

2 Cassette Datacorder

Loading and operating the cassette datacorder system

Subjects covered in this chapter:

- * Similarities and differences between data and audio cassettes
- * Loading and running programs from cassette
 - the Welcome tape
- * The optional cassette data speeds
- * Saving programs onto cassette
- * Read errors

The CPC464 memory is only able to store data as long as the power is connected to the computer - and the unit itself is switched on - in computer terminology it is a 'volatile' storage medium . If you want to store programs or data when the power is switched off - then this must be stored onto the cassette (or other 'non-volatile' storage medium - such as the optional disk system).

2.1 Cassette controls

At the right hand end of the keyboard unit you will find the cassette datacorder -figure 2.1. The mechanics of this cassette mechanism are essentially the same as those of an audio cassette system - except that the electronics that control the signals are specifically optimised for use with computer data storage systems.

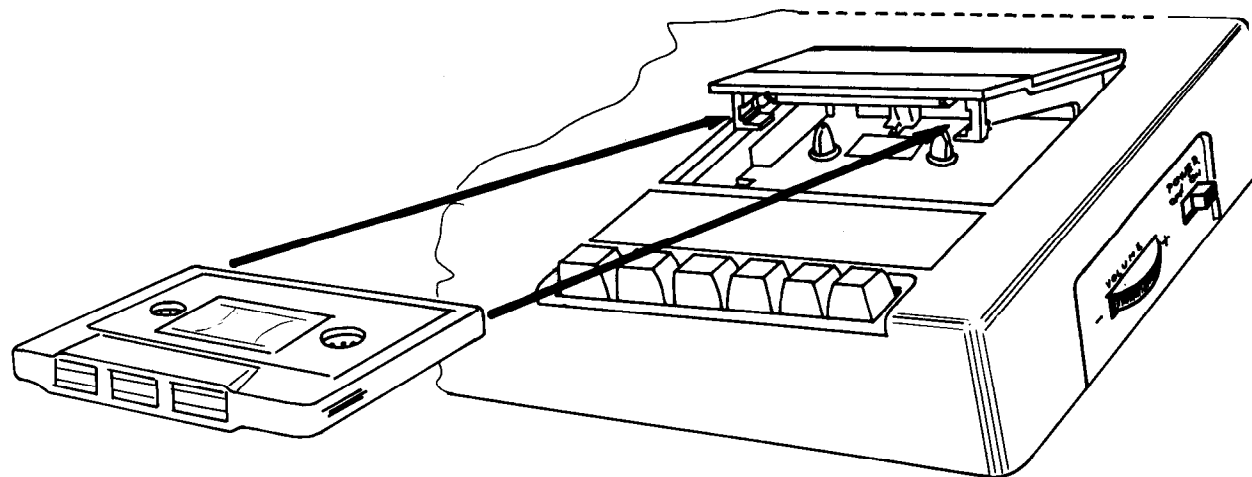


Figure 2.1 The right way to insert a cassette into the Datacorder

Similarly, operation of the auxillary keyboard for the cassette datacorder is the same as for most types of audio cassette recorder:

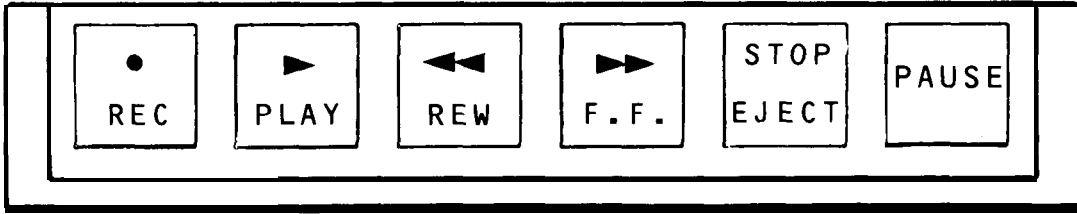


Figure 2.2 The CPC464 Datacorder controls

Note that these control keys require to be pressed considerably harder than the keys on the main 'typewriter-style' keyboard.

