

# ANNE v2.5.2

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## **Abstract**

ANNE is an Amstrad PcW16 emulator for UNIX and Windows. It only emulates the PcW16; use JOYCE for other PCW / PcW models.

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# 1 Introduction

## 1.1 Copyright

Copyright 1997,2001-7,2009-10,2012,2014,2016-7,2021,2022,2023,2024 John Elliott.

- Copyright 1994, 1995 Ian Collier.
- Copyright 1991 Jim Hudgens.
- Copyright 1987, 1999 DRDOS Inc.

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## 1.2 What ANNE does

ANNE emulates a PcW16 computer - an 8-bit computer intended by Amstrad as a word processor, and manufactured around 1996.

## 1.3 What's new?

### Since v2.4.0:

- ANNE can now emulate a LocoLink server. This allows the built-in 'Import' functionality in the Rosanne Word Processor and Spreadsheet applications to read in files from the host computer.
- Thanks to Bryan Sparks' clarification of the licensing issues, it has been possible to bundle a CP/M start-of-day disc for the PcW16. This is still not possible for other PCW/PcW versions as they contain code that is copyright Amstrad / Locomotive.
- A new feature allows CP/M 2 and CP/M-86 sessions to be run within CP/M Plus. For more information, see section 9.

### Since v2.2.0:

- ANNE will now prompt you when a CP/M program attempts to access files outside the emulator (for example, the supplied IMPORT or EXPORT utilities). This warning can be controlled from f6=Settings | General | File Access...
- The Windows version is distributed with the latest SDL.DLL.
- Various compilation fixes on Unix platforms.

### Since v2.1.0:

- A crash that occurs when trying to load the rescue disc has been corrected.
- Initial support for compiling under Mac OS X has been added.
- It is now possible to use a folder on the host computer as a CP/M disc.
- Native GSX support is now present.

- Can now boot CP/M.
- Successfully detects when a disc image has been changed.
- Does not let the mouse pointer go off the bottom of the PcW16 screen.
- Installation from a .CFI file (rather than a physical PcW16 rescue disc) now works correctly.
- With graphics acceleration turned on, the word processor display is not corrupted by scrolling.
- Floppy acceleration is a whole lot better than it was before.
- When you create a new disc image file, you will be asked whether it should be 720k or 1.4Mb. It will then be formatted, so you don't have to use the PcW16 file manager to format new discs. Instead, answer yes when it asks you if you want to create PcW16 folders on the disc.
- The mapping of the keyboard keys # and \ is corrected on Windows systems.

## 1.4 Concepts

When moving from a PcW to an emulator, the biggest change you have to accustom yourself to is the way that ANNE handles discs. Real PcW16s use real floppy discs<sup>1</sup>; you use the recovery disc to reload the system after a crash, a data disc to save your work on, and so on.

It is possible for ANNE to use real disc drives in the same way that a PcW does. However this is pretty slow and awkward; since the PC's got a hard drive, you might as well use it.

### Disc image files

Each floppy disc is read into the PC's hard drive and stored as a "disc image file". This is a one-time process; once the disc image files are created, the discs themselves are no longer needed.

Disc image files have a number of advantages:

1. They are much faster than real floppy discs.
2. You don't have to be shuffling a stack of floppies every time you want to use ANNE.
3. If you want more discs, you don't have to go to the shop to buy them. You just create more disc image files.

By convention, these have names ending in ".dsk". So instead of having a "manuscripts" disc, you would have a disc image file called "manuscripts.dsk". To normal UNIX or Windows software, "manuscripts.dsk" is just one file, but PcW programs see it as a disc with any number of PcW files on it.

One consequence of this is that the PcW16's floppy drive has nothing to do with your PC's real floppy drives. You can be working with a "disc" in the PcW's drive even when there's nothing in your real floppy drive(s).

Converting your PcW discs to disc image files is covered in section 2.

---

<sup>1</sup>The PCW16 design allowed a hard drive interface to be added. ANNE does not emulate this.

### **Disc image folders**

ANNE 2.1.8 and later can use folders instead of CP/M disc image files. In this system, one PcW disc corresponds to one PC folder. This has the advantage that each PcW file corresponds exactly to one PC file. For example, you could put text files in that folder, and then use the PcW's "Import" facility to import files from them.

