

64/256K SILICON DISC

The 64/256K silicon discs are designed to be used with at least one normal disc drive attached. Data can be transferred onto the silicon disc from a normal disc. Application programs can then work on the data at vastly increased speed, especially on systems with only one normal drive. Support Software is contained in an expansion ROM.

The Silicon Disc is compatible with all DK'tronics peripherals.

There are two environments in which to use the silicon disc:-

- 1) From BASIC under AMSDOS.
- 2) Within CP/M

**1) From BASIC:**

When the silicon disc is activated it will find out if there is a B drive or not. Using this information, the silicon disc is implemented as drive B or C. If there are two normal drives then an extra command 'IC' is added. The silicon disc can then be accessed by logging on the drive by using 'IB' or 'IC'. Alternatively specifying the drive letter in a file name will have the same effect. The silicon disc will react as would normal Amstrad disc drives.

At the start of a session using the computer, the data can be transferred to the silicon disc drive using the external command 'ILOADDISC'. When this data is updated it can be stored on the normal disc using the 'ISAVEDISC' command.

Once the silicon disc has been initialised it accepts all the normal AMSDOS commands, (LOAD,SAVE,CAT and disc files etc).

Even when the computer is reset (except by switching off the power) the contents of the silicon disc are kept intact. This means that it is possible to use CP/M and BASIC programs on the same data files without having to continually change discs.

**2) From CP/M :**

The utility ISETDISC will write a COM file on a copy of your CP/M system disc. This program when called from CP/M will implement an additional drive as drive B or C. Using the SETUP program you can get this program to run whenever you boot into CP/M.

Once the drive is implemented, CP/M will treat it like the normal drive(s). Data can be transferred to and from the silicon disc via the PIP utility as normal.

The silicon disc is especially useful for single drive CP/M systems as the disc containing the program is often nearly full and needs to stay in the drive. The silicon disc offers a cheap second drive for serious business applications.

CP/M is a registered trademark of Digital Research Inc.

**64K Silicon disc**

This is available to 6128 users without the need for further expansion as it utilises the second 64K of banked RAM, which is fitted as standard, as a Ram Disc.

464/664 users will need to fit the DK'tronics 64K RAM pack.

The 64K silicon disc operating system cannot be used with CP/M PLUS because they would both be trying to use the second 64K of memory.

**SILICON DISC MANUAL****WARNING**

Ensure that the power to your Amstrad computer is switched OFF before you fit the Silicon Disc to the expansion socket. Failure to comply with these instructions may cause permanent damage to the device or the computer.

**4.1 Installation**

This manual covers two versions of the silicon disc, the 64K and the 256K.

The software in ROM is compatible with the CPC 464/664 and 6128 computers. All programs in this manual have been designed to run on the CPC 464 where the CPC 664/6128 are UPWARD compatible. You may however wish to use the extra features of the BASIC 1.1 machines.

The 64K silicon disc is contained in one unit (Operating system ROM), while the 256K silicon disc is in two units (256K RAM and Operating system ROM).

Power down the computer and fit the Silicon Disc unit(s) onto the rear of your Amstrad. On the CPC 464 this socket is labelled 'Floppy Disc', on the CPC 664/6128 it is labelled 'Expansion'.

The Silicon Disc will only work in conjunction with the normal disc system. On the CPC 464 the FDI-1 MUST be fitted. Other expansions may be fitted into the expansion socket on the rear of the Silicon Disc, now switch on the computer.

The computer should power up as normal. If it fails to do so, check that all the connections are correctly made. Note that all DK'tronics products have a key location on the connector to ensure that there can be no alignment problems. OTHER interfaces may not use this keyway (the Amstrad disc interface is the most familiar example). Hence any connection problems will usually lie between the Silicon Disc and these expansions. If this is the case, try reconnecting the interfaces BEFORE inserting the Silicon Disc onto the expansion slot. This will give you a better view when lining up the pins.

If the computer DOES fail to power up due to misalignment problems the monitor may cut out the power to the computer until the MONITOR is switched off. This is not due to overload but is safety device built into the monitor to protect the computer and interfaces. On the colour monitor just switch the MONITOR off, reconnect the units as above, then switch on again. The monochrome monitor will have to remain switched off for quite a few seconds before the reset is cleared. Reconnect as above, wait for a few seconds, then switch the monitor back on.

It is very unlikely that the computer (CPC 664/6128) will fail to power up with the Silicon disc alone. If this is the case, then the fault will probably lie with the Silicon Disc. \* Return the Unit to DK'tronics if this is the case.

\* IT IS ESSENTIAL THAT YOU COMPLETE YOUR WARRANTY REGISTRATION CARD AND RETURN IT TO US IMMEDIATELY UPON PURCHASING THIS PRODUCT FROM YOUR DEALER (UK ONLY).

