

Flash Cache

An efficient method of enhancing system performance through disk drive access is to use a disk-caching program. Disk caching takes advantage of the fact that, during the course of normal operation, most users access the same program code and data repeatedly within a short period of time. The mechanics of a disk caching program involves the allocation of some system memory for temporary disk data storage. When the running application accesses data from the disk driver, the disk caching program saves the data to the temporary storage area in memory in the event it will be accessed again. If the application attempts to read the data again, the disk-caching program intercepts the disk access and provides the data stored in the temporary storage area established system memory. Because the data is provided immediately by the disk-caching program instead of the operating system reading it from the disk drive, system speed is effectively improved.

Flash Cache provides a boost in overall system performance. Tests show marked improvement in disk read operations when using Flash Cache, the results of which are listed below. The following table compares the times required to read several files of differing sizes from a hard disk drive, and with buffers of varying sizes. While disk write operations undergo little or no improvement, read operations benefit significantly from the use of Flash Cache.

File Size	Buffer Size	Read Time – No Cache	Read Time –Datalight Cache
5000KB	50KB	4.09 sec	0.739 sec
5000KB	25KB	4.14 sec	0.79 sec
2500KB	10KB	2.13 sec	0.46 sec
500KB	5KB	0.49 sec	0.12 sec
100KB	5KB	0.14 sec	0.08 sec
100KB	2KB	0.16 sec	0.05 sec

Based on internal Datalight tests, individual results may vary.

USING FLASH CACHE

Example Flash Cache Installations

We have provided the following examples of installations for Flash Cache. Likely, one of these will loosely resemble your system. As with any disk caching software, experimentation with the options may be the best way for you to get the most out of this software. Refer to this example installation, and look at the detailed command descriptions to see what each configuration option can do for you.

The amount of memory that you can assign Flash Cache changes with the use of the /@=B command. If you don't specify the /@=B then Flash Cache will only allow up to 3 megabytes of buffer space to be assigned. If you do use the /@=B command on the installation line then the maximum amount of assignable memory becomes 32 megabytes.

The following example shows you how to install Flash Cache using 384K of AT EXTENDED memory and use DOS for detecting disk changes for drive F:. In addition, NO track write buffer area is to be allocated.

```
C>FLASH 384/M=A/[F/!
```

The following will install the same as above except it will put the Flash Cache's TABLES into AT EXTENDED memory.

```
C>FLASH 384/M=AT/[F/!
```

The following will use as much of a megabyte of EMS EXPANDED RAM as possible while setting Flash Cache into track allocation mode! When using track allocation mode the size of the buffer MUST be in even increments of 17K. 1020K is an even multiple of 17K.

```
C>FLASH 1020/M=E/@=B
```

The following will use 64K of DOS RAM for its buffer space and eliminate the track read buffer area.

```
C>FLASH 64/!
```

The following will use 376K of the RAM DISK drive E: for Flash Cache's buffer space while telling Flash Cache not to check for SMART writes. A smart write checks the data about to be written. If the data does not need to be written then Flash Cache has done a SMART write!

```
C>FLASH 376/M=RE/N=N
```

The following will use 384K of AT EXTENDED memory plus 100K of DOS RAM plus 512K of EMS EXPANDED memory for its buffer space. It will also use the track allocation mode. We will also put the Flash Cache TABLES into AT EXTENDED memory.

```
C>FLASH 969/M=AT:374/M=C:85/M=E:510/@=B
```

NOTE: The /@=B command here forces you to use amounts that are even multiples of 17. Also Flash Cache's TABLES takes up 64K of AT EXTENDED memory. So make sure you have at least 438K of total AT EXTENDED memory when following the above example.

The following example will use 3 megabytes of EXTENDED memory. Flash Cache will put its buffer space AND program code AND TABLES into the EXTENDED memory. Flash Cache will also look for any HIGH-

DOS or UMBs that might be available. If UMBs or HIGH DOS is found Flash Cache will load its residency portion into it, thus taking less DOS memory.

```
C>FLASH 2992/M=A/@=B/C=A/C=U
```

The 2992K plus the 64K used by the /C=A option adds up to 3056K which is 16K short of 3 megabytes. Since the memory amounts assigned to Flash Cache should be even multiples of 17K it is quite possible that not every nook and cranny can be used, but no more than 16K will ever be wasted!

Flash Cache Short Command list

The following are a list of all useable Flash Cache Switches. Their full descriptions and syntaxes can be found in the pages to follow:

```
/A Activate / Gate A20 Monitor
/C Code Relocation
/D Deactivate
/E Show HI-PRI Used
/F FLUSH cache
/G Set Maximums
/H Turn HI-PRI on
/I Turn Drive Back On
/J Track Reads
/K Track Writes
/L Turn HI-PRI off
/M Select Memory Type
/N Check Writes
/O Turn Drive Off
/P Show HI-PRI list
/Q Load files as HI-PRI
/R Reset Statistics
/S Show Status
/T Write Protect Drive
/U Uninstall
/V Version / Visual Switch
/W Load / Clear HI-PRI list
/Y Turn Write Protect Off
/Z Cache Allocation
/[ Media Check For Removable Drives
/] No Media Check for Removable Drives
/! Don't Use Track Areas
/@ Use Track Memory Allocation
/2 Use EXTENDED Memory Faster 286's
/3 Use EXTENDED Memory Faster 386's
/{ Disable Delayed Write on Drive
/} Allow Delayed Write on Drive
```

TIPS FOR OPTIONS

Remember the phrase that pays, "KEEP IT SIMPLE". This applies to Flash Cache also because the less options you use, the less chance you have of misusing one. Flash Cache will typically get 90% of its speed by using the default settings. The other 10% are usually tweaked out by the other options.