### **Floppy Acceleration**

When you have floppy acceleration turned on, ANNE doesn't use disc images any more. When programs refer to the 'disc drive', they are actually looking at a directory called PcW16FS on your hard drive. This is more convenient if you want to share files between the PcW16 environment and the rest of the world, and you don't have to worry about disc images only holding 1.4Mb.

### **ROMs**

A real PcW16 has 1 megabyte of flash ROM, which holds the contents of the Cabinet, the built-in software, and the user settings. In the case of a program crash, the contents of the flash ROM could be lost, forcing a time-consuming reload from the recovery disc and data backups.

ANNE doesn't just use one flash ROM - it allows you to choose from several. One (called "Previous session") is automatically saved when you leave ANNE; another ("Empty system") is created when the recovery disc is first read in. It is possible to save others at any time; for example, if you have a Cabinet full of documents, you can save a copy of the ROM, and revert to that later if something goes wrong.

### **The MENU key**

ANNE requires a Windows-style keyboard with a Menu key. On most keyboards, Menu is between AltGr and Ctrl, to the right of the space bar. Under Mac OS X, there is no Menu key (even if you've plugged in a PC keyboard, SDL doesn't recognise the key) and you should use Command-F9 (Windows+F9 on a PC keyboard) instead.

## **1.5 Compiling ANNE**

If you have downloaded ANNE as a binary for your platform (eg: the full Windows install, or an RPM), you can skip this section.

To compile ANNE, you will need:

- SDL, the Simple DirectMedia Layer: <<http://www.libsdl.org>>. You need version 1.0.8 or later.
- libxml, the xml parser used by GNOME <<http://www.libxml.org>>. ANNE was tested with version 2.2.6.
- libpng, the image library. <<http://www.libpng.org/pub/png/>>. You need version 1.0.6 or later.

You should be able to compile with the commands:

```
./configure
make
sudo make install
```

On systems with a GCC version earlier than 3.0, the first line should be `./configure --with-ministl`.

To cross-compile ANNE for Windows, you need the XMINGW32 cross-compiler pack from <http://www.libsdl.org>, and MINGW32 versions of the above libraries.

### 1.5.1 ANNE on Mac OS X

I have successfully compiled ANNE on a Mac OS X (10.4.2) system. The process (and indeed MacOS X support in general) is pretty new and unpolished.

Firstly, the three libraries mentioned above (SDL, libxml and libpng) had to be compiled from source and installed using their “make install” commands; pre-packaged OS X versions didn’t seem to be suitable.

Secondly, the configure script needed to be told what the host system was:

```
./configure --host=powerpc-darwin-apple8.2.2
make
sudo make install
```

Thirdly, this builds an ANNE that is still very much a UNIX application; there’s no application icon, no native OS X menu, and so on.

## 1.6 Known bugs

This version of ANNE contains, or is thought to contain, the following bugs:

- Under MacOS X in full-screen mode, the mouse pointer can leave stray pixels where it has been.
- The serial port support is untested. It is possible to use QTERM under CP/M, but the SIO device driver (SIO.FID) has not been tested.
- The emulated PcW hangs if, from the front screen, you click ‘Help’ then ‘Index’.

## 1.7 Internet resources

The latest versions of ANNE- and any future updates - will be downloadable as part of the JOYCE suite, from <http://www.seasip.info/Unix/Joyce/>.

Announcements of new ANNE releases, if any, will be made to the newsgroup [comp.sys.amstrad.8bit](mailto:comp.sys.amstrad.8bit). It is also on-topic to discuss ANNE in this newsgroup.

# 2 Setting Up

## 2.1 Directory organisation

### 2.1.1 Under Windows

ANNE uses the same directories as its sister emulator JOYCE. These comprise two directories - a “system” directory common to all users (eg, “C:/Program Files/Joyce/lib”

and a “user” directory (eg: “C:/My Documents/Joyce”). Each of these directories will have subdirectories called `Boot` (boot files and boot disc images) and `Disks` (all other disc images). In the remainder of this document you will see directory names which look like “~/Joyce/Boot”; you should take the “~” to stand for the “My Documents” directory.

