

**MEMOTECH**  
**CFX**SYSTEM  
**OPERATOR'S**  
**MANUAL**

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## Introduction

CFX is an add-on card for the Memotech MTX range of computers, designed to provide removable storage for Memotech owners who do not have one of Memotech's disk drive add-ons. The name is derived from the removable media used, **Compact Flash**.

CFX is fitted with a system extension ROM which allows access to the fitted Compact Flash card in 2 ways :

- CFX can provide a limited CPM 2.2 environment this is based on Andy Key's reverse engineering of the original Memotech FDX ROM. However unlike the FDX or REMEMOrizer, there is no additional video hardware. Instead, a 62 column display is created using narrow characters in the MTX's graphics mode, in a similar way to Andy's SCPM ROM used in Memotech Video Walls. Whilst it's not recommended for long term use, it does have much faster loading times for those games available in COM format.

or

- It can provide extensions to the built in BASIC via the USER command as used by the SDX system, and again, is based on Andy's re-creation of the source code for that ROM.

On start-up a boot screen is displayed showing a reminder of the various boot options provided :



```
Memotech MTX                               CFX SYSTEM
OK RAM                                       Build 132
Compact Flash File System                   11 Oct 2015
Searching for boot drive:
Drive not found

Other boot options:
Reset C      - CPM mode
Reset M      - MTX mode
Reset Space  - start Magrom if fitted

Press <RET> to enter SDX BASIC
Press <I> for more information
```

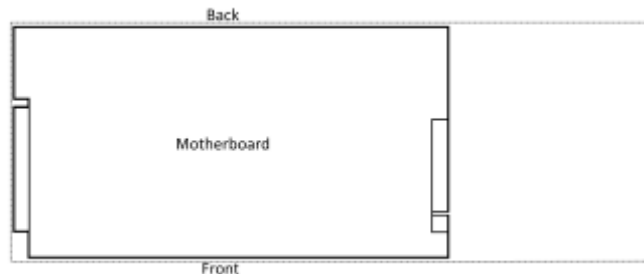
Holding down relevant key when the system is powered on or reset will enter the associated mode as shown. Pressing **<RET>** when the boot screen is displayed will enter SDX BASIC mode, or pressing **<I>** will display a crib sheet showing SDX BASIC USER disk commands

```
SDX Basic additional commands:
USER DIR
USER LOAD "FILENAME.EXT"
USER SAVE "FILENAME.EXT"
USER READ "FILENAME.EXT",start
USER WRITE "FILENAME.EXT",start,length
USER MTX "FILENAME.MTX"
USER RUN "FILENAME.RUN"
USER ERA "FILENAME.EXT"
USER REN "NEWNAME.EXT"="OLDNAME.EXT"
USER COPY "NEWFILE.EXT"="OLDFILE.EXT"
USER STAT "<drive>:" or "FILENAME.EXT"
USER OPEN#channel,"FILENAME.EXT",type
USER CLOSE#channel
USER KILL#channel
USER PRINT#channel,variable list
USER INPUT#channel,variable list
USER LINE INPUT#channel,variable
USER REC#channel,record number
USER EOF#channel,line number
USER TYPE "FILENAME.EXT"
USER QUIT (perform a NEW)
ROM 5 (reset the CF)
Press <RET> to continue into SDX Basic
```

## Installation

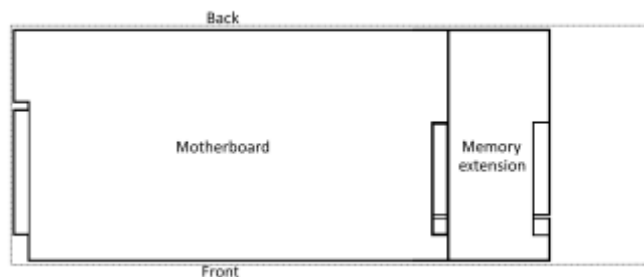
CFX has been designed to connect to either the MTX Cartridge Port (J10) or the internal edge connector (J0), the default configuration is for external mounting.

This sketch, reproduced from the FDX manual, although not dimensioned, is pretty much to scale; the dotted outline shows the size of the MTX case in relation to the motherboard. The area to the right of the motherboard was intended for Memotech's expansion cards - initially, RAM, ROM and the RS-232/FDX Interface boards.