The main options that you should study thoroughly are:

/M	Memory Type Select
/S	Various Status Screens
/U	Uninstall Flash Cache
/V	Visual Aid Switch
/!	Makes Flash Cache take up 8.5K less DOS RAM
/C=A,E,U	Makes Flash Cache as small as 4K
/@=B	Fast Block Mode
/K=Y,M	Disk Write enhancer

Options such as HI-PRI, BLOCK-LOAD, track reads should all be tested to see if the options gain you any additional speed.

For example: If you have an AT with 1024K of AT EXTENDED memory, all you would have to do is this "FLASH 1020/M=A/@=B/K=M".

If Flash Cache has troubles with your disk drive in detecting a disk change, run FSETUP.EXE and specify that drive. Then use the /[{DRIVE}] command when installing Flash Cache.

If you want delayed writes but don't want delayed writes on your floppies, use the /{A /{B command on the Flash Cache installation line.

Flash Cache Using Minimum DOS RAM

Flash Cache users, who want Flash Cache to take up as little of DOS memory as possible, can use four techniques to do so.

First, you can use the /! command to save you about 8.5K right off the top.

Second, if you are allocating more than 512K of Flash Cache buffer space, you can use the /@=B command.

Thirdly, you can tell Flash Cache to put its TABLES into AT EXTENDED memory or EMS EXPANDED memory. If you have a choice, use the AT memory instead of the EMS memory. This is because the AT memory for TABLES is faster.

Lastly, you can use the /C=A or /C=E options. These options will put MOST of the Flash Cache program and TABLES into AT EXTENDED memory or EMS EXPANDED memory.

For example: If you have 1024K of AT EXTENDED memory, you could install Flash Cache like so:

```
C>FLASH 952/M=AT/@=B/!
```

This tells Flash Cache to use 952K of AT EXTENDED memory for the buffer space of Flash Cache. In addition, the TABLES will go into AT memory. We will use the /@=B for smaller tables. The /! saves an 8.5K track read write area. The amount of memory saved by doing the above over doing the following:

C>FLASH 1024/M=A

This is about 32K of DOS RAM. Now that is a saving. However, you will not get the MAXIMUM performance from Flash Cache. Nevertheless, the difference might be slight enough in your applications to warrant the DOS savings.

Finally, the most optimum way to save DOS RAM usage by Flash Cache is to use the /C= option and the /! option together to produce the following:

C>FLASH 952/M=A/@=B/C=A/!

This only uses about 4K of DOS RAM memory! If you omit the /! option, 13K of DOS RAM will be used, with the added benefit of being able to use the /K=Y option which delays writes.

Non Standard Memory Usage

Some systems come with memory that cannot be accessed as AT EXTENDED memory or EMS EXPANDED memory. This memory for the most part is totally useless. In fact, the only use for it is probably a RAM DISK, with the RAM DISK software that came with the machine or add on board.

Some well-known examples of this memory are the AT&T 6300+ machines that have 384K of NON usable EXTENDED memory. In addition, the JRAM II boards are non-standard. Likewise, some clones come with a megabyte of memory of which 384K can ONLY be used as a RAM DISK.

Flash Cache can take advantage of these non-standard memories by using the /M=R{DRIVE} command. This command tells Flash Cache to use RAM DISK memory from a specified drive as the buffer space. Just make sure you set up your special RAM DISK software to use ALL of your special memory for the RAM DISK using 512 byte sector sizes. To do this you need a line in your CONFIG.SYS that looks something like this: "DEVICE=RAMDISK.SYS 384 512 /U". This is the example for the AT&T 6300+. It sets up a 384K RAM DISK in the upper memory using 512 byte sector sizes.

Then when you install Flash Cache you would specify the RAM DRIVE for the buffer space like so: "FLASH 376 /M=RD ". This tells Flash Cache to use 376K of RAM from the RAM DISK drive D: as the buffer space. The reason we did not use ALL 384K was that the directory information takes up a few K also.

Flash Cache Individual Switch definition

/A Activate / Gate A20 Monitor

Format 1: C>FLASH /A <RET> Default

Format 2: C>FLASH /A20=Y <RET>

Format 3: C>FLASH /A20=N <RET> Default

Purpose: To Re-Activate Flash Cache after a period of De-Activation by the /D option. It can also be used to monitor the state of the A20 line.

Tips: There is NO need to use this option if the /D option is never used! If you do not know what an A20 gate is then do not mess with this switch.

Description: It is necessary for Flash Cache to be active in order to speed up disk accesses. It may be necessary, however, to shut Flash Cache off temporarily. Example: You have a large database already in Flash Cache's memory and want to run another large program without

pushing the database out of the Flash Cache buffer. You may choose to De-Activate Flash Cache with the /D option. Remember to Re-Activate Flash Cache with the /A option after you are through running your large program. Most users will never use this option except for testing purposes.

Format 2, 3: Using the /A20=Y option will tell Flash Cache to monitor the state of the A20 gate line. The /A20=Y switch should be used on the installation line of Flash Cache. In this mode, Flash Cache will make sure that it does not change the state of the A20 line. This will slow Flash Cache down very slightly. If you use the /A20=N option, no monitoring will take place. This is the default mode. In this mode, Flash Cache will change the state of the A20 gate line to whatever makes Flash Cache happy.

/C Code Relocation

Format 1: C>FLASH /C=A <RET>

Format 2: C>FLASH /C=E <RET>

Format 3: C>FLASH /C=U <RET>

Purpose: Tells Flash Cache to relocate itself into either EXTENDED, EXPANDED memory or HIGH DOS memory, thus effectively reducing the amount of DOS memory used by Flash Cache. These options will make the Flash Cache program take only 13K. If you choose, you can use the /! option. This will reduce the DOS usage to ONLY 4K.

Tips: There is NO need to use this option unless you are having RAM CRAM. In other words, if you are NOT having a problem with too little DOS memory to load and run programs, there is NO NEED to use these options.