If you don’t want ANNE to put its files in “My Documents”, then you can override it. In ANNE, press [f9] for the menu, [f6] for settings, and select “General”. Then enter the new directory name, and press RETURN. You will need to copy the “Joyce” directory from “My Documents” to the new directory you specified.

### 2.1.2 Under UNIX

ANNE uses two directories - a “system” directory common to all users (by default, `/usr/local/share/Joyce` - see Appendix A) and a “user” directory for each user (by default, `~/Joyce`). Each of these directories will have subdirectories called `Boot` (boot files and boot disc images) and `Disks` (all other disc images).

## 2.2 Running ANNE for the first time

### 2.2.1 You will need:

- A version of ANNE that installed correctly.
- A screen capable of 800x600x256 graphics. ANNE may well be faster in 256 colour mode than in (say) 16-bit mode.
- One of the following:
  - A PcW16 rescue disc;
  - A disc image of the PcW16 rescue disc, that you previously generated;
  - The rescue disc in .CFI format from Cliff Lawson’s web page: <http://web.ukonline.co.uk/cliff.lawson/files>

### 2.2.2 The ANNE command

Under Windows, ANNE should be run from the Start Menu. Under UNIX, the command to use is either “`xanne`” (to run in a window) or “`xanne -f`” (to run full screen). Other command line options are given in section 3.3.2.

### 2.2.3 Adding boot ROMs

The first time ANNE is started, it will detect that no boot ROM is present. You will be asked to provide it with a rescue disc.

The next menu that appears asks you for the location of the rescue disc to use.

- If you are using real floppies, then select the correct drive (A: or B:).
- If you are using a pre-prepared DSK file, choose the correct file.
- If you are using a .CFI file, choose the file and then select “Advanced”. On the menu that appears, select “.CFI - compressed raw”.



Next select “Continue”. If all goes well, the boot ROM will now be created and the boot menu will appear. The only usable option will be “Empty system (Boot ROM only)” so select that.

You should then see the PcW16 memory test, followed by the “Fatal OS checksum error” message. Use the ANNE menu (see below) to insert the rescue disc again, and click the “power switch” icon. If you get a “Disk bootstrap error”, click the power switch again.

When the OS install is complete and you have entered your user details, use the ANNE menu to save the current system as a boot ROM (f2=Disc; Disc management; Save current ROM as boot ROM). Call it something like “Full system”.

## 2.3 Running ANNE for the second and subsequent times

When ANNE has been set up, it will display a boot menu when started. The menu will offer the following options:

**Previous session** The ROM saved when you last used ANNE. You would normally choose this option, unless the session has been corrupted by a program crash or you want to load an alternative ROM.

**n. title** ROMs that have been saved at earlier points. There will usually be one called “Empty system”, representing the state of the system just before the recovery disc is loaded.

**Other...** Load a ROM from a disc file.

# 3 In Use

## 3.1 What is emulated

- The Z80.
- 2MB of memory and 2MB of Flash ROM.
- The screen.
- The keyboard.
- The real-time clock
- A Centronics-only printer interface. You can print to a disc file or a UNIX command (eg, “lpr” for direct printer output).
- The mouse (either attached to a COM port, or directly driven). You will need a three-button mouse for the full effect.
- The serial ports (emulation of these is rather sketchy)
- The beeper.
- The LocoLink interface (over the parallel port).

## 3.2 What is not emulated

- The optional hard drive.

## 3.3 How the disc drive is handled

The basic concept of disc image files was described in section 1.4. There are several subtleties to be aware of:

### 3.3.1 Ejecting a disc

To eject a disc, press the MENU key (OS X: Command+F9) for the ANNE menu, then [f2] (Disc). If there is a disc in the PCW16's drive, you can eject it by selecting the corresponding "eject" option. Remember that ejecting discs from ANNE's emulated drive doesn't have anything to do with whatever floppy drives are actually fitted to the PC.

### 3.3.2 Command-line options

If you want ANNE to start with a disc in its emulated drive, then use -A with a filename:

```
xanne -A documents.dsk
```

will start up with "documents.dsk". in the drive.

To start up without asking which boot ROM to use, use the -E option with a filename:

```
xanne -E bootfile.rom
```

### 3.3.3 Non-floppy discs

The following JOYCE utilities have not been tested on ANNE. Some may work.

