Software Packages contains a set of default values which represent (more or less) the parameter values used in the "boot system" on the the diskettes. (The "boot system" is an installed system on the Distribution Diskettes which will boot up when these diskettes are first used.)

These default values, and the values used in the boot system, have been deliberately chosen to be very generous with the drive parameters, so that the distribution system can be booted from almost any drive. Only one single-sided drive is required to boot and install a Quark operating system, although two make the installation much easier. The drive(s) are assumed to have slow track-to-track stepping rates (15ms for 8-inch drives, 30ms for 5.25-inch), long head-load, motor-start, head-settling, and tunnel-erase delays, and a minimum number of tracks (35 on 48tpi 5.25-inch, 70 on 96tpi 5.25-inch, 77 on 8-inch).

If you have problems when installing a drive, you can always get back to the default values used on the Distribution Diskettes by copying the orginal QSYS.DAT from the Distributon Diskette to your work diskette, and starting the installation over.

For explanations of the various parameters and QINSTALL questions, refer to the Megatel Quark Manual and the "EXPLANATION OF THE COLUMN HEADINGS IN TABLE 1" section of this Application Note.

TABLE 1. Floppy Disk Drive Characteristics and Installation Parameters

MANUFACTURER	MODEL	MEGATEL TESTED	DRIVE TYPE	PHYSICAL TRACK DENSITY (tpi)	NUMBER OF HEADS	HEIGHT	PINOUT	NOTES	INSTALL SIZE (inches)	INSTALL TPI	STEPPING RATE IN H/W OR S/W (ms)	MOTOR START TIME (ms)	HEAD LOAD DELAY (ms)	HEAD SETTLING TIME (ms)	DELAY BETWEEN DRIVE SELECTS (ms)	TUNNEL ERASE DELAY (µs)	LOW WRITE CURRENT (track number)	NUMBER OF RETRIES	NUMBER OF SEEK RETRIES	
Hitachi	HFD305D	NO	8	100	1	40mm		E,F,3.00 inch	5.25	48	3 S/W	N/A	N/A	N/A	DEF	N/A	N/R	DEF	DEF	3.00-, 3.25-, and 3.50-inch Drives
Tabor Corp	TC-500	NO	9	140	1	STD	5	D,E,F,3.25 inch	5.25	48	10 S/W	400	N/A	15	DEF	N/A	N/R	DEF	DEF	
Mitsubishi	MF351	NO	8	135	1	STD	2	D,E,F,3.5 inch	5.25	48	3 S/W	N/A	N/A	15	DEF	N/A	N/R	DEF	DEF	
Shugart	SA 300	YES	8	135	1	STD	2	B,D,E,F,3.5 inch	5.25	48	6 H/W	500	0	15	DEF	1000	N/R	DEF	DEF	
Shugart	SA 350	NO	8	135	2	STD	2	B,E,F,3.5 inch	5.25	48	6 H/W	500	100	15	DEF	1000	N/R	DEF	DEF	
Sony	OA-D30V	YES	7	135	1	STD	4	D,E,F,3.5 inch	8	48	15 S/W	0	50	15	DEF	525	N/R	DEF	DEF	
YE Data	YD-620	NO	6	67.5	2	STD	2	D,E,F,3.5 inch	5.25	48	5 S/W	400	0	30	DEF	N/A	N/R	DEF	DEF	
YE Data	YD-625	NO	6	67.5	2	STD	5	D,E,F,3.5 inch	5.25	48	5 S/W	400	0	30	DEF	N/A	N/R	DEF	DEF	
YE Data	YD-640	NO	6	135	2	STD	2	D,E,F,3.5 inch	5.25	48	3 S/W	400	0	15	DEF	N/A	N/R	DEF	DEF	
YE Data	YD-645	NO	6	135	2	STD	2	D,E,F,3.5 inch	5.25	48	3 S/W	400	0	15	DEF	N/A	N/R	DEF	DEF	
Amlyn	1865	NO	10	170	2	HALF	1	K	8/5	48	2 S/W	N/A	N/A	25	DEF	N/A	N/R	DEF	DEF	5.25-inch Drives
BASF	6106	NO	2	48	1	2/3	2	F	5.25	48	12 H/W	N/A	35	45	DEF	N/A	N/R	DEF	DEF	
BASF	6108	NO	2	48	2	2/3	2	F	5.25	48	12 H/W	N/A	35	45	DEF	N/A	N/R	DEF	DEF	
Drivetec	320	YES	5	192	2	HALF	3	D,E,F,G	8	48	3 S/W	0	35	15	DEF	1000	N/R	DEF	DEF	
Evergo	DS-5	NO	2	48	2	HALF		F	5.25	48	6 H/W	500	N/A	15	DEF	N/A	N/R	DEF	DEF	
Micropolis	1015-II	NO	9	100	1	FULL		E,F,Not recommended	5.25	48	10 S/W	500	75	15	DEF	1000	N/R	DEF	DEF	
Micropolis	1015-IV	YES	9	100	2	FULL		E,F,Not recommended	5.25	48	10 S/W	500	75	15	DEF	1000	N/A	DEF	DEF	
Micropolis	1015-V	NO	2	96	1	FULL		Not recommended	5.25	96	10 S/W	500	75	15	DEF	1000	N/R	DEF	DEF	
Micropolis	1015-VI	NO	2	96	2	FULL		Not recommended	5.25	96	10 S/W	500	75	15	DEF	1000	N/R	DEF	DEF	
Micropolis	1115-II	YES	9	100	1	FULL	2	D,E,F,H	5.25	48	6 H/W	250	75	15	DEF	850	100	DEF	DEF	