Description: These options are used on the INSTALLATION line of Flash Cache. If used AFTER Flash Cache is installed, they will be IGNORED. Typically Flash Cache takes about 29K of memory and the space required for the Flash Cache TABLES and the track read/write buffer. The space used by the tables grows with the size of the cache. For every megabyte of cache, the tables grow by 1.8K. The space used by the track read/write buffer is always 8.5K. By using the code relocation options, you can shrink the Flash Cache program and tables to 4K no matter how much memory you have allocated to the cache. You may not mix the /C=A or /C=E options with the /M=AT or /M=ET options. These options are mutually exclusive. The /C=A is designed to put Flash Cache's executable program code into EXTENDED memory. The /C=E is designed to put Flash Cache into EXPANDED memory.

Format 1: By using the /C=A option you will reduce the allowable cache size to 15 megabytes. The performance loss will be typically less than 1%. Probably too little to mention.

CAUTION: There is a situation that will cause this option to malfunction and lock-up. If a program that is interrupt (background) driven goes and interrupts Flash Cache and accesses EXTENDED memory, Flash Cache will probably lock-up. This is because Flash Cache is relocated into the first 64K of EXTENDED memory (HMA) and expects this memory to be visible while in the midst of doing Flash Cache routines. If the memory becomes invisible while in the middle of doing Flash Cache routines, Flash Cache will lock-up. Accessing EXTENDED memory typically makes the EXTENDED memory invisible. The only program that we know of to date that will cause this situation is listed below:

1. Spoolers using EXTENDED memory.

Examples: C>DLCACHE [1020/M=A/C=A/@=B](#)
C>FLASH 306/M=A/C=A/!

Format 2: By using the /C=E option you will reduce the allowable cache size to 15 megabytes. The performance loss will vary from system to system. Typically the loss will be around 3% on 386 machines, 2% on 10MHZ 8088 machines, 24% on 16MHZ 286 machines w/o the NEAT chip set, 2% on 20MHZ 286 machines with the NEAT chip set.

NOTE: If using the /C=E option and allocating more than 8 megabytes of RAM to the cache, be aware that a warning message may appear. If this warning message appears, you will be warned that the cache speed will be significantly reduced. As Flash Cache loads it determines if there are any EXPANDED memory mappable pages other than the standard four that are available. If others exist, Flash Cache will not print the error message and will operate at top speed, otherwise the error message will display and Flash Cache will run slower.

Format 3: By using the /C=U option you will instruct Flash Cache to load its residency portion into a HIGH DOS memory block. These blocks are referred to as UMBs. You may load Flash Cache high with the use of programs such as loadhi. If loadhi cannot find a big enough UMB, Flash Cache will not load high. The use of the /C=U accomplishes the same result as loading high except for the fact that it will NOT require as big of a UMB to be present. The /C=U may be used in conjunction with the /C=A or /C=E option for smaller UMB requirements.

/D Deactivate

Format: C>FLASH /D

Purpose: Tells Flash Cache to De-Activate itself and to NOT add anything to Flash Cache's buffer. This in turn makes it so that no data is pushed OUT of the buffer space of Flash Cache.

Tips: There is NO need to use this option unless you have a very limited amount of buffer space for Flash Cache and don't want certain programs to push data out of the Flash Cache buffers. This option is typically used only for testing purposes only.

Description: The /D option De-Activates Flash Cache. You must use the /A option to turn Flash Cache back on. If you do not do this Flash Cache will not be buffering any data and your application will not be sped up anymore.

/E Show HI-PRI Used

Format: C>FLASH /E <RET>

Purpose: To display the list of files that are loaded as HI-PRI from the HI-PRI list.

Tips: Only files that are specified with the /W=H can appear in the list.

/F FLUSH cache

Format 1: C>FLASH /F? <RET>

Format 2: C>FLASH /F{DRIVE} <RET>

Format 3: C>FLASH /F=Y <RET>

Format 4: C>FLASH /F=N <RET>

- Purpose:** To force Flash Cache to forget ALL information about ALL drives or just a specific drive. Can also be used to force delayed writes pending data to disk when a program uses the DOS COMMIT function.
- Tips:** Use this option when doing speed tests with Flash Cache. You can force Flash Cache to flush the contents of any drive before doing the speed test. This way you can guarantee that Flash Cache will not have any unfair advantage by already having disk data in memory!
- Description:** If you want to flush the contents of all drives that Flash Cache has control over, use the /F? command. If you just want to flush a specific drive then use the /F{DRIVE} command. For example to flush drive C:
- C>FLASH /FC <RET>
- It can also be used for getting rid of HI-PRI files that may be in the buffers of Flash Cache. This way the space carved out by the HI-PRI files can once again be used by Flash Cache for other files or other HI-PRI files. However, HI-PRI OTHER data will NOT be flushed out. This is to protect any data stored by the Flash Cache RAM-DISK, SPOOL-MASTER, Flash Cache- EMS, SHARE-EMS, SHARE-XMS or Flash Cache-Screen Scroll programs.
- Format 3:** This is the default mode. This tells Flash Cache to monitor the DOS COMMIT function that can be used by programs. If Flash Cache detects that a program calls the COMMIT function, Flash Cache will write out to disk ALL pending data in the cache. If you do not use delayed writes then this option serves no value.
- Format 4:** This tells Flash Cache to ignore any DOS COMMIT functions that programs may use. This mode may make your program run a little faster, but you take the risk of some data loss in case of a power failure or lock- up.