- ANNEDRV.FID gives the emulated PcW16 a hard drive (available only under CP/M). It uses a similar "disc image file" system to the floppy drives, but the image files can be up to 8Mb in size.
- REDIR.COM allows you to use one or more UNIX directories as CP/M drives. It requires CP/M. This avoids the problem that the host PC can't see "inside" image files without extra software.
- IMPORT.COM and EXPORT.COM will copy single files into or out of the ANNE environment. They require CP/M.

All these utilities are on the file UTILS16.DSK. You can get at them with a command something like:

```
xanne -A=/usr/local/lib/Joyce/Disks/utils16.dsk
```

and then start CP/M using "Run external program". REDIR.COM and its companion programs are in Group 1; the others are in Group 0.

### 3.3.4 Floppy Disc Acceleration

As mentioned in section 1.4, floppy disc acceleration makes a directory on your hard drive appear to be the PcW16 floppy drive. This does not work with CP/M; for CP/M discs, use the “Folder” option in the “Enter filename for disc image” menu.

## 3.4 What if the speed is wrong?

### 3.4.1 If ANNE is too slow

One solution is to increase the CPU speed. Press [MENU], then [f6] and select 'General'. Then enter the new speed.

It may also be possible to improve the performance of ANNE by changing the video refresh frequency. This is normally 12, but it can be reduced to improve performance. If it is reduced to 3.75, for example, then programs may appear a little jerky, but ANNE should run at its full speed.

To change the video refresh frequency, start ANNE. At the opening screen, press [MENU], then [f6] and select 'Video'. Then enter the new frequency and press RETURN.

### 3.4.2 If ANNE is too fast

The built-in speed regulation in ANNE should stop it running too fast. Possibly you could reduce the overall speed: press [MENU], then [f6] and select 'General'. Then enter a new speed.

## 4 Peripherals in ANNE

### 4.1 The keyboard

The keyboard is laid out to match the PcW16's own keyboard - a UK-layout 102-key arrangement. The following keys have different captions on the PcW16:

[This is for a UK keyboard with XFree86. Other X servers may behave differently].

PC key	PCW key	Notes
ESC	STOP	^C under CP/M
F9	Blue	Under Mac OS X, F9-F12 trigger
F10	Yellow	Exposé, so you may have to use
F11	Green	(eg) CTRL+F9 instead.
F12	Red	
Scroll Lock	UNDO	ESC under CP/M
Pause	Help	
Alt	Task	

### 4.2 The Mouse

The PcW16 uses a Mouse Systems type mouse, connected to its second serial port (referred to by ANNE as COM3:). ANNE can emulate the mouse as either:

- No emulated mouse.
- Serial mouse on COM1 (the mouse is in the wrong socket)
- Serial mouse on COM3 (the mouse is in the right socket)
- Update ROSANNE directly (the ROSANNE mouse coordinates are updated directly, which produces much better results than the emulated serial mouse options)

To choose which emulation is selected, press [MENU] in ANNE; then [f6] for Settings, and choose Mouse.

It is possible to use ANNE with a real PcW16 (or compatible) mouse - any serial mouse that uses the MouseSystems protocol should be suitable. To do this, choose 'No emulated mouse', plug the mouse into a serial port, and set the PcW16's COM3 to use that port.

### 4.3 The disc drive

Instead of a real disc drive, ANNE works with "disc image files" on the computer's hard drive. These are fully described in sections 1.4 and 3.3. If Rosanne acceleration is turned on (section 6), then instead of disc image files, ANNE will use a directory on your hard drive.

### 4.4 The LocoLink interface

ANNE allows three forms of LocoLink communication (only two under Windows, though).

#### 4.4.1 LocoLink to a directory on your computer

- Go into the settings for the printer port, and set it to "Use internal LocoLink server...". Then use the file chooser to select the directory with the files that you want Rosanne to be able to access.

#### 4.4.2 LocoLink to another emulator

- Go into the settings for the printer port and set it to "output to Shared memory" or "output to Socket". On the screen that appears, select the correct socket type and name (see below) and ensure the "Client (eg printer, PcW16)" option is ticked. Set up the other emulator with the same socket / shared memory settings, but with "Server (eg LocoLink v2/v3) ticked, and run the LocoLink 3.00 server (supplied with LocoLink for Windows) on it.