Each of these boards was half the width of the expansion card area, i.e., up to two expansion cards could be installed internally. (A combined 80-column/RS-232 board, taking up the full width of the expansion card area was released later but is not relevant to this discussion, since it was meant to support Memotech's own disk based CP/M add-on using a disk interface connected to the cartridge port on the left hand side of the case. If you have one of those, you probably don't need CFX.

The most common expansion card seen is the RAM extension card, due, in no small part, to Memotech's common practice of selling an "MTX512" that was made up of an MTX500 motherboard with an additional RAM board fitted with the extra 32kB of memory.

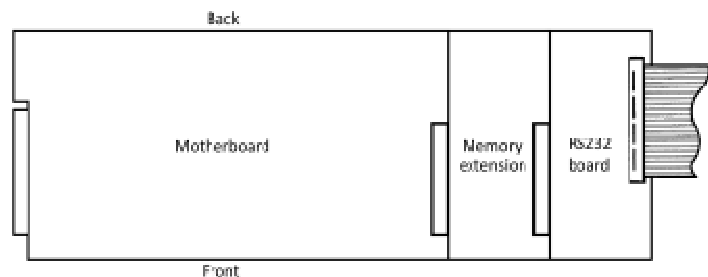


I expect that this was due to Memotech having a surplus of MTX500 boards when the MTX512 was released. This wasn't normally a problem unless the user wanted to install more than 1 additional board - at least until the 80 column board was released when MTX owners could get a nasty shock when opening up the case to try and fit it!

It may not be clear from the sketch, but the RAM (and ROM) boards had an edge connector plug on the left and the right hand side had a pass through board edge connector to allow a second card to be plugged into it.

To allow one of my expansion cards (CFX or MAGROM) to be installed internally by as many MTX owners are possible, the cards need to be no wider than one of Memotech's expansion boards, i.e., ~80mm.

However, the situation is complicated by the RS232/FDX Interface board shown fitted in this sketch. For clarity, the SM1 bus interface cable is shown going off to the right but in practice, it was folded back on itself and exited the case at the rear.



This board does not have the MTX bus pass through connector and must be installed to the right hand side of the motherboard or other board.

This creates a potential issue for prospective CFX users who's MTXs already have an internal expansion card fitted, either by accident (Memotech installed), or design (user installed). Obviously, if two boards are already fitted, then CFX can only be fitted externally, and if no boards are fitted internally, then CFX can be used either internally or externally.

Where a single board is already fitted internally, the type of board dictates whether CFX can also be installed internally. If the existing expansion board is a ROM or RAM board, then CFX can be installed alongside it, however, if the board is an RS232/FDX Interface board, then, CFX must be installed externally as neither board has a pass-through connector. I did consider trying to include a composite connector at the right hand side of the CFX board that could accept an edge connector plug for external use and also have a pass through board edge connector for internal use but decided that the effort involved was not warranted given the very small number of people who would need it.

The table below shows the compatibility matrix for CFX, MAGROM and REMEMOrizer with MTX computers :-

Compatibility Matrix		Internal (1)		External (2)		
		CFX	MAG	CFX	MAG	REM
<b>Internal Devices</b>						
Motherboard only						
MTX Memory	(ROM/RAM)	3	3			
MTX RS232	(RS232)					4
CFX	(CFX)					
MAGROM	(MAG)					5
<b>External Devices</b>						
CFX	(CFX)					
MAGROM	(MAG)					
REMEMOrizer	(REM)		5			
<b>Notes :</b>						
1	Limited to a maximum of 2 internal boards (only 1 non-Memotech					
2	Limited to a maximum of 1 external board					
3	The additional board must be installed in "Slot" 2					
4	The RS-232 board requires a replacement PAL (available with					
5	<a href="#">MAGROM requires some patch wiring</a>					



## Preparation

Check that you have all of the parts, you should have received :

### CFX PCB

(The PCB shown here has edge connectors for both internal and external installation)



### Compact Flash Reader

+

### Compact Flash Card



### IDE Extension Cable (Optional Extra)

If the CFX PCB is to be mounted inside the MTX and IDE extension cable is required.