[REC] = **[REC]**ord (operates simultaneously with **[PLAY]** to record data when instructed by the program to do so). It can not be activated unless a cassette with the 'record protect' tab (see figure 2.2) is placed in the machine, and the door shut. To activate the function, you must press **[REC]** - and then whilst holding down the **[REC]** key, press the **[PLAY]** key. The computer will then write data onto the cassette when instructed to do so by the program currently in the memory -or by a direct **SAVE** command entered from the keyboard.

[PLAY] = **[PLAY]** the tape to either **L O A D** or **R U N** a program from the cassette system. The computer will then read data from the cassette when instructed to do so by the program currently in the memory - or by a direct command entered from the keyboard. Both the **[REC]** and **[PLAY]** keys are reset by a mechanical trip in the mechanism when the cassette tape reaches its end.

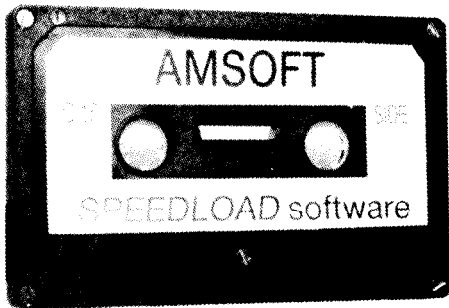
[REW] = **[REW]**ind the tape from the right hand spool to the left hand spool. There is no mechanical cancellation of this function at the tape end, so you should not leave the machine running in rewind mode or the tape drive motor may overheat when stalled.

[F.F.] = Fast Forward will advance the tape rapidly, winding from the left hand spool to the right hand spool. There is no mechanical cancellation of this function at the tape end, so you should not leave the machine running in fast forward mode or the tape drive motor may overheat when stalled.

[STOP/EJECT] = Stop any current cassette operation, and reset all the cassette operation keys to the original state. If the key is released and then pressed again, the cassette lid will open, allowing a cassette to be either removed or inserted as required. The cassette cannot be taken out until the operation of the drive has ceased.

[PAUSE] = A mechanical pause operating in conjunction with the **[PLAY]** or **[REC]** and **[PLAY]** keys. It should not be used to pause during either a data read or data write operation, or an error will occur. All pauses during play and record operations are handled by internal instructions in the CPC464 software, leaving the mechanical pause facility largely unused.

2.2 Write protect (figure 2.3)



In order to prevent accidental erasure of data that you wish to keep on cassette, a mechanical interlock tab is provided on all standard compact cassettes. This tab may be removed by snapping it off using a small pair of pliers etc. whereupon you will be unable to depress the **[REC]** key with the 'write protected' cassette in the drive.

The write protect feature applies individually to EACH SIDE of the cassette -so in order to protect both sides of the cassette, both of the tabs must be removed. If you subsequently wish to re-enable the facility to record on a cassette that has been protected in this way, then you can cover the depression in the cassette housing created by removal of the tab using a piece of self adhesive tape pulled taught across the opening.

2.3 Loading the cassette

Figure 2.1 illustrates the correct way to fit a cassette into the machine, using the tape supplied with your CPC464.

The cassette should be fully rewound (from the right hand to the left hand spool) -so if it is not, press the **[REW]** key until the motor stalls at the tape end. If the tape is accidentally looped out of the aperture on the front of the cassette, then you should rewind the tape into the body of the cassette before inserting into the cassette machine or the cassette tape and the information stored on it may be lost.

Please note that whilst it is possible to use cassette tapes on audio systems that have suffered various forms of abuse leading to creases and other damage to the tape surface - it is not possible to maltreat a computer data recording in the same way and still expect it to continue to work reliably.

For example, if you damage a tape by trapping a stray loop in the cassette door etc., but find that you are still able to load or run the program from it, you should immediately re-S A V E the program on a fresh undamaged tape (while the program is safe in the CPC464 memory), and throw the damaged tape away before you are tempted to try and re-use it.