#### 4.4.3 LocoLink to a real computer (requires Linux)

- ANNE will act as the master. Connect the parallel port of your Linux box to the other computer (if it's another PC, use a LapLink cable; if it's a PcW, use the original LocoLink cable). Go into the settings for the printer port, and set it to "Output to parallel port". Then select the appropriate parallel port (normally /dev/parport0 or /dev/parport1). You will then need to run the LocoLink 3.00 server (supplied with LocoLink for Windows) on the computer at the other end of the link.

#### 4.4.4 Sockets and Shared Memory

Sockets and shared memory are two methods by which two emulators can communicate to each other – for example, emulating the scenario where a PcW16 and a PCW are connected by a LocoLink cable.

If you have a choice I recommend using shared memory as it is simpler to set up and can cope better with unexpected disconnections.

**Shared memory** can be used to communicate with other emulators on the same computer. They are described by a name (for example, “locolink”) and a “client” or “server” indicator. When setting it up, you need to designate one computer as the client and the other as the server; if they’re both set as client or both as server it doesn’t work.

**UNIX domain sockets** (not supported on Windows) can be used to communicate with other emulators on the same computer. They work pretty much like normal files, and their names are normal filenames; so, for example, one might be called “/tmp/locolink.socket”. When you are establishing a link, it is important that both ends are using the same socket name.

**TCP/IP sockets** can be used to communicate with other emulators not only on the same computer, but across a network or the Internet. However, JOYCE does not perform any security checks on socket connections, so I strongly recommend that you do not use TCP/IP sockets while connected to the Internet.

For a LocoLink client, the name of a TCP/IP socket is formed “host:port” - for example, “localhost:8256”, “127.0.0.1:8512” or even “www.somewhere.com.invalid:8080”.

For a LocoLink server, the name of the socket is formed “interface:port”. The interface is usually either “127.0.0.1” (accept only connections from this computer) or “0.0.0.0” (accept connections from any computer).

The port has to be the same on both client and server sides of the connection, and the host/interface have to refer to the same computer. For two emulators on the same computer, use “127.0.0.1:*port*” for both client and server.

## 5 The ANNE Menu

If you press the Menu key (OS X: Command+F9), a menu will appear at the top of the screen. It offers the following options:

- ESC=return to ANNE

Leaves the menu system.

- f1 = Help

Display the keyboard layout onscreen.

- f2 = Discs

Options for the floppy drive. Use this to "insert" and "eject" discs, to read floppy discs into the ANNE environment, and to modify boot ROM settings. It brings up the Discs menu below.

- f5 = Reboot

Simulates turning the PcW off and then on again.

- f6 = Settings

Settings for all aspects of the emulator. The Settings menu will appear.

- f7 = Debug

Display the Debug menu (5.2).

- f8 = Action

Display the Action menu (5.1).

- f10 = Quit

Leave ANNE. You will be asked for confirmation. Under OS X, use Command+F10, because F10 by itself triggers Exposé.

## 5.1 The Action Menu

This menu has only one option: “Select PCW screen.” This is intended for use with GSX programs (such as DR Graph) which exit without shutting GSX down properly. In such cases, the program will appear to hang, but selecting the PCW screen will display the A> prompt.

## 5.2 The Debug Menu

There are four options here, intended mainly for advanced users or ANNE developers.

- “Debug mode” puts the system in debug mode. This has no effect in the current release.
- “CPU state” displays the values of the Z80 registers.
- “RAM dump” writes out the contents of RAM to a file in the current directory called “anne.ram”. This is not a full snapshot facility; memory dumps can’t be reloaded, and they don’t contain CPU state.
- “Power switch” simulates the power switch being pressed or released.