If there will only a single expansion board inside the MTX, the CF Reader may also be fitted inside the case, otherwise, the cable will need to exit the rear of the MTX case.



## External Mounting

Fit the Compact Flash Reader to the PCB header pins as shown

Insert the Compact Flash card into the reader

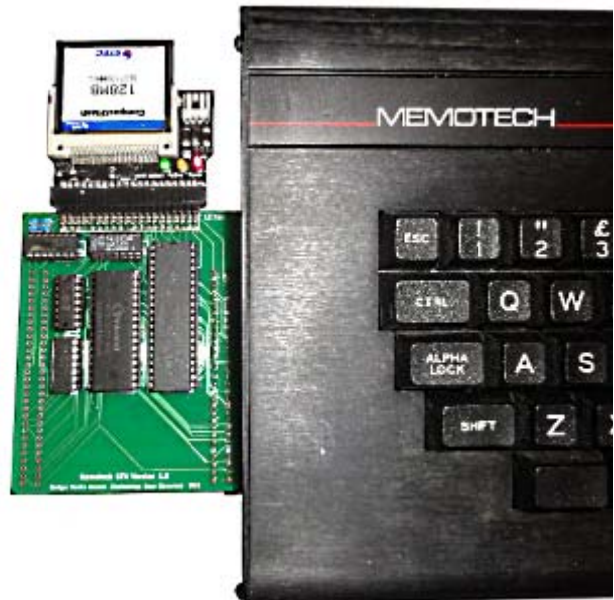


**\*\*\* Turn OFF the MTX \*\*\***

*The MTX and/or the CFX card may be damaged if the PCB is installed or removed with power applied*

## Fit the CFX PCB

Connect CFX to the MTX and apply power, you should see the CFX Boot Screen and hear the CFX “Welcome” tone.



If you do not see the CFX Boot Screen, power off the system and check that the PCB has been correctly mated with the edge connector and that the CF Reader and Card are installed correctly.

If you still do not see the CFX Boot Screen, please contact your supplier.

## Internal Mounting

Requires an additional MTX Edge Connector fitted to the CFX PCB and an IDE extension cable.

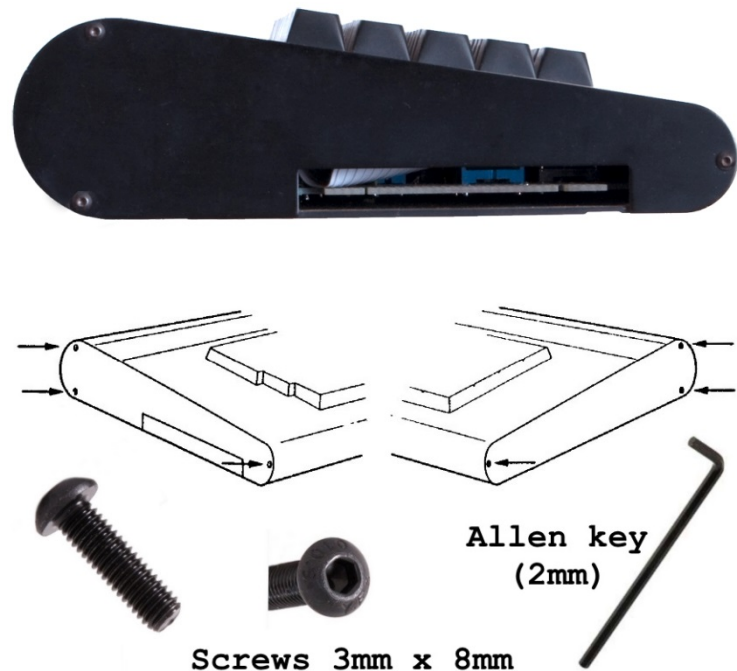
**\*\*\* Turn OFF the MTX \*\*\***

***The MTX and/or the CFX card may be damaged if the PCB is installed or removed with power applied***

The two halves of the MTX case are secured by six, 3mm socket head machine screws, three through each end plate.

The front edges of the two halves of the case have interlocking profiles that allow the keyboard to be swung upwards like a hinge.

Using a 2mm Allen key, remove the three screws from the right and left hand sides of the MTX.