2.4 Running the Welcome tape

The tape supplied with the CPC464 contains a number of demonstrations of the sound and graphics capabilities of the computer and its built-in software - the **AMSTRAD BASIC**, and the Machine Operating System. (**MOS**)

Part of the function of the machine operating system is the cassette operating software itself, which includes a series of brief commands that read and write data and programs on to the tape. The most frequently encountered are the **LO A D** and **R U N** commands.

To make operation of the computer as simple as possible, the CPC464 includes a number of special functions that simplify the keyboard entry until you've had some practice with the keyboard. If you have switched the computer on and are looking at the 'wake up' screen message, with the computer prompting you with the word:

Ready

Insert the tape as shown (figure 2.1), reset the tape counter to 000 by pressing the small button alongside the tape counter window, and press the control **[CTRL]** key and then whilst still holding this key down, press the small **[ENTER]** key at the bottom right-hand corner of the number-only keypad. You will be prompted by the message:

RUN"

Press PLAY then any key:

For your information, this is an example of the expansion token, first encountered in the **KEY** command briefly introduced in Chapter 1, where the computer is instructed to perform a complete command sequence using a shorthand form of keyboard entry to speed up simple and frequently required instruction sequences.

You could have typed in the **R U N "** instruction - and then pressed the **[ENTER]** key, but it is easier to use just 2 keystrokes to achieve the same results.

For most purposes, the two **[ENTER]** keys perform the same task - but there are circumstances where the smaller of the two keys can be altered (redefined) to some other operation using instructions from programs. The subject of 'User Defined Keys' will be covered in more detail later on.

The **[PLAY]** key you are being prompted to press is the key on the cassette drive mechanism. Press it now until it 'latches' and stays down. The part of the prompt message that asks you 'press any key' is a commonly used phrase in computing that can mislead the unwary. It is used to simplify sequences that instruct a program to get on with the next operation by avoiding the need for further specific instruction keywords.

It would be more correct to say 'press any key - other than the **[SHIFT][CAPS LOCK][CTRL][ESC]** keys (or any of the keys on the cassette sub-panel)' - but all computers inevitably have to make certain assumptions in the interests of simplicity. Wherever the term 'press any key' occurs in this user guide (or in

programs supplied by **AMSOFT** and other vendors), assume the exceptions outlined above still apply.

The key you press will not result in a character appearing on the screen, it will simply cause the tape motor to start playing the tape. If the tape does not start - press another key (it's a good habit to use the large **[ENTER]** key) and check that the **[PAUSE]** key has not been accidentally pressed down.

If you type more than one key, the computer will discard any other keystrokes once it has started to load the program.

Note that you have not specified any particular program name. As long as nothing else occurs on the same line immediately after the

RUN"

instruction, the computer will search for the first program it can find on the tape, and start to load it. When the computer has found the first correctly recorded program on the tape, the following message will appear:

Loadi ng WELCOME 1 block 1

This advises you that the computer has located the first of a series of blocks of the program entitled 'Welcome 1'. Each program is saved on the tape in the form of blocks of data (up to 2kbytes long) that are read into the computer - each data block is separately identified on the tape, and the message on the screen advises you of the current block being read. After each block of data, the tape pauses momentarily, and then starts again - shortly after restarting, the message 'updates' to include the block number presently being read.

If at any time the computer detects bad data, it will display an error message (listed in Appendix VIII) that advises the nature of the problem. It is not generally possible to do anything other than attempt to run the program again until it loads without an error.

Assuming that your tape is loading, read the instructions on the screen, and your Welcome tape will do the rest..

2.5 Supersafe and Speedload

The CPC464 offers two speeds to the user: a Supersafe speed of 1000 baud (bits of data per second), and a Speedload rate of 2000 baud. The Speedload rate thus writes and reads data at twice the Supersafe rate, although it sacrifices the safety margin sometimes required to account for inconsistencies in low cost tapes and the errors that can arise from the different alignment of tape heads in different recorders.

For programs saved and loaded on the same machine, the Speedload rate should prove to be acceptably reliable using reasonable quality tapes. Speedload will also be capable of loading most commercial software tapes directly without errors - although AMSTRAD advise that all such software be recorded using the option of both speeds.