TABLE 1.(continued) Floppy Disk Drive Characteristics and Installation Parameters

5.25-inch Drives

MANUFACTURER	MODEL	MEGATEL TESTED	DRIVE TYPE	PHYSICAL TRACK DENSITY (tpi)	NUMBER OF HEADS	HEIGHT	PINOUT	NOTES	INSTALL SIZE (inches)	INSTALL TPI	STEPPING RATE IN H/W OR S/W (ms)	MOTOR START TIME (ms)	HEAD LOAD DELAY (ms)	HEAD SETTLING TIME (ms)	DELAY BETWEEN DRIVE SELECTS (ms)	TUNNEL ERASE DELAY (µs)	LOW WRITE CURRENT (track number)	NUMBER OF RETRIES	NUMBER OF SEEK RETRIES
Micropolis	1115-IV	NO	9	100	2	FULL	2	D,E,F	5.25	48	6 H/W	250	75	15	DEF	850	N/R	DEF	DEF
Micropolis	1115-V	YES	2	96	1	FULL	2	D,E,F	5.25	96	6 H/W	250	75	15	DEF	850	N/R	DEF	DEF
Micropolis	1115-VI	YES	2	96	2	FULL	2	D,E,F	5.25	96	6 H/W	250	75	15	DEF	850	N/R	DEF	DEF
Micropolis	1117-VI	NO	3	96	2	FULL		D,E,F	8	96	6 H/W	200	0	15	DEF	N/A	N/R	DEF	DEF
Mitsubishi	M4851	NO	2	48	2	HALF	2	C,F	5.25	48	6 H/W	250	50	25	DEF	590	N/R	DEF	DEF
Mitsubishi	M4852	NO	2	96	2	FULL	2	C	5.25	96	3 S/W	250	50	15	DEF	590	N/R	DEF	DEF
Mitsubishi	M4853	NO	2	96	2	HALF	2	C	5.25	96	3 S/W	250	50	15	DEF	590	N/R	DEF	DEF
Mitsubishi	M4854	YES	3	96	2	HALF	2	C,D,E,F	8	96	3 H/W	250	50	15	DEF	590	N/R	DEF	DEF
Mitsubishi	M4855	NO	4	96	2	HALF	2	C,D,E,F	8	96	3 H/W	250	50	15	DEF	590	N/R	DEF	DEF
Remex	RFD 480	NO	2	48	2	2/3	2	F	5.25	48	5 S/W	200	0	15	DEF	N/A	N/R	DEF	DEF
Remex	RFD 485	NO	2	48	2	HALF	2	B,F	5.25	48	5 S/W	200	0	15	DEF	N/A	N/R	DEF	DEF
Remex	RFD 486	NO	2	48	1	HALF	2	B,F	5.25	48	5 S/W	200	0	15	DEF	N/A	N/R	DEF	DEF
Remex	RFD 960	NO	2	96	2	2/3	2	B	5.25	96	5 S/W	200	0	15	DEF	N/A	N/R	DEF	DEF
Remex	RFD 965	NO	2	96	2	HALF	2	B	5.25	96	3 S/W	200	0	15	DEF	N/A	N/A	DEF	DEF
Remex	RFD 966	NO	2	96	1	HALF	2	B	5.25	96	3 S/W	200	0	15	DEF	N/A	N/A	DEF	DEF
Shugart	SA 200	NO	2	48	1	2/3	2	F	5.25	48	26 S/W	N/A	350	20	DEF	1000	N/R	DEF	DEF
Shugart	SA 400	YES	2	48	1	FULL	2	F	5.25	48	20 H/W	500	0	20	DEF	1000	N/R	DEF	DEF
Shugart	SA 400F	NO	2	48	1	FULL	2	F	5.25	48	6 H/W	200	N/A	15	DEF	N/A	N/A	DEF	DEF
Shugart	SA 400L	NO	2	48	1	FULL	2	F	5.25	48	20 H/W	500	100	15	DEF	N/A	N/R	DEF	DEF
Shugart	SA 410	NO	2	96	1	FULL	2		5.25	96	6 H/W	0	200	15	DEF	1000	N/R	DEF	DEF
Shugart	SA 450	NO	2	48	2	FULL	2	B,F	5.25	48	20 H/W	500	0	15	DEF	1000	N/R	DEF	DEF