/G Set Maximums

- Format 1:** C>FLASH /G=S:{#} <RET>
Format 2: C>FLASH /G=H:{#} <RET>
- Purpose:** To set maximum values for certain Flash Cache functions.
- Tips:** There is NO need to use this option unless you want to limit the amount of memory that can be consumed by HI- PRI files or to set a limit on the number of files that can be remembered by /W=H.
- Description:** The /G=S:{#} is used to increase the amount of filename space that Flash Cache uses to remember HI-PRI files. The amount of memory that Flash Cache normally uses is 200 bytes. This is enough to hold about 10-20 filenames depending on the length of the names. If you need to hold more then use the following:
- C>FLASH /G=S:1024
- This will increase the space to 1024 bytes. This would be enough to hold about 50-100 filenames. You may allocate from 0 up to 2048 bytes.
- The /G=H:{#} is used to set the MAXIMUM amount of buffer space that can be consumed by HI-PRI memory. This can be useful so that not all of your memory will be consumed as HI-PRI. If all of your memory ends up as HI-PRI, there will be NO memory

left for regular disk caching! HI-PRI includes our FRAMDISK.SYS which is a dynamically allocating RAM-DISK. Our SPOOL-MASTER printer spooler also uses HI-PRI memory from Flash Cache. By setting a limit of HI-PRI, you are also setting a limit on HI-PRI OTHER.

/H Turn HI-PRI on

Format: C>FLASH /H <RET>

Purpose: This turns Flash Cache into HI-PRI mode. Any disk accesses are stored by Flash Cache as usual, but they are stored as HI-PRI.

Tips: It is not necessary to use this option unless you plan on placing your FAT and DIRECTORY information into Flash Cache as HI-PRI. Also, do not use this option unless you have allocated plenty of buffer space to Flash Cache. We suggest at least 512K of memory before using this option.

Description: Sometimes it is nice to have certain disk data as HI- PRI. Although you may specify certain files as HI-PRI, it is NOT possible to specify your directory information as a file. This is why we allow you this option. For example:

```
C>FLASH /H
C>CHKDSK
C>FLASH /L
```

This example will cause every disk access requested AFTER the /H command to be stored in Flash Cache as HI-PRI. The /L command puts Flash Cache back into normal mode. Placing the entire directory tree information into Flash Cache can be a bit of a waste. In order to specify which subdirectories get loaded, use the following example:

```
C>PATH=C:\DOS;\C:\UTIL;\C:\WORD;\123;\WHATEVER
C>FLASH /H
C>NOFILE
C>FLASH /L
```

This will cause DOS to search ALL of the PATH directories for the file called NOFILE. Since NOFILE probably will not be found, the only effect of this command is that ALL of the directories searched will now be placed into HI-PRI.

NOTE: The FLASH.EXE file itself is also loaded as HI- PRI since DOS does disk accesses to load the Flash Cache program before the /L can take effect.

/I Turn Drive Back On

Format 1: C>FLASH /I? <RET>

Format 2: C>FLASH /I{DRIVE,CD} <RET>

Purpose: Turns caching on for a drive after it had been turned off by the /O command.

Tips: There is NO need to use this option if /O command is never used!

Description: If you want to turn Flash Cache back on for ALL of your drives, use format1. If you want to turn Flash Cache back on for a specific drive, use this command. This command, when

used in conjunction with the /O command, can be useful when making speed tests which show how much Flash Cache can speed up a particular drive.

Notes: Stacker and SuperStor volumes are treated differently. They can be cached at the BIOS level or at the DOS device driver level. If they are buffered at the DOS Device level then the /I command does extra work. If the /I is for a Stacker volume, then ALL Stacker volumes will be turned off. The same is true for SuperStor volumes.

Notes: If you want to turn Flash Cache ON for your CD-ROM drive, use the command /ICD. This is the ONLY case where a two-letter drive is valid.

/J Track Reads

Format 1: C>FLASH /J=D <RET> Default

Format 2: C>FLASH /J=Y <RET>

Format 3: C>FLASH /J=N <RET>

Purpose: Tells Flash Cache when and when NOT to do tracks reads.

Tips: The default setting is the optimum setting for MOST programs. Do not use the /J=Y unless you have proven, through testing, that it will be faster than without it. The only way to know for sure is by testing. Usually the /J=D setting is the fastest mode of operation.

Description: Flash Cache, in the default mode (/J=D), will decide for itself if it should read in ONLY what DOS wants or if it should pre-read the rest of the track. By pre-reading a track, Flash Cache can improve the performance on programs that read files sequentially forwards or backwards. If you use the /J=N command, Flash Cache will NOT do any pre-reading. This may cause some programs to read sequential files slower. If you use the /J=Y command, Flash Cache will ALWAYS pre-read. This may cause programs that access data randomly to execute slower. If you have installed Flash Cache with the /! option, Flash Cache will default to /J=N. This is because the /! Option gets rid of the track read ahead buffer. Thus no track reads can be done.

/K Track Writes

Format 1: C>FLASH /K=N <RET> Default

Format 2: C>FLASH /K=Y <RET>

Format 3: C>FLASH /K=Y:# <RET>

Format 4: C>FLASH /K=F <RET>

Format 5: C>FLASH /K=M <RET>

Purpose: Tells Flash Cache whether or NOT to perform track writes.

Tips: Most disk writing can be sped up by specifying /K=Y or /K=M. If you notice that there is NO difference between /K=Y or /K=M and /K=N then use /K=N command.

Description: Using the /K=Y command tells Flash Cache NOT to write out data until a specified time delay has occurred. This can increase speed while reducing wear and tear on your drives. If Flash Cache detects a program exiting, it will write out the necessary data immediately. Also pressing CONTROL-ALT-DEL will cause Flash Cache to write out any data needed. Using FORMAT3 allows you to specify a delay between 0-9 seconds. For example:

C>FLASH /K=Y:5

This would tell Flash Cache to wait 5 seconds before writing the data to the disk. If you are using drives that are removable and the data was NOT written out before you changed disks, Flash Cache would prompt you to put back the old disk so that the data can be written to it. You should also be aware that if you are just sitting at a DOS PROMPT, no further delay is waited upon. The writes will occur immediately. This saves you time.

However, if the drive were not capable of detecting disk changes, i.e. 360K disk drives, the data would end up being written to the wrong diskette. So, make sure that you wait the full length of the delay before changing disks or turning the machine off. It should be noted that a power outage would cause loss of data too!