## 5.3 The Disks menu

The Disks menu displays the status of the floppy drives, and allows you to eject or insert discs. Each drive has three lines in the menu:

1. The first line reads either “Drive A: (Ejected)” or “Drive A: (*Filename*)”. This shows whether there is a “disc” (.DSK file) in the drive or not.
2. The second line reads either “Eject” or “Insert...” depending whether there’s a disc in the drive. “Eject” ejects the current disc (.DSK file); while “Insert...” brings up a window asking for the file to insert. You can also “insert” a real floppy drive; this allows the emulated PcW to access a real drive directly (if

slowly). If you change the disc in the real drive, you may need to “eject” and “insert” the real drive, so that the PcW’s own software can tell that the disc has changed. If you ask to “insert” a folder, and the folder you select has not previously been used in this way by JOYCE or ANNE, then you will be asked what format the folder should pretend to be in.

3. The bottom line for each drive reads “Read only”. If there is a tick beside it then the write protect holes on the disc have been opened and it cannot be written to.
4. If you select “Disc management...” then a menu appears allowing you to read in extra floppy discs, or convert .DSK files back to real discs.

### **5.3.1 The Disc Management menu**

There are six options:

1. Add a boot ROM from a file - Reads in a boot ROM and adds it to the opening menu.
2. Save current ROM as boot ROM - Saves the current ROM file and adds it to the opening menu.
3. Rename a boot ROM - Allows you to change the caption associated with a boot ROM.
4. Delete a boot ROM - Removes a boot ROM from the opening menu. Use this option with caution!
5. Convert floppy to ANNE.DSK file - Read in a normal (data) disc, storing the new disc image file in the “user discs” directory.
6. Write .DSK file back out to floppy - Convert a disc image file (either normal or start-of-day) back to a floppy disc.

## **5.4 The Settings menu**

Choose the item of hardware for which you want to make changes. Note that if you make a change such as disconnecting or connecting an interface, the emulated PcW may not pick it up until the next reboot.

### **5.4.1 Disc drives**

Note: The menus in this section only allows you to create configurations that could exist on a real PcW16. By manually editing `~/Joyce/annehw.xml`, you can create “impossible” configurations, such as a system with two floppy drives (CP/M and Rosanne won’t detect the second one.) If the configuration is “impossible”, the menus will look different as they attempt to accommodate the changes.

The settings in this menu are:

### Drive A: settings:

This brings up its own menu, allowing you to set what type of disc drive is attached to the PcW. The default type (“720k 3.5”) in fact supports 1440k disc images as well. If you want to emulate 5.25” drives or anything else unusual, select “other” and manually enter the drive type, the number of cylinders<sup>2</sup> it can access, and whether it’s single or double-sided.

#### 5.4.2 Extra drives

This menu allows you to set up drives C: - L: and N: - P:. Obviously these drives don’t exist on real PcW16s, but they can on an ANNE system, though only under CP/M. You will need to have a copy of ANNEDRV.FID on your start-of-day disc for these drives to become available - see section 7.1.

For each drive, you can set it up in three ways:

- As direct access to the PC’s floppy drives.
- As a floppy drive that accesses a standard disc image file, just like the emulated A: drive.
- As a hard drive with 8Mb of storage. The hard drive will also be stored on a .DSK file, but this .DSK file will not be usable in emulated floppy drives.

To set up a drive, choose it from the list. Then choose or enter the filename and drive type, as listed below:

Type of drive to use	Choose file	Choose option
Floppy drive A: or B:	A: or B:	floppy drive
Floppy drive using standard image file	.DSK file	floppy drive
Hard drive using special image file	.DSK file	hard drive

#### 5.4.3 Memory

This allows you to set the memory size of your emulated PcW. If your computer is running very low on memory, the “Current memory size” may be less than requested.

By default, ANNE uses maximum values - 2Mb of Flash ROM and 2Mb of RAM. If you want it to behave like a real PcW16, set both of these to 1Mb.

#### 5.4.4 General options

This screen allows you to choose the speed at which ANNE should run. It also allows you to control the warning that appears when a CP/M program attempts to access files outside the emulator (as, for example, the supplied IMPORT and EXPORT utilities do). Select “File Access...” and select one of three options:

**Allow full access** Programs running under CP/M will be able to read and write any file on your computer, without prompting. This is how ANNE 2.2.6 and previous versions behaved.

---

<sup>2</sup>The drive documentation may call this figure the number of tracks rather than the number of cylinders. Either way, it’s usually 40 or 80.



**Prompt for each file** When a CP/M program attempts to read or write a file, ANNE will display a prompt asking whether this should be allowed (see below).