Lift the MTX keyboard at the rear, just above the plastic panel, taking care not to put strain on the keyboard interconnecting cable



This photo shows a ribbon cable attached to the MTX computer board and to the left hand side of the keyboard.

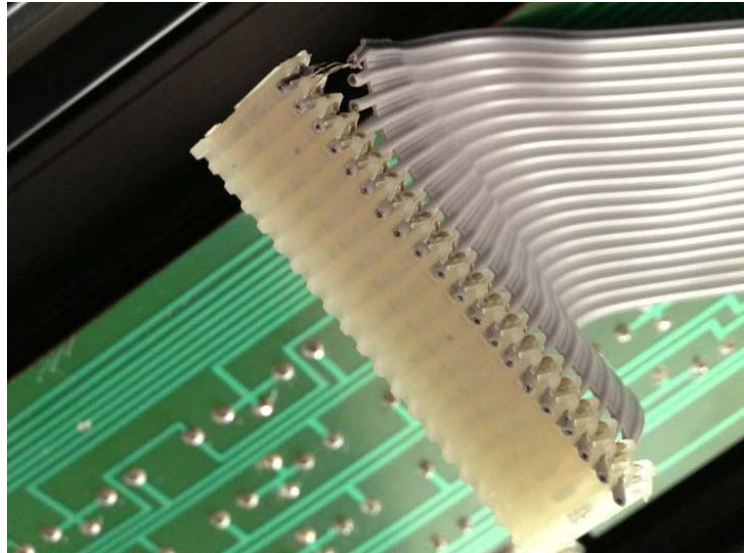
This cable is not the original MTX one, the Memotech cable is shorter and you will not be able to raise the keyboard to the same extent as in this photo without disconnecting the cable first.





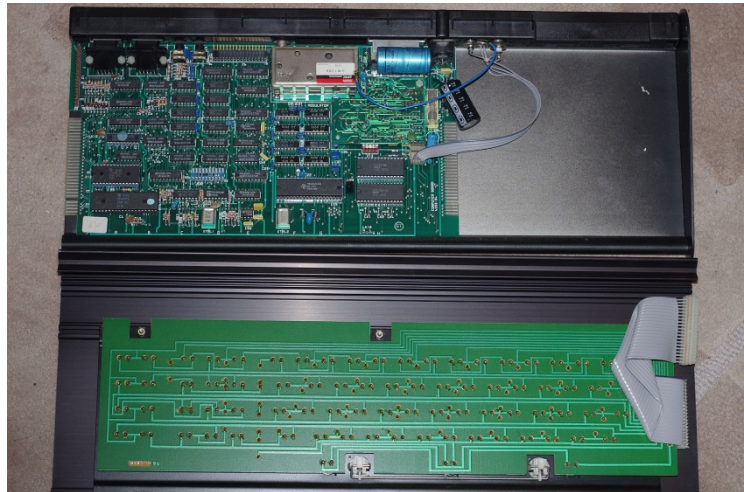
Gently ease the keyboard interconnecting cable from the mother board connector, always using the connector - do not pull on the ribbon cable.

The photo shows the type of cable damage that can result if care is not taken in opening the case or disconnecting the keyboard cable.



After the cable has been disconnected from the computer board, the keyboard is released from the base by sliding it completely to the left or right, leaving the MTX in two halves as shown here.

The right hand side of the computer board is very close to the AV connectors and has an overhanging capacitor as shown.



Fit the IDE extension cable to the CFX Pin Header, Pin 1 of the header is at the right hand side.

Carefully attach the CFX board to the MTX computer board edge connector. Take care not to break the AV ribbon that connects to the rear panel it is very fragile!

You may need to slightly reposition the black capacitor that overhangs the computer board PCB.



The CF Card Reader will sit on the base of the MTX, to ensure that there is no short circuits when the system is in use, insulate the base of the case - in this example, I have used insulation tape.

Fold the ribbon cable at 45° and place the CF Reader on top of the insulated area of the case.