/K=M can be used if you are careful NOT to RE-BOOT your machine too quickly after updating files or exiting programs. The /K=M option will improve your performance even more than the /K=Y. The "M" means mixed mode of operation. Instead of writing out ALL data that is in the buffer after the delay time has been met, only a tiny bit of data is written at a time. This gives the program that is currently running more time to spend doing it's thing. The only danger here is that you may exit a program and see a DOS prompt and immediately press the RESET BUTTON. You must wait until you see NO disk activity for at least three full seconds!

NOTE: Using the /! command will force Flash Cache into the /K=N mode. This is because the /! command gets rid of the track write buffer area. The /K=F option works identical to the /K=Y option except that when writing to floppies NO VERIFICATION is performed. We don't suggest using this option unless you feel that the speed gained is worth it and that you have tested it long enough to know that with your particular drives and diskettes that NO errors will occur.

NOTE: You may notice that writes to floppies take longer with the /K=M. This is because Flash Cache is NOT writing all the data at once. It is writing little chunks at a time. This gives your application more time to do its thing, but make you wait longer for you floppy to be done writing.

NOTE: If there is an error in writing to disk AFTER the delay time has been met, you will get a Flash Cache error message indicating the drive that couldn't be written to. You will be prompted to (R)etry, (I)gnore, (A)bort. Always try the RETRY option first. If that fails to produce a good write, try the IGNORE option. Once you have ignored the write request, you should probably redo the operation that you were doing so that the files will be updated properly. This should never occur on a hard disk.

Once writing has completed to floppies, you will here a beep. This informs you that the writes have completed and you may take out your floppy and do with it as you wish.

If you are using communications programs, it is quite possible that you could lose some characters while the data is being written to disk. This is especially true for communication programs that do not have very good protocol.

/L Turn HI-PRI off

Format: C>FLASH /L <RET> Default

Purpose: Forces Flash Cache back into normal priority mode after using the /H command.

Tips: Use this option after you are done using the /H option. Otherwise, ALL of your Flash Cache buffers spaces will eventually be filled up with HI-PRI data. Most of which may never be accessed again. This will cause Flash Cache to lose performance.

/M Select Memory Type

EXAMPLES OF FLASH CACHE'S BUFFER SPACE USING ONLY ONE MEMORY TYPE

Format 1: C>FLASH 1020 /M=A <RET>
Format 2: C>FLASH 1020 /M=AT <RET>
Format 3: C>FLASH 1020 /M=AS\$1024 <RET>
Format 4: C>FLASH 1020 /M=AT\$1088 <RET>
Format 5: C>FLASH 1020 /M=E <RET>
Format 6: C>FLASH 1020 /M=ET <RET>
Format 7: C>FLASH 1020 /M=R{DRIVE} <RET>
Format 8: C>FLASH 1020 /M=\$\$D000 <RET>

EXAMPLES OF FLASH CACHE'S BUFFER SPACE USING MULTIPLE MEMORY TYPES

Format A: C>FLASH 768 /M=A:384 /M=E:384 <RET>
Format B: C>FLASH 768 /M=AT:384 <RET>
Format C: C>FLASH 768 /M=AS\$1024:384 <RET>
Format D: C>FLASH 768 /M=AT\$1088:384 <RET>
Format E: C>FLASH 768 /M=E:512 <RET>
Format F: C>FLASH 768 /M=ET:512 <RET>
Format G: C>FLASH 768 /M=R{DRIVE}:512 <RET>
Format H: C>FLASH 768 /M=\$\$D000:512 <RET>

Purpose: To tell Flash Cache where to put its buffer space and internal table space.

Tips: There are no special tips. Just make sure that you read the following description completely.

Description: Flash Cache will recognize XMS EXTENDED memory and use it before it uses regular EXTENDED memory.

Format 1: Use this if you want Flash Cache to use AT EXTENDED memory for its buffers.

Format 2: Same as above AND puts Flash Cache's internal TABLES into EXTENDED memory also. Keep in mind that Flash Cache's tables takes up the first 64K of AT EXTENDED memory (HMA)! You might want to consider the /C=A option instead of the /M=AT option, if you are trying to conserve DOS RAM usage.

Format 3: Use this if you want Flash Cache to use AT EXTENDED memory AND need Flash Cache to go into a specific address in EXTENDED memory. The number AFTER the "\$" is the address used to START Flash Cache's buffers in AT EXTENDED memory. This option is rarely used unless you have a program that tries to use the same space that Flash Cache is using in EXTENDED memory.

Format 4: Same as above and places the TABLES in EXTENDED memory. Keep in mind that Flash Cache's tables take up 64K of AT EXTENDED memory!

- Format 5: Tells Flash Cache to use EMS EXPANDED memory for its buffer space.
- Format 6: Same as above AND puts Flash Cache's TABLES into EMS EXPANDED memory. Keep in mind that Flash Cache's tables can take up to 64K of your EMS EXPANDED memory! You might want to consider the /C=E option instead of the /M=ET option, if you are trying to conserve DOS RAM usage.
- Format 7: Tells Flash Cache to use a RAM DRIVE of your choice for the buffer space of Flash Cache. This is handy for PC's with NON standard memory boards. Setup the memory as a RAM DRIVE and let Flash Cache access it through the RAM DRIVE.
- Format 8: Tells Flash Cache to use a specific starting segment of RAM for its buffer space. This option can only be used on machines with RAM at locations \$C000-\$E000. Very few PC's have this ability!
- Formats A-H: Show the use of the colon ":". If you have both AT EXTENDED memory and EMS EXPANDED memory that you would like Flash Cache to use, use the multiple memory allocation format. For example, if you wanted to have Flash Cache use 320K of AT EXTENDED memory and 512K of EMS EXPANDED memory and put Flash Cache's TABLES into EXTENDED memory, use the Flash Cache installation command below:

```
C>FLASH 832/M=AT:320/M=E:512
```

This is very straightforward. Make sure the total buffer size that you give Flash Cache is the total of ALL of the different memory types. If the size you tell Flash Cache is larger than the total, the remainder will be allocated from DOS memory. After installing, Flash Cache will use the memory in the order you specified. This way, you can control which memory is utilized first, second and so on. It is a good idea to put your fastest memory first!