**No file access** CP/M programs will not be able to access arbitrary files on your computer. The IMPORT and EXPORT utilities will not operate.

If 'Prompt for each file' is selected, then when a CP/M program attempts to open a file, the following warning will be displayed:

```
Confirm host file access
A CP/M program is attempting to access the file:
bank_passwords.txt
Do you want to allow access to this file?
No
No, and don't ask again
Yes
```

The prompt will offer three options:

**No** Access to the file will be blocked. You will be prompted again if the program attempts to read or write a different file.

**No, and don't ask again** Access to the file will be blocked, and the File Access settings screen will be switched to the "No file access" option, blocking all future file access. If you subsequently want to grant access again, this must be done through the File Access menu screen.

**Yes** Access to this file will be allowed. You will be prompted again if the program attempts to read or write a different file.

#### 5.4.5 Mouse

The mouse settings available here are:

- Emulation mode: No mouse, Mouse on COM1:, Mouse on COM3: and Update ROSANNE directly (see section 4.2).

#### 5.4.6 Video

The Video settings allow you to change:

- "Video refresh" - the number of times per second that the screen is redrawn. You can go up to 50Hz (ie, the screen is redrawn 50 times a second) or down to 0.01Hz (the screen is drawn once every 10 seconds). The default setting in ANNE is 12Hz, which is fine for nearly all programs.
- The beeper is usually emulated using the PC's sound card. You can also have it manifest as a red flash of the screen ("Visual Beeper") or silence ("Disable beeper").
- Whether the PcW has a colour monitor (the default), a monochrome white monitor (like the real PcW16) or a monochrome green monitor.

### 5.4.7 Printer

The following settings are available for the parallel printer port:

- **CONNECTED/DISCONNECTED:** Is the printer connected to the PcW?
- **OUTPUT TO FILE:** Output goes to a disc file. When you select this option, you are asked for the filename to send the output to.
- **OUTPUT TO UNIX COMMAND:** Output goes to a UNIX pipeline. You can use this to send output to the UNIX printing system (enter “lpr” here, with any appropriate options).
- **OUTPUT TO PARALLEL PORT :** Output goes to a real live parallel port, with no processing. This can be used to LocoLink to a real PcW.
- **OUTPUT TO SHARED MEMORY :** Output is sent to another process, using shared memory. This can be used to LocoLink to an emulated PcW (using JOYCE v2.5.2+).
- **OUTPUT TO SOCKET:** Output is sent to another process, over a socket. This can be used to LocoLink to an emulated PcW (using JOYCE v2.1.0+).
- Under Windows, you also get the option to send data to LPT ports.
- **SPEED:** If you are attempting to emulate a LocoLink interface, the parallel port emulation needs to be slowed down - otherwise the emulated PcW16 will miss communications from the other end. The speed starts off at 63, but can be between 1 and 5000. Lower speeds are more likely to work when you are emulating a LocoLink connection; if you want to use the port as a printer port, you can set the speed to the maximum of 5000.

### 5.4.8 Save settings

If you do not save the settings, they will remain in force only for the duration of your current ANNE session. The settings will be saved to the file *Joyce/annehw.xml* in your home directory.

## 6 Rosanne Acceleration

ROSANNE ACCELERATION allows certain functions normally performed by the PcW16's Rosanne operating system to be taken over by the emulator.

To turn acceleration on, press the Menu key, then [F6] for the Settings menu, and select “Rosanne acceleration”. If there is no tick by 'Enabled', press SPACE. You will then see a list of further options, each of which can be ticked and unticked as required.

In general, acceleration replaces parts of Rosanne with calls to special functions in the emulator. This can greatly improve performance, though possibly at the cost of compatibility for some programs. Rosanne acceleration has been tested on Rosanne v1.12; it may or may not work with other versions of Rosanne.

Acceleration must be turned off during a reload from the rescue disc.

## 6.1 Memory Test

Ticking this option will cause the “PLEASE WAIT. CHECKING MEMORY” screen to be skipped.

## 6.2 Floppy disc

If this option is ticked, then instead of using a disc image file for its floppy drive, ANNE will use a directory on the hard drive ( ~/Joyce/PcW16FS). This has a number of advantages:

1. It's faster.
2. You can get files in and out of the PcW16 environment much more easily.
3. The resulting drive is not limited to 1.4Mb.