TABLE 1.(continued) Floppy Disk Drive Characteristics and Installation Parameters

5.25-inch Drives

MANUFACTURER	MODEL	MEGATEL TESTED	DRIVE TYPE	PHYSICAL TRACK DENSITY (tpi)	NUMBER OF HEADS	HEIGHT	PINOUT	NOTES	INSTALL SIZE (inches)	INSTALL TPI	STEPPING RATE IN H/W OR S/W (ms)	MOTOR START TIME (ms)	HEAD LOAD DELAY (ms)	HEAD SETTLING TIME (ms)	DELAY BETWEEN DRIVE SELECTS (ms)	TUNNEL ERASE DELAY (µs)	LOW WRITE CURRENT (track number)	NUMBER OF RETRIES	NUMBER OF SEEK RETRIES
Shugart	SA 455	YES	2	48	2	HALF	2	F	5.25	48	6 H/W	500	15	15	DEF	1000	N/R	DEF	DEF
Shugart	SA 460	NO	2	96	2	FULL	2	B	5.25	96	6 H/W	200	0	15	DEF	1000	N/R	DEF	DEF
Shugart	SA 465	YES	2	96	2	HALF	2	B	5.25	96	3 S/W	300	0	15	DEF	1000	N/R	DEF	DEF
Shugart	SA 475	NO	3	96	2	HALF		E,F	8	96	3 H/W	500	83	15	DEF	N/A	N/R	DEF	DEF
Tandon	TM 100-1A	YES	2	48	1	FULL	2	B,F	5.25	48	5 S/W	250	0	15	DEF	800	N/R	DEF	DEF
Tandon	TM 100-2	YES	2	48	2	FULL	2	B,F	5.25	48	5 S/W	0	250	15	DEF	800	N/R	DEF	DEF
Tandon	TM 100-3	YES	2	96	1	FULL	2		5.25	96	5 S/W	0	250	15	DEF	800	N/R	DEF	DEF
Tandon	TM 100-4	YES	2	96	2	FULL	2		5.25	96	5 S/W	0	250	15	DEF	800	N/R	DEF	DEF
Tandon	TM 101	NO	2	96	2	FULL	2	B	5.25	96	3 S/W	250	0	15	DEF	N/A	N/R	DEF	DEF
Tandon	TM 102	NO	4	96	2	FULL	2	B,D,E,F	8	96	3 H/W	250	0	15	DEF	N/A	N/R	DEF	DEF
Tandon	TM 50-1	NO	2	48	1	HALF	2	B,F	5.25	48	20 H/W	1000	0	20	DEF	N/A	N/R	DEF	DEF
Tandon	TM 50-2	NO	2	48	2	HALF	2	B,F	5.25	48	6 H/W	1000	0	20	DEF	N/A	N/R	DEF	DEF
Tandon	TM 55-2	NO	2	48	2	HALF	2	B,F	5.25	48	6 H/W	250	0	15	DEF	N/A	N/R	DEF	DEF
Tandon	TM 55-4	NO	2	96	2	HALF	2	B	5.25	96	3 S/W	250	0	15	DEF	N/A	N/R	DEF	DEF
Teac	FD-50C	NO	2	100	1	FULL	2	E,F	5.25	48	25 S/W	1000	35	10	DEF	N/A	N/R	DEF	DEF
Teac	FD-55A	NO	2	48	1	HALF	2	F	5.25	48	N/A	N/A	N/A	N/A	DEF	N/A	N/R	DEF	DEF
Teac	FD-55B	NO	2	48	2	HALF	2	F	5.25	48	N/A	N/R	N/R	N/R	DEF	N/R	N/R	DEF	DEF
Teac	FD-55E	NO	2	96	1	HALF	2		5.25	96	N/A	N/A	N/A	N/A	DEF	N/A	N/R	DEF	DEF
Teac	FD-55F	YES	2	96	2	HALF	2		5.25	96	3 S/W	400	35	15	DEF	1000	N/R	DEF	DEF
Teac	FD-55G	NO	3	96	2	HALF			8	96	N/A	N/A	N/A	N/A	DEF	N/A	N/R	DEF	DEF
Video Tech	FDM 130	NO	2	48	1	HALF	2	F	5.25	48	12 H/W	500	N/A	15	DEF	N/A	N/R	DEF	DEF

TABLE 1.(continued) Floppy Disk Drive Characteristics and Installation Parameters.