/N Check Writes

- Format 1: C>FLASH /N=Y <RET> Default
- Format 2: C>FLASH /N=N <RET>
- Purpose: Tells Flash Cache whether or not it should check to see if the data about to be written is already on the disk. This is called the SMART WRITE option.
- Tips: Use the /N=N option if you are using AT EXTENDED memory and are using the /286=N option. Otherwise, the time needed to check will more than out way the speed gained. 386 machines do not have this deficiency. On 386 machines, use the /N=Y option at all times.
- Description: The /N=Y command is the default setting. Flash Cache checks to see if the write request should be physically written to disk or not. By checking the writes, speed improvements can be seen with data base applications. In other words, why bother writing the SAME data to a spot on the disk if the disk spot already has the same data on it.

/O Turn Drive Off

- Format 1: C>FLASH /O? <RET>
- Format 2: C>FLASH /O{DRIVE,CD} <RET>
- Purpose: Turns Flash Cache off for a specific drive.

- Tips:** You can use this command to turn Flash Cache off for a specific drive, when doing speed tests without having to UN-Install Flash Cache.
- Description:** You should use the /I{DRIVE} command to turn on Flash Cache for the drive after testing. If you use the /O? command, ALL drives will be turned off, including CD- ROM drives. Sometimes it is handy to use /OA and /OB to turn Flash Cache off for your floppy drives.
- Notes:** Stacker and SuperStor volumes are treated differently. They can be cached at the BIOS level or at the DOS device driver level. If they are buffered at the DOS Device level then the /O command does extra work. If the /O is for a Stacker volume, then ALL Stacker volumes will be turned off. The same is true for SuperStor volumes.
- Notes:** If you want to turn Flash Cache OFF for your CD-ROM drive use the command /OCD. This is the ONLY case where a two-letter drive is valid.

/P Show HI-PRI list

- Format:** C>FLASH /P <RET>
- Purpose:** Display contents of the HI-PRI file list and the BLOCK load file list.
- Tips:** There is NO need to use this option unless you have used the /W=H or /W=B command.
- Description:** After specifying a list of files to Flash Cache with the /W=H or /W=B commands, it may be necessary to review the list later. This command will display ALL files specified with the /W=H command and the /W=B command.

/Q Load files as HI-PRI

- Format 1:** C>FLASH /Q <RET>
- Format 2:** C>FLASH /Q <Flash Cache.PRE <RET>
- Purpose:** Pre-Loads Flash Cache with files as HI-PRI.
- Tips:** There is NO need to use this option if you do not care about using HI-PRI files. See the section on HI-PRI files.
- Description:** If you want Flash Cache to Pre-Load HI-PRI files, /Q will do the trick. After using the /Q command, Flash Cache will ask for filenames. It is necessary to specify the full drive, path, and filename for Flash Cache to load as HI-PRI. When finished, press return.
- You can put this command into your AUTOEXEC.BAT so that after your machine is booted, all the files requested will be loaded as HI-PRI. Too make this easier, we have provided the /Q <Flash Cache.PRE command. By using this command, Flash Cache will load a list of files from the Flash Cache.PRE file. The Flash Cache.PRE file actually contains a list of files you wish to have loaded as HI-PRI. For example:
- C:\DOS\DEBUG.EXE
C:\DOS\CHKDSK.COM
D:\123FILES\123.EXE
- Note:** There should be an extra blank line as the last line of the file. If not, the Flash Cache command will lock up.

/R Reset Statistics

Format: C>FLASH /R <RET>

Purpose: Resets Flash Cache's statistics.

Description: This is great for testing Flash Cache's ability to save disk accesses with various programs. All you have to do is use the /R command and the REAL and SAVED reads and writes in the Flash Cache status will be zeroed out. You can now run your next program and check what kind of statistics you get from it. This saves you from having to Uninstall Flash Cache and then Re-Installing Flash Cache.

/S Show Status

Format 1: C>FLASH /S <RET>

Format 2: C>FLASH /SM <RET>

Format 3: C>FLASH /SD <RET>

Format 4: C>FLASH /SP <RET>

Purpose: Displays Flash Cache's status screen.

Description: Using the /S command will display standard information about how much Flash Cache is speeding you up. It also shows what drives are being sped up too.

If you are curious about what parts of AT EXTENDED memory are being used for Flash Cache or how much FRAMDISK memory is used or where the Flash Cache TABLES are kept or whatever, you may use the /SM command.

The /SD option shows you technical information about the drives that Flash Cache is controlling.

The /SP option shows you your partition layout for each logical drive that is located on your hard disks.

/T Write Protect Drive

Format 1: C>FLASH /T? <RET>

Format 2: C>FLASH /T{DRIVE} <RET>

Purpose: Write protects a drive.

Tips: There is NO need to use this option.

Description: If you are afraid of some shareware programs writing onto your disk in a destroying capacity, you may wish to use the /T{DRIVE} command for your drive until you are through with the shareware program. If you use the /T? command, ALL of the drives under the control of Flash Cache will be protected.

Make sure to use the /Y{DRIVE} command when finished so that normal disk writing may occur for your programs.

/U Uninstall

Format: C>FLASH /U <RET>

Purpose: Uninstall Flash Cache and removes it from memory.

Description: Use this option if you are going to run an application that requires that Flash Cache not be running. For example: If a program requires a full 640K of RAM to run, it may be necessary to remove Flash Cache from memory first.

/V Version / Visual Switch

Format 1: C>FLASH /V <RET>
Format 2: C>FLASH /V=N <RET> Default
Format 3: C>FLASH /V=Y <RET>

Purpose: The /V command will display version information about Flash Cache. It can also be used to display a visual indicator that Flash Cache is currently doing something.