The computer automatically sets itself to read the rate at which the tape has been recorded. When **S A V E** ing a program, you need to instruct the computer if you wish to use the Speedload rate, or it will default to the Supersafe speed.

To select the higher rate to save your programs and data, check you are in direct mode (the **R e a d y** prompt displayed), and type:

SPEED WRITE 1

to return to the default speed, you can either reset the computer (in which case all data will be lost, or you can type (at the **R e a d y** prompt):

SPEED WRITE 0

2.6 Saving programs and data on the cassette

BASIC has several commands that are concerned with the way in which data is written onto the cassette. They are summarised briefly here, together with examples.

2.6.1 **SAVE " <file name> "**

The most straightforward method of saving data onto the cassette is to use the command **SAVE** when the CPC464 is displaying the Ready prompt after executing or listing a program. Using the example of a brief program that lists the displayable characters discussed in Chapter 1 as the object of our **S A V E** command.

The **<file name>** can be any combination of 16 keyboard characters (including spaces). If you try to enter a longer name, the 17th and subsequent characters will be discarded. With the program in the computer's memory, type:

SAVE "CHARACTERS"

The computer responds with the prompt message:

Press REC and PLAY then any key:

Remember the qualification of the term 'any key', the tape will start and the computer will save the program under the filename **C H A R A C T E R S**.

IMPORTANT

Note that the computer cannot detect whether or not you have actually pressed the correct cassette keys - so if you only press **[PLAY]**, the tape will start and the program will appear to be saved when it is not.

BEWARE: If you accidentally press **[REC]** and **[PLAY]** when you want to read/load in a program from tape, then you will erase whatever programs exist on the cassette. If uninterrupted by pressing the **[ESC]** key, the tape will wind through to the end and be completely erased since the tape will not have been halted by the computer finding the program it was searching for. If you are anxious to avoid losing data in this way, get in to the habit of using the snap-off write protect tabs on the cassette casing before you remind yourself the hard way.

There are four ways in which files may be S A V E d by the CPC464. You have just seen the most general method, but there are three alternative formats for more specialised purposes.

2. 6. 2 S A V E " <filename> ", A

The procedure is the same as above, except that the suffix ,A instructs the computer to save the program or data in the form of an ASCII text file, rather than the shorthand notation the computer uses by default.

This method of saving data applies to files created by wordprocessors and other applications programs, and its use will be further discussed as applications are encountered.

2. 6. 3 S A V E " <filename> ", P

The , P tells the computer to protect (scramble) the data on the cassette so that the program cannot easily be read by anyone R U Nning it from cassette and then stopping its execution using the [ESC] key function. Programs saved in this way can only be recalled using the R U N or C H A I N commands. If you anticipate wanting to edit or alter the program, you should also keep a copy for yourself in unprotected form.

2. 6. 4 S A V E " <filename> ", B, <start address, <length> [, <entry point>]

This option allows you to perform a binary save where a complete block of the data stored in the computer's RAM is stored onto the cassette exactly as it occurs in the internal memory. It is necessary to instruct the computer where the section of memory you need to save starts, how long it is, and the memory address at which to start execution if the file is to R U N as a program.

This binary save feature allows data from a screen display to be stored directly onto the cassette in the form of a screen dump. One of it's main uses is to build 'title' sequences for long programs - breaking the monotony of a lengthy loading process.

2. 6. 5 Unnamed files and CAT

If you S A V E a file without giving it a file name:

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SAVE ""
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then BASIC will save it as an U n n a m e d f i l e. The cassette can save as **many** files of the same name (including unnamed files) as can be fitted onto a tape one after another, unlike a disk system which requires each entry to have a unique name.

You will quickly lose track of your programs if you don't give them names that will remind you of their content - and you are advised to add some date code to the name so that you can tell which are the most recent updates of your programs and data files.