MANUFACTURER	MODEL	MEGATEL TESTED	DRIVE TYPE	PHYSICAL TRACK DENSITY (tpi)	NUMBER OF HEADS	HEIGHT	PINOUT	NOTES	INSTALL SIZE (inches)	INSTALL TPI	STEPPING RATE OR S/W IN H/W (ms)	MOTOR START TIME (ms)	HEAD LOAD DELAY (ms)	HEAD SETTLING TIME (ms)	DELAY BETWEEN DRIVE SELECTS (ms)	TUNNEL ERASE DELAY (µs)	LOW WRITE CURRENT (track number)	NUMBER OF RETRIES	NUMBER OF SEEK RETRIES
5.25-inch Drives																			
Video Tech	FDM 140	NO	2	96	1	HALF	2		5.25	96	6 H/W	500	N/A	15	DEF	N/A	N/R	DEF	DEF
Video Tech	FDM 145	NO	2	48	2	HALF	2	F	5.25	48	12 H/W	500	N/A	15	DEF	N/A	N/R	DEF	DEF
Video Tech	FDM 160	NO	2	96	2	HALF	2		5.25	96	6 H/W	N/A	N/A	N/A	DEF	N/A	N/R	DEF	DEF
YE-Data	YD-274-DD	NO	2	48		N/A		F	5.25	48	30 H/W	N/A	N/A	N/A	DEF	N/A	N/R	DEF	DEF
YE-Data	YD-380	NO	2/3	96	2	HALF		Dual speed operation	8/5	96	3 H/W	1000	50	15	DEF	N/A	N/R	DEF	DEF
YE-Data	YD-380T	NO	3	96	2	HALF			8	96	3 H/W	N/A	50	15	DEF	N/A	N/R	DEF	DEF
YE-Data	YD-480	NO	2	96	2	HALF	2		5.25	96	3 H/W	1000	50	15	DEF	N/A	N/R	DEF	DEF
8.00-inch Drives																			
Cont. Data	9406-3	NO	1	48	2	FULL	1		8	48	3 H/W	0	40	23	DEF	N/A	N/R	DEF	DEF
Mitsubishi	M2896-63	NO	1	48	2	HALF	1		8	48	3 H/W	N/A	35	15	DEF	N/A	N/R	DEF	DEF
Qume	Datatrak 8	NO	1	48	2	FULL	1		8	48	3 H/W	0	35	15	DEF	590	N/R	DEF	DEF
Remex	RFD 2000/1	NO	1	48	1	FULL	1		8	48	3 H/W	0	35	15	DEF	N/A	N/R	DEF	DEF
Remex	RFD 4000/1	NO	1	48	2	FULL	1		8	48	3 H/W	0	35	15	DEF	N/A	N/A	DEF	DEF
Shugart	SA 800/801	NO	1	48	1	FULL	1		8	48	8 S/W	0	50	15	DEF	1000	N/R	DEF	DEF
Shugart	SA 810	NO	1	48	1	HALF	1		8	48	3 H/W	210	0	13	DEF	1000	N/R	DEF	DEF
Shugart	SA 850/851	YES	1	48	2	FULL	1		8	48	3 H/W	0	50	15	DEF	1000	N/R	DEF	DEF
Shugart	SA 860	YES	1	48	2	HALF	1		8	48	3 H/W	120	0	13	DEF	1000	N/R	DEF	DEF
Siemens	200-8	NO	1	48	2	FULL	1		8	48	6 H/W	0	25	24	DEF	580	N/R	DEF	DEF
Tandon	TM 848-1	NO	1	48	1	HALF	1		8	48	3 H/W	500	100	15	DEF	550	N/R	DEF	DEF
Tandon	TM 848-2	YES	1	48	2	HALF	1		8	48	3 H/W	500	100	15	DEF	550	N/R	DEF	DEF

EXPLANATION OF THE COLUMN HEADINGS IN TABLE 1

MEGATEL TESTED A "YES" in this column indicates that the drive has been tested by Megatel for use with the Quark. Check the "NOTES" column for particular comments on the drive. When the table shows several versions of the same basic drive (such as both the single- and double-sided versions, or the 48tpi and 96tpi versions), these notes will generally apply also to the other versions of any drive which has been tested.

DRIVE TYPE The drives in Table 1 have been broadly classified by media size, data transfer rate, and recording density. See "EXPLANATION OF DRIVE TYPE CODES", below.

PHYSICAL TRACK DENSITY The actual track density of the drive, in tracks per inch. This figure may differ from the "INSTALL TPI".

NUMBER OF HEADS The number of read/write heads on the drive.