Tips: Use the /V=Y to create a RED BLOCK visual indicator in the upper left hand corner of your screen to show when Flash Cache is being used by a program.

Description: The /V command will display what version of Flash Cache you are currently using. It tells you the last date of update.

If you use the /V=Y command, even accesses to your Flash Cache FRAMDISK will be indicated by a Flash Cacheing "O". It is nice to see some indication that something is happening instead of maybe nothing. Without this indicator, it could appear that your machine was locked-up when in fact Flash Cache was just saving you several disk accesses. In addition, delayed track writes are indicated by a Flash Cacheing "W" in the upper left corner of the screen.

NOTE: To change the placement to the upper right corner of your screen, use the FSETUP program provided and choose menu option 5.

/W Load / Clear HI-PRI list

Format 1: C>FLASH /W=C <RET>
Format 2: C>FLASH /W=H <Flash Cache.HI <RET>

Purpose: Gives Flash Cache a list of files to watch for to be loaded as HI-PRI. You may also clear the HI-PRI list so that a new file list may be loaded with the command /W=C.

Tips: There is NO need to use this option unless using HI-PRI files.

Description: Using the /W=H command is like the /Q command. There is one very BIG difference however. It is necessary to make sure that NO path is specified. This is different than the /Q command which REQUIRES it. After the file list is fed into Flash Cache, Flash Cache monitors what files are being accessed. If perchance a file specified is being accessed, it is loaded, in its entirety, into Flash Cache's memory as HI-PRI.

This is a delayed effect compared to the /Q command which loads the file immediately.

The /W=C command clears out the HI-PRI and BLOCK-LOAD list so that a new list may be input.

NOTE: If you installed Flash Cache with the `/!` option, the `/W` command will be ignored. This is because the `/!` option gets rid of the track read ahead buffer. The `/W` command uses this area.

/Y Turn Write Protect Off

Format 1: `C>FLASH /Y? <RET>`

Format 2: `C>FLASH /Y{DRIVE} <RET>`

Purpose: Turns off the write protect for a drive.

Tips: There is NO need to use this option unless you used the `/T{DRIVE}` command.

Description: Under normal circumstances, it is necessary to make sure that Flash Cache is able to write to a drive. So, after you are done write protecting a drive, use this command to turn the write protect off. For example:

`C>FLASH /YC`

This turns write protect off for drive C. Using the `/Y?` command will turn off write protect for all drives.

/Z Cache Allocation

Format 1: `C>FLASH 1020 /M=E /@=B /Z=U <RET>`

Format 2: `C>FLASH 1020 /M=A /@=B /Z=D <RET>`

Format 3: `C>FLASH 1020 /M=A /@=B /Z=N <RET>` Default

Purpose: This option tells Flash Cache how to allocate HIPRI-OTHER memory for the Flash Cache RAM-DISK and SPOOL-MASTER. The default is "N" for normal.

Tips: There is NO need to use this option UNLESS you plan to use SHARE-EMS, SHARE-XMS, SHARE-ALL or have EXTENDED memory. Of which is part fast and part slow and want to make sure the cache has the fastest memory and the Flash Cache RAM-DISK and SPOOL-MASTER to have the slowest memory.

Description: If you have EMS 4.0 memory available, the optimum way to use Flash Cache is to give ALL of your EXPANDED memory to Flash Cache and use SHARE-EMS. At the same time you should install Flash Cache with the `/Z=U` option. Likewise, if you have XMS Memory 2.0 available, give ALL of your EXTENDED memory to Flash Cache and use SHARE-XMS. This forces the Flash Cache RAM-DISK and SPOOL-MASTER to borrow memory from the bottom of the cache. This leaves the top of the cache free to resize itself downward when other programs such as Lotus 123 need to use EXPANDED memory. If the top of the cache were to contain data from the Flash Cache RAM-DISK or SPOOL-MASTER, Flash Cache would not be able to resize itself smaller to accommodate the EXPANDED memory request from other applications.

If you have EXTENDED memory that is split between FAST on board system memory and SLOW memory in a card slot, you can use the `/Z=D` option. This will force the Flash Cache RAM-DISK and SPOOL-MASTER programs to borrow from the top of the cache which will typically be the slower memory. This leaves the FASTER memory always available to the caching of disk data.

NOTE: By using the /Z=U or the /Z=D option, you are directing Flash Cache to put the Flash Cache RAM-DISK and SPOOL- MASTER into predetermined places in the cache buffer. If the cache buffer area that is about to be used by the Flash Cache RAM-DISK or SPOOL-MASTER is already occupied by HIPRI STICKY files, it will be overwritten. This means that it is possible that some files that you might expect to always be retrieved from the cache will have to go to disk to retrieve them. This slight performance penalty is outweighed by the memory sharing capabilities.

/Z=N is the default setting. This setting makes NO distinction between what part of memory to store any kind of data. Flash Cache will follow a modified LRU algorithm and any STICKY files will be kept in tact.

/[Media Check for Removable Drives

Format: C>FLASH /[{DRIVE} <RET>

Purpose: Tells Flash Cache to ask DOS if a disk has been changed instead of comparing directory entries. This is the faster and preferred method.

Tips: There is NO need to use this option for your floppy drives.

Description: It is necessary for Flash Cache to detect disk changes on the drives that are sped up by Flash Cache. If you are using 3.5 inch drives or 1.2M 5.25 inch drives, Flash Cache checks the disk change status from the drive. This means Flash Cache knows even when you pop a disk out. If you are speeding up a REMOVABLE cartridge disk system then use the /[{DRIVE} command for the drive to tell Flash Cache to ask DOS if a disk was changed. It is faster and more reliable. For example, if you have a PC AT with drive F: being a 20 megabyte REMOVABLE hard disk, use the command:

C>FLASH /F

This tells Flash Cache to ask DOS if a disk was changed for the drive F: during disk accesses.