You can *C A* Talogue the contents of a cassette by entering the command *C AT*, and following the instructions:

Press PLAY then any key:

BASIC will now list the contents of the tape, returning all file **names** as UPPER CASE, followed by the number of blocks present, and then a single character that tells you what sort of file it is:

\$ is a standard BASIC program

% is a protected BASIC program

***** is an ASCII text file

& is a binary file

An **O k** at the end of the line indicates that file is readable, and would have loaded had the computer been requested to do so. Performing the *C AT* function will not affect the program currently in the computer's memory..

2.7 Read errors

If you get the message displayed that a **Read e r r o r** has **occured** while the CPC464 has been *trying to* load a program or data from the cassette, then the tape will continue to play, and the computer will continue to read the blocks that it finds after the error - except that it will not attempt to **L O A D** them unless they are identified as being block 1 of the program it first tried to load (unsuccessfully).

This means that after a read error, you can stop the tape using the cassette **[STOP/EJECT]** key, **[REW]**ind the tape to the beginning, and press **[PLAY]** again. The computer will then have another try at loading the program in which it found the read error - and with luck, this time you will be successful.

Read errors arise from a number of causes - the most common of which is accidental damage to the cassette tape through creasing, stretching or other afflictions of the recording surface. They can also arise from the apparently innocent **practise** of switching off the computer whilst the cassette **[PLAY]** key or the **[REC]** and **[PLAY]** keys are still pressed down.

This is because when the key is pressed down, the tape is held up against the tape head, and a brief pulse of electricity can pass through this record/replay head as the power supply discharges itself. Even though the tape itself has remained static -this 'switch off pulse' (and also the switch on pulse) can effectively scramble the information in that part of the tape, and make it unreadable. Furthermore, the stationary tape is held tightly between the capstan and pinch roller, which, if greatly prolonged, can lead to tape creasing.

Read errors can also occur if the tape was **[PAUSE]**d during the record or play **process, or if it has** been originally recorded on another CPC464 where the **tape** heads are incorrectly aligned.

Read errors will also arise from time to time for purely arbitrary reasons. The compact cassette was not originally designed as a medium for data storage, and as such it has several shortcomings that set it apart from the more complex and considerably more costly 'professional' tape storage systems.

Notwithstanding this, the cassette has performed an excellent job of providing a standard 'medium' for low cost computer data storage and retrieval. The limitations of the physical characteristics of the size of the magnetic particles on the tape surface, coupled with the speed at which the tape passes the head places a finite limitation on the rate at which data will transfer between tape and computer. To attempt to push speeds beyond the upper tolerance of the system will cause unreliable operation - particularly with mass cassette duplication methods used for manufacturing low cost software.

NOTE that cassettes containing programs from other types of computer cannot be read or loaded on the CPC464. They may look the same - they may even make similar 'sounds' if played through an audio cassette playback system - but they will not load and run. If you do find any that appear to load and run - then we would be pleased to hear from you giving details of the computer type and program concerned.

2.8 Cassette considerations

Although the Datacorder will happily accept all types of cassette up to **C90**, you should only use **C12** (6 minutes per side) and **C30** at the most. Programs stored at the end of long cassettes are hard to locate unless you are prepared to wait for them to be found (and you can remember the filename you gave them), or you are meticulous about using the tape counter in your indexing system (ie in the file name). If you want to overwrite a program stored on a long cassette, then you must be careful to locate the start point, and take care that you do not overwrite any other program that you may wish to keep.

Overall, use each separate cassette for as few programs as possible. **C12** cassettes are relatively cheap - and should you damage the tape for any reason, it's considerably less tempting to want to save a cassette which is 'good in parts'.

Finally, please remember that commercial software is nearly always supplied under strict conditions of copyright. You should not attempt to copy or otherwise duplicate software supplied on cassette other than in accordance with the terms of sale of that software (some programs actually encourage you to make backup copies) - even if it's 'only for a friend'. The laws of copyright are being revised to deal with all forms of unauthorised software duplication, and although there have been few prosecutions to date, this situation will change substantially over the next few years, and may be retrospectively enforceable.