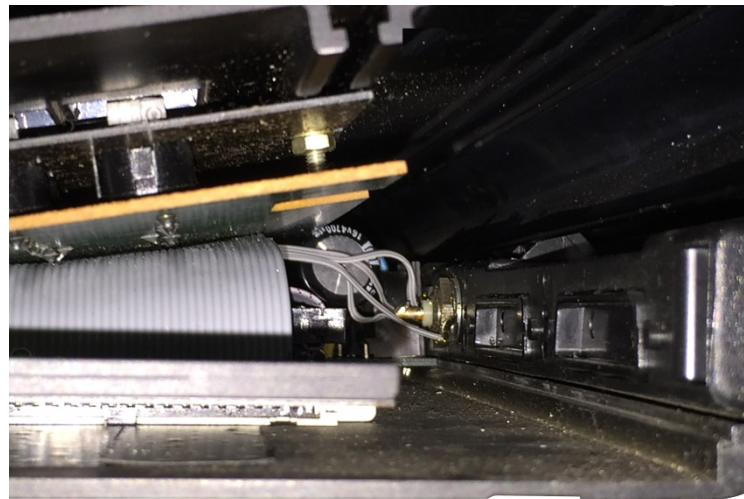
You may wish to secure the card reader with double sided tape under the IDE connector, but it should not be necessary.



Slide the keyboard back onto the base and carefully close the case, making sure that the capacitor and AV cable are not trapped or squeezed by the keyboard PCB.

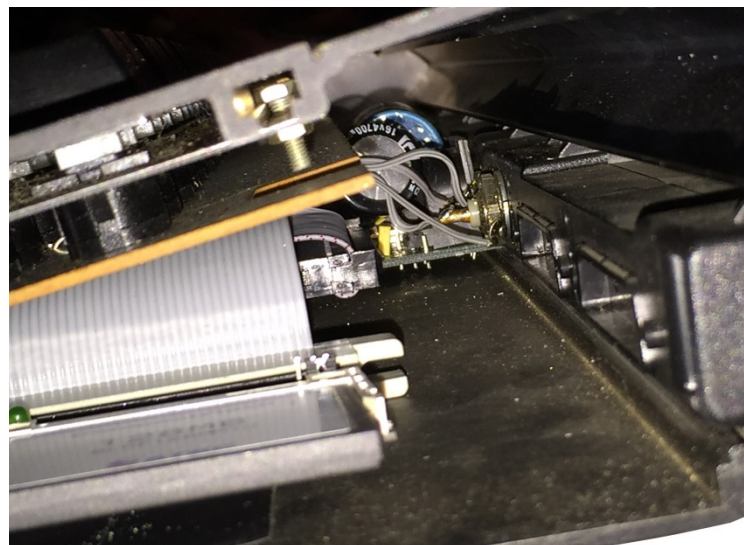
Look in through the right hand end and recheck the clearance.

In this photo, the capacitor is positioned too far towards the rear of the case and is being stressed by the keyboard.



The capacitor has been repositioned slightly, just enough so that it is not being compressed by the keyboard PCB.

**NB** : If it is not possible to make enough room for the CFX PCB without risking damaging the capacitor, you should replace the capacitor, ensuring that you leave long enough leads (insulated with heat-shrink) to allow it to be positioned away from the base of the keyboard PCB.



You should check that CFX is working properly before closing up the case.

Apply power, you should see the CFX Boot Screen and hear the CFX “Welcome” tone.

**If you do not see the CFX Boot Screen, power off the system and check that the PCB has been correctly mated with the edge connector and that the CF Reader and Card are installed correctly.**

**If you still do not see the CFX Boot Screen, please contact your supplier.**



## CFX CPM

The CPM ROM requires a minimum of 64k of RAM fitted, it will fail to operate if used on an unexpanded MTX500.

Resetting the system with the “C” key pressed will boot into a full version of CPM 2.2. There are obvious limitations because of the restricted resolution and clarity of the display. As this is a full implementation, all the usual utilities and commands are available.

**DIR**, **ERA**, **TYPE** and **REN** work in the same way as their SDX cousins, though of course, the **USER** prefix is not required. The CPM version of **STAT** has more options than the SDX version.

Any games that are available in the COM format can be started from the command line by simply typing the name and hitting enter. Only the first part of the name is required, the full stop and COM should be omitted.

The CF card can have a maximum of 8 partitions of 8 megabytes each, of which any 4 can be used concurrently. In addition there is a support for a RAM drive if systems have sufficient memory

2 additional utilities written by Andy for the REMOrizer can be used to set up and access the partitions.