**4.2 FIRST STEPS**

When the computer is powered up the ROM should sign itself on as:-

```
'Silicon Disc 0.1' (for use with 64K BANKED RAM)
'Silicon Disc 1.1' (for use with 256K BANKED RAM)
```

The silicon disc requires a store of 450 bytes which are taken from the memory store before BASIC is entered. The Amstrad disc ROM must set up all the disc commands before the Silicon disc is started and so trying to access the silicon disc now will give an error of drive not present.

Type 'ISDISC' and the computer will implement the silicon drive.

Once the Silicon disc has been called an additional drive will be available to the system:-

```
On a single drive system the drive is 'B'
On a dual drive system there is a new drive 'C'
```

Try typing 'IB;CAT' or 'IC;CAT'.

All the commands which are normally used in BASIC for the standard drives now apply also to the silicon disc. The only difference you should notice is the difference in access time for files and programs.

When the computer is first switched on the Silicon Disc is empty. The catalog shows that there is 62/254K free. With 2K for the directory that's 64/256K!

Obviously that is not a lot of good, you want to put programs onto the silicon disc and take them off. There are two commands which allow bulk data to be moved from a normal disc (Drive A) to the silicon disc and vice-versa:-

```

ILOADDISC Move normal disc's contents to silicon disc
ISAVEDISC Put data back onto a normal disc

```

The first command might be used at the start of a programming session to move all your data to the silicon drive. The second would be used at the end to move all the data back to a normal disc. (Remember the contents of the silicon disc are lost if the computer is switched off!.)

The 'ILOADDISC' command transfers ALL the files from the normal disc to the Silicon disc. With a maximum size of 178K you will never fill the 256K Silicon Disc from a normal disc. However if you try to transfer more than 62K of data from the normal disc to the 64k Silicon Disc then the system will lock up.

The 'ISAVEDISC' command also transfers all the files from the Silicon Disc to the normal disc but will not work if there is too much data on the silicon disc. Some BAK files etc will have to be removed first. If you wish to selectively save files it is best to use PIP in CP/M.

Note that both the ILOADDISC and ISAVEDISC commands use BASIC memory to store the disc catalog so that the transfer is completed as fast as possible. This means that BASIC programs are lost. Hence both commands are best used before or after a programming session.

Remember also that each disc copy will REPLACE the original contents of the drive you're copying to even if no files are present on the disc being copied. The 'ISDISC' command must be issued after using the 'ILOADDISC', 'ISAVEDISC' commands if you want to continue using the Silicon drive.

Once the silicon disc has some programs on it, these can be loaded simply by using the standard LOAD and SAVE commands. Try loading some of your long programs from normal disc and then Silicon Disc to see the increase in speed.

The ILOADDISC and ISAVEDISC commands automatically check whether you mind the BASIC area being used. If you respond with 'n' then they will abort back to BASIC, otherwise they will carry on. If, however, you add an optional parameter of 1 then the check will not be made and the commands will take action straight away.

The ISAVEDISC command can also take a parameter of 2 which tells it to save all files onto a normal disc except the COM files. This is useful if you have too much data on the silicon disc so that it would fill the normal disc. You may not mind losing copies of your COM files as these are often stored seperately on your system, disc.

### 4.3 COMPATIBILITY

BASIC programs using:-

```

SAVE, LOAD, MERGE, CHAIN, RUN", CHAIN MERGE, CAT, OPENIN, OPENOUT,
CLOSEIN, CLOSEOUT, INPUT #9, PRINT #9, LINE INPUT #9, WRITE #9,
LIST #9, EOF

```

will function as normal. If the program was written to access only drive A then it will need to be altered to allow for drive B or C. Alternatively the drive letter could be specified:-

eg SAVE"C:PROGRAM1,BAS" or RUN"B:DEMO"

All the standard external commands as supplied with AMSDOS will function:-

```

IA, IB, IC (dual drive only), IDISC (.IN and .OUT),
ITAPE (.IN and .OUT), ICPM, IDIR, IDRIVE, IERA, IREN, IUSER

```

Typing IC or IB will set the silicon disc as default and all the above commands will function on the silicon disc unless the drive letter is specified.

The Silicon Disc will activate the Amstrad's error trapping if this is set up and the error number returned by DERR and ERR are the same.

Some errors cannot occur on the Silicon Disc:-

DERR = 149; Disc changed with files open

```

and Drive; disc missing
      Drive; disc is write protected
      Drive; read fail
      Drive; write fail

```

The silicon disc cannot be removed, so there is no problem with logging the disc on or writing files to it. Because the disc is RAM there can be no read or write errors. The normal disc drives will issue all the error messages that it normally does.

The command ITAPE will switch in the tape unit as normal; IDISC will switch both the normal disc dirve(s) and the silicon disc back in.

The filenames are identical for both normal and silicon drives. The system will default to .BAS or .BIN extensions where applicable, also .\$\$\$ files are created before files are closed and .BAK files for one level backup.