HEIGHT This represents the size of the faceplate of the drive relative to "standard" 8- or 5.25-inch drives. The approximate dimensions are:

SIZE	FULL	HALF
8	115mm	59mm
5.25	83mm	41mm
3.5	—	41mm
3.25	—	41mm

PINOUT Pinout code for the drive's interface connector. See "EXPLANATION OF PINOUT CODES", below.

NOTES See the "EXPLANATION OF NOTES", below.

INSTALL SIZE This is the response that should be given to the "SIZE OF DRIVE?" query. This data is used in different ways by the different Quark operating systems.

In CP/M 2.22, this is used to set the number of sectors/track (16/30 for 5.25-inch in single/double density, 26/48 for 8-inch single/double), to set the skew factor (2/3 for 5.25-inch, 6/4 for 8-inch), to decide whether the second drive can support an interchange format (interchange drive format is allowed only if the "second" drive is the same size as the system A:drive), and, if the second drive is installed as a 5.25-inch 96tpi drive, to enable double-stepping when reading the interchange format on a 5.25-inch system.

In CP/M 3.01, this is used when generating the software step pulses. Note that the auto-size select feature is no longer supported in 3.01, and will probably not be included in future releases either.

INSTALL TPI A choice of 48tpi or 96tpi is allowed. This is used to decide if the 5.25-inch interchange format drive should be double-stepped. (The interchange format is 48tpi, but if a 96tpi drive is used for the interchange drive, the system will automatically issue two step pulses per track when accessing the interchange drive). Note that this value may not be the same as the "PHYSICAL TRACK DENSITY".

EXPLANATION OF THE COLUMN HEADINGS IN TABLE 1 (Continued)

STEPPING RATE, IN H/W OR S/W

This is the minimum track-to-track step delay. If the drive requires a direction-change delay, then the direction-change delay should be added to the stepping delay.

In 2.22, only the stepping rates generated by the FDC 1793 chip are allowed. (The 1793 allows 6, 12, 20, or 30ms with 5.25", and 3, 6, 10, 15ms for 8"). In 3.01, either these hardware rates or those generated by a software timing loop are permitted. Software stepping rates allow more choice of rates, including 3 to 6ms rates for 5.25" drives not otherwise possible when using the 1793's stepping rates.

MOTOR START TIME

The time for the drive spindle motor to reach full speed, as given by the manufacturer. In 2.22 and 3.01, this delay is used only on write operations (to insure that the disk is at speed before writing). Note that each drive should be set up so that its spindle motor is enabled by the DRIVE SELECT true condition.

HEAD LOAD DELAY

Normally the time needed for the read/write heads to be loaded against the disk after the DRIVE SELECT true condition. This delay is used before any read or write operation.

HEAD SETTLING TIME

Delay used before any read/write operation after the head has been moved. This allows the head to come to rest over the desired track, preventing false seek errors.

DELAY BETWEEN DRIVE SELECTS

Not strictly a drive parameter. When a previously-deselected drive is selected, this delay is inserted to allow the power supply time to recover from the dip which may accompany the motor-on/head-loading action. The Delay Between Drive Selects is needed only if this is a problem. If possible, the user should use a value zero for optimum performance.

TUNNEL ERASE DELAY

Delay used before moving the heads after the end of a write operation. Specified by the manufacturer to allow the erase head to switch off fully. Typical values are around 1 msec.

LOW WRITE CURRENT

Most newer drives do not require external control of the write-head current, which is reduced on inner tracks where the bit density is higher. If your drive does require it, then specify the address of a parallel port on the Quark, the mask for the bit to use, and the track number at and above which this LOW WRITE-CURRENT line will be active (TTL low). Note that the line chosen must be enabled for output before it is used, and that it must be able to drive a 150ohm load at the drive.

NUMBER OF RETRIES

This parameter specifies the number of times the disk handler will retry an operation when an error occurs. The disk handler will always attempt to position the head on the correct track for each retry (see "Number of Seek Retries") before retrying the actual I/O operation. If the seek operation is successful, the disk handler issues the appropriate read or write command to the 1793; otherwise, an error is reported to the disk handler and a retry is done.

Internally, the 1793 will retry the command for approximately five revolutions before reporting the error to the disk handler. The parameter specifies the number of times the disk handler will retry the requested operation. Retries may be generated by errors from the 1793 (CRC, RECORD NOT FOUND, LOST DATA, and WRITE PROTECT errors) or from the seek routine of the disk handler.

Increasing this parameter allows more "soft" disk errors to be ignored, but increases the time spent waiting for a "hard" error to be reported to the BDOS. Decreasing this parameter leads to faster reporting of real disk errors, while allowing less tolerance of soft errors. Typical values range from 7 to 31. If in doubt, try the default value which appears when you run QINSTALL for the first time.