### RECONFIG

This should be followed by a drive:partition list e.g.,

**RECONFIG B:18 C:19 F:52**

Which would set up 2 partitions for access as drives B and C, along with a 320k RAM drive.

Drives “B” to “E” are valid for the CFX, as are partitions 18, 19, 1A, 1B, 1C, 1D, 1E and 1F. Drive letter “A” is used as an alternative for the boot drive (normally “B”) and should not be used in the RECONFIG command as there is no physical “A” drive.

The RAM drive, Drive “F”, memory permitting, has 3 options :

F:50 for a 256k drive,  
F:52 for a 320k drive, and  
F:53 is a 412k Drive.

### REFORMAT

Can be used to prepare both partitions and the ram drive for use, for partitions this only has to be done once, the RAM drive would need re-initialising after each reset due to corruption from the MTX system ROM.

## CFX SDX ROM

Pressing <RET> from the start-up screen enters the familiar blue screen of the BASIC environment. The auto run ROM will initialise the CF on start-up so all the additional commands are ready from the outset.

The SDX rom uses CPM for all disc accesses and so retaining full compatibility with the CPM ROM.

There is no need to manage separate memory cards for each option. Needing to reserve memory space for CPM does reduce the amount of memory available for basic and will cause issues with some games that are only intended to run from tape.

On an unexpanded MTX500 the amount of memory for BASIC programs is reduced to approximately 20k.

As the CFX implementation of the SDX rom is mapped into ROM bank 5, typing "**ROM 5**" will re-initialise the CF if required, without disturbing the program in memory.

All the additional commands are accessed via the USER command. The full set of SDX extensions are provided, with two omissions, attempting to format a drive or copy the system tracks, will result in an error message being produced. All format actions have to be done from the CPM side.

Like the CPM side, drive letter "A" can be used as an alternative for the boot drive as there is no separate "A" drive.

If you've used the SDX or single disc FDX, you will find that along with the 2 commands that have been disabled there are two extra commands added.

In addition the control ROM has been extended so that it can see the first 4 partitions, and access them as drives "B" to "E", unlike the CPM side, it's not possible to re-map the drive letter to point to the last 4 partitions. Increasing the number of partitions means that the NODE networking software will not coexist with CFX

Attempting to access drive letters above "E" will result in an error being displayed, and may need the CF re-initialising with "**ROM 5**".

The RAM drive is not available in SDX mode even if memory is available.



## SDX BASIC Program Commands

### HELP

#### USER HELP

Will display the same crib sheet as that invoked by the "I" on the boot screen.  
(Does not disturb the program currently in memory)

```
SDX Basic additional commands:
USER DIR
USER LOAD "FILENAME.EXT"
USER SAVE "FILENAME.EXT"
USER READ "FILENAME.EXT",start
USER WRITE "FILENAME.EXT",start,length
USER MTX "FILENAME.MTX"
USER RUN "FILENAME.RUN"
USER ERA "FILENAME.EXT"
USER REN "NEWNAME.EXT"="OLDNAME.EXT"
USER COPY "NEWFILE.EXT"="OLDFILE.EXT"
USER STAT "<drive>:" or "FILENAME.EXT"
USER OPEN#channel,"FILENAME.EXT",type
USER CLOSE#channel
USER KILL#channel
USER PRINT#channel,variable list
USER INPUT#channel,variable list
USER LINE INPUT#channel,variable
USER REC#channel,record number
USER EOF#channel,line number
USER TYPE "FILENAME.EXT"
USER QUIT (perform a NEW)
ROM 5 (reset the CF)
Press <RET> to continue into SDX Basic
```

### SAVE

#### USER SAVE "FILENAME.EXT"

Will save to the B drive, partition 18, by default

#### USER SAVE "[x:] FILENAME.EXT"

Will save to the specified drive x:, as long as it's in the A-E range

**Note:** SDX BASIC accepts optional drive qualifiers [x:] in the range A: to E: when loading and saving programs.

File names don't have to be in upper case, however files with lower case characters won't be accessible from the CPM rom. File name extension is optional, the BASIC extensions will attempt to load any file when requested. Specifying the drive is optional for all the disc commands, the default is the A/B drive if the letter isn't specified.