**4.4 USING YOUR SILICON DISC IN CP/M 2.2**

Before the silicon disc can be used under CP/M, the silicon disc program needs to be stored on a copy of your system disc. With the computer just powered up, and a copy of your system disc in drive A, if you have not already got a copy of your system disc to use then make a copy as described in Amstrad's manual:-

Type 'ISETCPM' and press <ENTER>

The computer will write a file onto the system disc called 'SDISC.COM'

Enter CP/M by typing 'ICPM' then press the <ENTER> key.

When the 'A>' prompt appears, type 'MOVCPM 176 #' and press the <ENTER> key then type in 'SYSGEN #' and press the <ENTER> key.

This will move the top of CP/M down so that there is some spare memory for the program to use. This change will not affect the majority of your programs as the amount of memory used is so small. However the Amstrad DISCOPY, COPYDISC and other programs use the whole of the memory so it is best to keep an unaltered system disc for when you want to copy discs. The use of PIP is not affected so it is probably best to use PIP (LOADDISC and ISAVEDISC) in conjunction with the Silicon disc when you want to copy discs.

If you now type 'SDISC', the computer will start up with the Silicon disc. You do not need to type MOVCPM and SYSGEN every time, just SDISC. The Silicon disc can be set to automatically start when you boot CPM:-

Type 'SETUP' and press <ENTER>

The first question SETUP will ask is to set up the initial command buffer. Select 'n' option so that you can change the start up buffer. Now enter 'SDISC#M' the 'M' will cause the computer to type the SDISC command whenever CPM is entered. Answer 'y' to all the other questions and 'y' to altering the system disc. Note that the 'M' key is located on the same key as the 'E' key.

The system disc is now finished. Try Resetting and booting CPM to see how it works.

Once SDISC has been activated, an extra drive will be available as drive B or C depending on whether you have a second normal drive.

All the standard CPM programs will now use the silicon disc if you specify the silicon drive's letter.

**4.4.1 USING YOUR SILICON DISC IN CP/M PLUS**

**NOTE** that the 64K Silicon Disc cannot be used under CP/M PLUS because there will be a conflicting access to the banked RAM.

Before the 256K Silicon disc can be used under CP/M PLUS a patch to the early morning start-up file (.ems) is required. This will support a RAM drive as C:. The following steps are necessary:-

- 1) Create a new disc with a copy of the .ems file
- 2) From BASIC type in 'ISETCPMPLUS' then press <ENTER>. This will place a copy of the patcher.com file onto the disc.
- 3) Boot CP/M PLUS using this disc in drive A; The new disc must have at least 25K free !.
- 4) Immediately following the A> type 'patcher' then press <ENTER>. The patcher program will now create a new version of the .ems file erasing the old copy at the same time.
- 5) Reboot CP/M plus using this new file. The silicon disc will now log on automatically as drive C:.

The capacity of this disc will be one of the following :-

- a) 190K - if only a 256K DK'tronics memory expansion is available.
- b) 254K - if only the DK'tronics silicon disc RAM is available.  
(compatible with current CP/M 2.2 version)
- c) 444K - If both the DK'tronics 256K memory expansion and the silicon disc are available.

The new .ems file automatically works out how much extra RAM you have on the system and configures it accordingly.

The RAM disc directory is automatically initialised to contain no files the first time this new .ems file is run. However, if the files have been placed in the RAM disc on a previous occasion, the directory is not formatted, assuming the computer has not been switched off. This allows you to enter CP/M 2.2 or AMSDOS and then return to CP/M PLUS with your files still present in drive C:.

**4.5 ADVANCED NOTES**

Both under AMSDOS and CPM the individual file's write disable and system status are complied with.

The use of the silicon disc from machine code can be easily implemented by using FAR calls to the external commands and by using the cassette calls as documented in the Amstrad manual. All the interfaces are the same so existing software should run fine. The external commands which read and write to specific sectors, format and move the head on the normal two drives (CTRLA to CTRLD) will not function on the silicon drive and in fact may issue an error message that the drive is not present. Any direct reading and writing can be done by bank switching the 64/256K of memory into the main memory map 16K at a time.

The 16K memory block is switched in and out of the main memory map, (16384 to 32767), by sending the appropriate code to the port location &7F00.

There are 4 banks of 16K for the 64k banked RAM and 16 banks of 16K for the 256K banked RAM. The numbers to send to the port are as follows:-

**64K Silicon Disc**

196, 197, 198, 199

Therefore if you wish to select a bank you would use the following :-

OUT &7F00, ( BANK + 196 )                    where BANK has a value of 0 - 3

**256K Silicon Disc**

228, 229, 230, 231, 236, 237, 238, 239, 244, 245, 246, 247, 252, 253, 254, 255

There is a simple formula to calculate the correct value for the bank you want:-

VALUE=228+(BANK AND 3)+8\*(BANK/4)                    where BANK is 0 - 15

Therefore if you wish to select a bank you would use the following :-

OUT &7F00, VALUE

To restore the original 16K block VALUE would be set to 192.

The first bank holds the catalog and the first 14 blocks of 1K.