EXPLANATION OF THE COLUMN HEADINGS IN TABLE 1 (Continued)

NUMBER OF SEEK RETRIES

This parameter sets the number of times the seek routine portion of the disk handler will attempt to position the read/write head over the requested track. The 1793 verifies that the head is over the correct track before returning a successful completion code to the disk handler. It should be noted that if the seek routine believes that the head is already over the requested track, no seek operation is performed (unless the disk operation is the first request to a drive after another drive has been de-selected).

When the disk handler receives a SEEK ERROR, it will RESTORE the heads (move the heads to track 00), and then re-seek to the same track. This parameter can be set to a large value (10, say) for drives which may have a "difficult time" getting to the correct track, but newer drive designs make values of 3 to 5 more appropriate.

EXPLANATION OF DRIVE TYPE CODES

1. A standard 8-inch floppy drive. Transfer rate 500kbits/s (MFM) or 250kbits/s (FM).

2. A standard 5.25-inch floppy drive. Transfer rate 250kbits/s (MFM) or 125kbits/s (FM).

3. An "8-inch replacement"-type 5.25-inch drive. This drive has the same format characteristics, transfer rates, and data capacity as Type 1, above. Its pinout may match standard 8-inch or 5.25-inch pinouts; check the PINOUT column.

4. An extra-high capacity 5.25-inch drive. This drive allows twice as many sectors/track as compared to a standard 5.25-inch drive. Transfer rates are those of a standard 8-inch drive (250/500kbits/s for FM/MFM).

5. A high-capacity servo-tracking 5.25-inch drive. See the discussion below on installation of this type of drive.

6. A "5.25-inch replacement"-type 3.5-inch drive. This drive has the same format characteristics, transfer rates, and data capacity as Type 2, above. Its pinout may or may not match the standard 5.25-inch pinout; check the PINOUT column.

7. A 3.5-inch hard-shell microfloppy. Transfer rate same as Type 1; 500kbits/s (MFM) or 250kbits/s (FM).

8. A 3.5-inch hard-shell microfloppy. Transfer rate same as Type 2; 250kbits/s (MFM) or 125kbits/s (FM).

9. A 3.25-inch hard-shell microfloppy. Transfer rate same as Type 2; 250kbits/s (MFM) or 125kbits/s (FM).

10. A high-capacity 5.25-inch drive which uses reference data on a special track to increase the track density. See the discussion below on the installation of this drive.

EXPLANATION OF PINOUT CODES

1. This drive uses the standard 50-pin, 25-position double-sided card edge finger pattern for 8-inch drives.

2. This drive uses the standard 34-pin, 17-position double-sided card edge finger pattern for 5.25-inch drives.

3. This drive uses a 17-position double-sided card edge finger pattern. The connector for use with this drive is the same as that which would be used for a standard 5.25-inch drive, but the ordering of signal lines matches that of pins 13-46 on a standard 8-inch drive. These pins carry all of the lines needed to interface the drive with the Quark.

4. This drive uses a 26-pin, 13-position double-row male post connector. The pattern used is proprietary to this drive.

5. This drive uses a 34-pin, 17-position double-row male header post connector. The pattern matches the order used on a standard 5.25-inch drive.

EXPLANATION OF NOTES

N/R Not required. Enter "0" or "X" as appropriate.

N/A Specification not available at the time of writing.

DEF Enter the QINSTALL default value, or a value of your choice.

A) The spindle motor on this drive runs continuously when power is applied.

B) The spindle motor on this drive runs continuously when a disk is inserted in the drive.

C) The spindle motor on this drive starts when the drive is selected and continues to run for a period after it is deselected.

D) The heads on this drive are always loaded against the diskette, so the manufacturer specifies a head load delay of zero. However, because of the operation of the Quark BIOS, a non-zero value is recommended for the Head Load Delay.

The floppy disk drive handler in the BIOS executes a Head Load Delay after it selects a drive but before it starts any read or write operation. The Motor Start Delay is added after the Head Load Delay only for write operations. This technique is used to improve system performance with drives where the motor is started when the drive is selected.

For drives where the spindle motor rotates continuously and the heads are loaded when the drive is selected, the Motor Start is zero and the Head Load is the value recommended by the manufacturer. This corresponds directly to the way in which the BIOS uses the two delays.

For drives where the heads are always loaded and the motor is started when the drive is selected, it is not necessary to wait for the full Motor Start Delay before attempting to read the disk. If a read is performed before the drive is at speed an error may result, but the system will automatically try again on the next revolution. Since the system has nothing else to do until the disk operation is complete, no advantage is obtained by waiting the full delay. In fact, since most "motor-start-on-select" drives incorporate an internal delay feature which keeps the motor spinning for several seconds after it is deselected (on the expectation that the drive is likely to be selected several times, not just once), after the first successful read, waiting for the Motor Start Delay on each successive read would degrade system performance unnecessarily.