## LOAD

### **USER LOAD “[x:] FILENAME.EXT”**

Will attempt to load the named file as a BASIC program, whatever the extension

## RUN

### **USER RUN “[x:] FILENAME.EXT”**

Attempts to load and run a binary game image file, the first 4 bytes providing the start address and length of the data. Used to load a number of, mostly early Continental Software, games that have been converted using the tape to disc software that was available for the FDX/SDX or that were converted for MAGROM. Conventionally the extension used for these types of file is RUN but this does not have to be the case.

## MTX

### **USER MTX “[x:] FILENAME.EXT”**

Will attempt to load a MTX format tape image file, any multi part images are likely to fail. The command may enable some games that are not available in the other supported formats to load. As with RUN , the file extension for this type of file is normally MTX

## DRIVE

### **USER DRIVE “x:”**

Changes the logged drive to “x:” where “x:” is in the range B: to E:.  
Drive “x:” becomes the default drive for SDX BASIC USER commands.

## RESET

### **USER RESET**

Reloads CP/M and logs onto drive B:

## Commands for loading and saving raw data directly from MTX memory

### WRITE

**USER WRITE “[x:] FILENAME.EXT”,<start>,<size>**

Save a block of memory to the named file starting at <start> and <size> bytes long.

### READ

**USER READ “[x:] FILENAME.EXT”,<start>**

Attempt to read a file into memory beginning at address <start>.

### VWRITE

**USER VWRITE “[x:] FILENAME.EXT”,0**

Save all 16K of Video RAM to a file

### VREAD

**USER VREAD “[x:] FILENAME.EXT”,0**

Load up to 16K from the named file into of Video RAM

## Data File Handling Commands

### OPEN

#### **USER OPEN#<channel no>,"[x:] FILENAME.EXT",<type>(<reclen>)**

Open a file for input/output, valid channel numbers are 1-4. <type> is a string type, and can be "O" output, "I" input or "R" random I/O. the quotes are required. <reclen> is an optional record length for random files.

An error will be reported if the file is already open.

### CLOSE

#### **CLOSE#<channel no>**

Closes a currently open file.

### KILL

#### **USER KILL#<channel no>**

Close and erase a currently open file. Use with care.

### INPUT

#### **USER INPUT#<channel no>, arguments**

Will read numeric or string data from an open file, an error will occur if the variable types don't match.

### LINE INPUT

#### **USER LINE INPUT#<channel no>, arguments**

Read an entire line into a string variable.

### PRINT

#### **USER PRINT#<channel no>, arguments**

Send numeric or string data to an open file.

### REC

#### **USER REC#<channel no>,<position>**

Move the file pointer in a random access file to the specified record in preparation for the next action.

## EOF

**USER EOF#<channel no>,<line no>**

Will do a GOTO *<line no>* in BASIC if the end of file marker has been reached for the channel selected.

## Disc Maintenance Commands

### DIR

**USER DIR** is use in the same way as the CPM command both “?” and “\*” wildcards are allowed, all 4 legal partitions can be accessed.

### ERA

**USER ERA** is use in the same way as the CPM command both “?” and “\*” wildcards are allowed, all 4 legal partitions can be accessed, care should be taken as inappropriate wildcards could result in the entire partition being wiped.

### STAT

**USER STAT” [x:] FILENAME.EXT”**

Will display basic file info

**USER STAT”x:”**

Will display basic partition info

### TYPE

**USER TYPE “[x:] FILENAME.EXT”**

Will read and display a file on the screen, control characters are displayed, so typing a data file could have unexpected consequences!

### REN

**USER REN “[x:] NEWNAME.EXT”=” [x:] OLDNAME.EXT”**

Rename a file in the same way as CPM, except lower case is allowed.

### COPY

**USER COPY “[x:] NEWFILE.EXT”=” [x:] OLDFILE.EXT”**

Will copy files on the same partition, or across partitions.

### QUIT

**USER QUIT**

Equivalent of NEW, will run NCPM.COM if found, otherwise enters BASIC.

## Legal, but Disabled Commands:

### FORMAT & SYSCOPY

**USER FORMAT** is disabled and will return an error if used.

**USER SYSCOPY** is disabled and will report an error if used.