NOTE: Any drive that was specified in the FSETUP program to be accessed by Flash Cache at the DOS DEVICE driver level will, by default, have the /[option performed on it.

/] No Media Check for Removable Drives

Format: C>FLASH /]{DRIVE} <RET>

Purpose: Tells Flash Cache to revert to checking the Root directory for detecting disk changes.

Description: This command undoes the effect of the /[{DRIVE} command.

/! Don't Use Track Areas

Format 1: C>FLASH /! <RET>

Purpose: Eliminates track buffers so Flash Cache uses up less DOS RAM.

Tips: Use this option if you are short on DOS RAM.

Description: Using the `#!/` command deletes the track write buffer area and makes the `/K=Y` option useless. The `#!/` command also gets rid of the track read ahead buffer and makes the `/J=Y` and `/J=D` commands useless. The `#!/` command also makes the loading of HI-PRI files, using the `/W` command, useless. This is because the track read ahead buffer is used to load in the HI-PRI files.

NOTE: This command can only be used on the installation command line for Flash Cache. If used AFTER Flash Cache has been loaded as a TSR, it will be ignored.

/@ Use Track Memory Allocation

Format 1: `C>FLASH 1020/M=A/@=B/286 <RET>`
Format 2: `C>FLASH 1020/M=A/@=N/286 <RET>`

Purpose: Tells Flash Cache to use track memory allocation. See section on memory allocation style.

Tips: Do not use this option unless you are allocating more than 512K of RAM. This is for performance reasons.

Description: Using the `/@=B` or `/@=N` command requires that the amount of memory specified be in even 17K increments. You might need a calculator to figure out the right amounts. However, it is worth the effort, because Flash Cache will take up LESS DOS RAM and RUN FASTER.

Using the `/@=B` command also allows you to allocate up to 32 megabytes of RAM for disk caching! The `/@=N` is the same as the `/@=B` except in one respect. The `/@=N` does NOT allow BLOCK memory moves when possible. This is so that high-speed communications will not lose characters when doing a large BLOCK move in AT EXTENDED memory.

We have tested Flash Cache in EXTENDED memory using BLOCK moves with communications software running at 2400 baud with no problems.

/2 Use EXTENDED Memory Faster 286's

Format 1: `C>FLASH 512/M=A/286 <RET>`
Format 2: `C>FLASH /286=N <RET>`
Format 3: `C>FLASH /286=Y <RET>`

Purpose: Tells Flash Cache to utilize AT EXTENDED memory much faster. By doing so, Flash Cache bypasses the BIOS.

Tips: Do not use this option unless you think Flash Cache is not properly setting the `/286` option itself. Flash Cache will automatically set the `/286` option to what it thinks is the optimum setting. For testing purposes or performance comparisons, you may wish to use this option.

Description: The `/286` or `/286=Y` option speeds up AT EXTENDED memory access. Flash Cache will handle the EXTENDED memory moves itself. If the `/286` option appears to work fine for most programs but causes a few to give "PACKED FILE CORRUPT", try to make sure you have at least 64K worth of DOS + DEVICE DRIVERS + TSRs installed. Otherwise for these programs we have provided the `/A20=Y` option.

The /286=N option forces Flash Cache to use the BIOS INT 15 function to move EXTENDED memory around. This is slower than letting Flash Cache move the memory itself.

/3 Use EXTENDED Memory Faster 386's

Format 1: C>FLASH 512/M=A/386 <RET>

Format 2: C>FLASH /386=N <RET>

Format 3: C>FLASH /386=Y <RET>

Purpose: Tells Flash Cache to utilize AT EXTENDED memory much faster. By doing so, Flash Cache bypasses the BIOS.

Tips: Do not use this option unless you think Flash Cache is not properly setting the /386 option itself. Flash Cache will automatically set the /386 option to what it thinks is the optimum setting. For testing purposes or performance comparisons, you may wish to use this option.

Description: This option speeds up AT EXTENDED memory access. If the /386 option appears to work fine for most programs but causes a few to give "PACKED FILE CORRUPT", try to make sure you have at least 64K worth of DOS + DEVICE DRIVERS + TSRs installed. Otherwise for these programs we have provided the /A20=Y option.

The /386=N option forces Flash Cache to use the BIOS INT 15 function to move EXTENDED memory around. This is slower than letting Flash Cache move the memory itself.

/ { Disable Delayed Write on Drive

Format 1: C>FLASH 512/M=A/{ A <RET>

Format 2: C>FLASH /{ A/{ B <RET>

Format 3: C>FLASH /{ ? <RET>

Purpose: Tells Flash Cache to not allow delayed writes to a specific drive. This is a way you can utilize delayed writes for all of your drives except drives you specify.

Tips: Do not use this option unless you are using delayed writes. See the /K command.

Description: This option removes the ability for delayed writes for specific drives. This can be handy if you like delayed writes for most of your drives but wished that a delayed writes were disable for other drives. Format1 show that you can use it on the installation line of Flash Cache. Format2 shows that you can disable delayed writes for multiple drives in a single command. Format3 shows that you can disable delayed writes for ALL of your drives in one command.

/ } Allow Delayed Write on Drive

Format 1: C>FLASH / } A/ } B <RET>

Format 2: C>FLASH / } ? <RET>

Purpose: Tells Flash Cache to go ahead and allow delayed writes to a specific drive. This is a way you can turn delayed writes off and then back on again for specific drives.

Tips: Do not use this option unless you are using delayed writes. See the /K command.

Description: This option allows the ability for delayed writes for specific drives. This command is used typically after you have used the `/f` command for a drive and you are through with the operation that you didn't want delayed writes on for. Format2 shows that you can re-enable delayed writes for multiple drives in a single command. Format2 shows that you can re-enable delayed writes for ALL of your drives in one command.