For write operations on such drives the BIOS waits the full Motor Start delay, as otherwise it might be possible to write on the diskette when it is not running at full speed.

Although the drive manufacturer may specify a zero head load delay, it is recommended to install a small delay. This allows for the drive to be at least partially up to speed before the first read. (If the disk is read just as it starts spinning it will occasionally generate erroneous data which may be interpreted strangely by the controller).

E) Megatel CP/M distribution software is not currently available on media compatible with this drive. Install this drive by using an 8-inch or 5.25-inch system with the suggested parameters and then transferring the system onto the proper disk.

F) Megatel CP/M 3.01 Distribution software is currently not available on 5.25-inch 48tpi diskettes. Use either a 5.25-inch 96tpi or an 8-inch drive when installing CP/M 3.01.

G) This drive uses special pre-formatted 5.25-inch floppy diskettes which have servo-positioning information recorded between tracks. This servo information is used in the fine-positioning of the heads, which allows the drive to achieve a very high track density.

The format used on these diskettes assumes 256 data bytes per sector. Under CP/M 2.22, the diskette format is 128 bytes per sector (except for the interchange format), and cannot be changed through the installation procedure.

The sector size is an installable parameter under CP/M 3.01, and can be set to 128, 256, 512, or 1024 bytes per sector independently for each logical drive. This disk drive should be installed as if it were an 8-inch drive with the parameters shown in Table 1. When entering the format specifications select 256 bytes per sector for the sector size.

Since the drive operates only with the manufacturer's pre-formatted diskettes, do not use the Megatel-supplied QOCERT, QCERTWO, or QCERT disk formatting utilities. Doing so would erase the special format used on these diskettes.

H) This drive requires an additional delay between step pulses when changing directions, or it may not actually reverse the direction of motion of the heads. (Many drives specify such a delay, but in practice, most do not require it.) As there is no provision in the CP/M 2.22 or 3.01 BIOS to install for a direction-change delay, this drive should be installed with a steppping rate equal to the sum of the manufacturer's stated stepping rate and direction-change delay. This usually means that the effective stepping rate will be quite slow, a factor which should be taken into account when selecting a floppy disk drive. (A direction-change delay may be added by patching the BIOS directly. Source code for the BIOS is included with the Quark System Software Packages).

I) This drive requires a minimum delay of 200 us between the unloading of the head and the de-selection of the drive as otherwise the head may remain in contact with the surface of the disk.

J) This drive may have head-loading trouble if the heads are loaded or unloaded too quickly. If this occurs, try increasing the delay between drive selects and/or the head load delay.

K) This drive uses diskettes which have been recorded with a special reference track. The drive uses the data on the reference track to maintain accurate positioning at 170 tpi. The reference track is outside of the area used for recording, so these diskettes may be formatted in the same manner as normal diskettes.

Transfer rates are 500kbytes/sec in double-density (250kb/s in single-density). The drive can also read 5.25-inch diskettes recorded at normal speeds (i.e, 250/125kb/s) by running at 600rpm. At this speed, data on the normal 5.25-inch diskette is read at 500/250kb/s.

This drive should be installed as if it were an 8-inch drive with 154 tracks/side. Megatel Distribution software on 5.25-inch diskettes can be read by setting up the drive for the 600rpm mode, and reading/writing with the Transfer Rate ("Size Select") line on the Quark set for 500/250kb/s ("8-inch speeds").

A NOTE ON WRITE PRE-COMPENSATION

When writing in double-density mode, the FDC 1793 controller directs the Quark to apply a certain write pre-compensation shift period to each out-going data pulse. This shift causes the pulse to appear early or late with respect to, or just at, its nominal position in the data stream. By adjusting the positioning of the recorded pulses in this way, the disk controller can compensate for the recording characteristics of the media and of the drive's heads.

The maximum pre-compensation shift in either direction is equivalent to one-sixteenth (1/16) of one bit-period of the data stream. Thus when operating at the fast transfer rate (500kbits/s for double-density 8-inch drives) the amount of the pre-comp is 125ms, while at the slow transfer rate (250kbits/s for double-density 5.25-inch drives), the pre-comp is 250ns. In single-density mode, no pre-comp is applied.

Manufacturers of drives usually recommend some range of pre-comp values for their drives in their technical manuals, although a close examination of this literature is sometimes required in order to find the information. For 8-inch drives (meaning those accepting 8-inch diskettes), typical pre-comp values range from 0 to 250ns. The Quark applies a 125ns pre-comp when writing to these drives, a value which is acceptable to virtually all 8-inch drives.

The 125ns value will also be used for those 5.25-inch, 3.5-inch, and other drives which use the fast, "8-inch" transfer rates. Such drives include the so-called "8-inch replacement" 5.25-inch drives. Recommended pre-comp values vary for these drives, but because of the high-performance heads and electronics on these drives, the 125ns pre-comp is generally acceptable.

For normal 5.25-inch drives (those with 250kbits/s data transfer rates in double-density), the 250ns pre-comp is usually acceptable, even for drives where the manufacturer may have specified other values. This is true also of the various smaller-size drives, many of which are designed to be directly compatible with 5.25-inch drives.

There may be some drives which cannot tolerate 250ns pre-comp. However, if you choose to use such a drive, it is possible to modify the Quark so that the pre-comp will be zero. If you believe that you require such modifications, please contact the factory for details and instructions.

A NOTE ON DISK DRIVE CAPACITIES

The maximum data capacity of a drive depends on the total number of tracks on which data can be stored, the number of sectors per track, and the number of bytes per sector.

The total number of tracks available is determined by the design of the drive itself, and by the number of heads on the drive (that is, whether the drive is a single- or double-sided drive). The industry standard 8-inch drive allows 77 tracks/side. Standard 96tpi 5.25-inch drives usually allow 80 tracks/side, while 48tpi units allow 40 tracks/side. Older 48tpi 5.25-inch drives may permit only 35 tracks/side. Some of the newer 5.25-inch drives use even higher track densities to increase the number of tracks beyond eighty.

The data capacities shown in Table 2 below are based on the use of all of the available tracks on the diskette. Since it is commonplace to reserve some tracks for the operating system, and since the disk directory uses disk space starting immediately after the system tracks, the capacity available for file storage will be somewhat less than that shown in the table. Typically the system will require 2 tracks on an 8-inch drive, or 3 on a 5.25 inch. Each directory entry requires 32 bytes (64 if time-and-date stamping, archiving, etc. are enabled).

The number of sectors per track is determined by the maximum bit density possible on the drive (a function of the read/write heads and electronics, and the recording media), the size of each sector, and the recording method. In Table 2 it is assumed that double-density (MFM) recording is used; in single-density the maximum number of sectors/track would be slightly more than half.

The number of data bytes/sector is determined by the way in which the disk format is constructed. Because Digital Research's 8-bit CP/M operating systems all use a 128-byte logical record size, it is natural to set up the disc format for 128-byte sectors. With this format, a logical record corresponds directly to a physical sector. To use larger sectors, procedures called "blocking /deblocking routines" must be incorporated in the software interface between the CP/M BDOS and the Floppy Disk Controller hardware.

Megatel's CP/M 2.22 system generally uses only 128-byte sectors. (CP/M 2.22 systems set up for 5.25-inch drives block/deblock when using the Osborne interchange format, which is 256 bytes/sector.) Full support for variable sector sizes is provided in Megatel's CP/M 3.01, in which each of the five disc formats may be set up independently with 128, 256, 512, or 1024 bytes/sector.

Table 2 shows the data capacity of various types of single- or double-sided drives, using formats with 128 or 512 bytes/sec.

DRIVE TYPE	Tracks /Side	Number of Sides	Format Byte/Sector	Sector/Track	Capacity (kbytes)
1	77	1	128	48	473088 (462k)
			512	17	670208 (655k)
		2	128	48	946176 (924k)
			512	17	1340416 (1309k)
2	40	1	128	30	153600 (150k)
			512	10	204800 (200k)
		2	128	30	307200 (300k)
			512	10	409600 (400k)
3	77	1	128	48	473088 (462k)
			512	17	670208 (655k)
		2	128	48	946176 (924k)
			512	17	1340416 (1309k)
4	80	1	128	60	614400 (600k)
			512	20	819200 (800k)
		2	128	60	1228800 (1200k)
			512	20	1638400 (1600k)
5	160	1	128	48	983040 (960k)
			512	17	1392640 (1360k)
		2	128	48	1966080 (1920k)
			512	17	2785280 (2720k)
6	80	1	128	30	307200 (300k)
			512	10	409600 (400k)
		2	128	30	614400 (600k)
			512	10	819200 (800k)
7	70	1	128	48	430080 (420k)
			512	17	609280 (595k)
		2	128	48	860160 (840k)
			512	17	1218560 (1190k)
8	80	1	128	30	307200 (300k)
			512	10	409600 (400k)
		2	128	30	614400 (600k)
			512	10	819200 (800k)
9	100	1	128	30	384000 (375k)
			512	10	512000 (500k)
		2	128	30	768000 (750k)
			512	10	768000 (750k)

TABLE 2. Double-Density Floppy Disk Drive Capacities

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