The directory does not have to exist; to create it, turn on floppy disc acceleration, go into the File Manager, and press Control-L.

Note that when floppy disc acceleration is turned on, asking ANNE to insert or remove disc images will have no effect.

## 6.3 Graphics

If this option is ticked, several low-level graphics operations will be implemented in native code. This considerably improves the speed of drawing of menus, dialogs, and those huge buttons on the front screen.

# 7 ANNE Utilities

The following utility programs are supplied with ANNE. They are designed to access features of the emulator which have no equivalent on a real PcW. You will find them on the disc image “utils16.dsk”.

## 7.1 ANNEDRV

ANNEDRV.FID is a file which is used to add one or more extra disc drives to CP/M running within ANNE. The first of these drives will usually be drive C:.

Unless the settings are changed (see section 5.4.2) the drives will be set up as 8Mb hard drives, called ~/Joyce/Disks/c.dsk, ~/Joyce/Disks/d.dsk, etc. This can be used to share files between an install of JOYCE and an install of ANNE. The drives cannot be accessed from Rosanne.

## 7.2 DDJOYCE.PRL

DDJOYCE is new in v2.1.7. It is a GSX driver for the host PC's graphics screen, allowing high-resolution colour graphics to be used from CP/M.

To use it, edit your ASSIGN.SYS file. Remove the entry which reads

```
01 @:DDSCREEN
```

and replace it by

```
01 @:DDJOYCE
```

DDJOYCE has been tested with the Digital Research programs DR Draw and DR Graph, with the following issues:

- My copy of DR Graph insists on trying to access drive B: all the time, causing invisible “Please insert the disc for drive B:” messages. The program then appears to hang until you press RETURN to acknowledge the message.
- When DR Graph shuts down, the screen goes blank. This is because DR Graph does not make a proper ‘close workstation’ call when it terminates. Use the Action menu to switch back to the PcW16 screen.
- DR Draw works correctly, though text rendering is rather ugly.

### 7.3 DOSDIR

DOSDIR displays the contents of a directory in the host filesystem (the name DOSDIR is for compatibility with MYZ80). Syntax is:

```
DOSDIR
or DOSDIR {x:/path/}filespec
```

Note that if you include a path you must include a filename. The command

```
DOSDIR C:/IMAGES/      is invalid, but
DOSDIR C:/IMAGES/*. *   is valid.
```

To get lower-case commands, use:

```
A>DOSDIR \
DOSDIR>/usr/local/bin/*
```

### 7.4 EMULIOS.RSX

EMULIOS allows Digital Research Logo to use the 800x600 screen.

To set it up, use the following commands (under CP/M):

```
PIP EMULOGO.COM=LOGO.COM
GENCOM EMULOGO
GENCOM EMULOGO EMULIOS
```

- Then EMULOGO.COM will behave as LOGO.COM, but using the 800x600 screen. The following commands will behave differently:

**setpc** Allows a number from 0 to 255

**setbg** Allows a number from 0 to 255

**savepic** The .PIC file saved is in Windows BMP format, and can be exported, renamed to .BMP, and loaded by paint programs.

**loadpic** The .PIC file loaded must be in Windows BMP format and have 256 colours, but its size does not have to be 800x600.

## 7.5 EXPORT

EXPORT will write CP/M files out as UNIX files. It respects exact file sizes.

The syntax is:

```
EXPORT cpmfile { [O] }  
EXPORT unixfile=du:cpmfile { [O] }
```

The first form of the command produce a UNIX file with the same name as the CP/M file.

The second form creates a UNIX file with a name that may be different from the CP/M name.

If you're using UNIX rather than Windows, beware: because the CP/M CCP renders all filenames into uppercase, it's very unlikely you'll be able to pass directory names to EXPORT; if you say

```
EXPORT /home/fred/cpmfile
```

EXPORT.COM will see "/HOME/FRED/CPMFILE", which probably won't exist. To get round this, use:

```
A>EXPORT \  
EXPORT>/home/fred/cpmfile
```

## 7.6 GUEST, GDUMP and ENDGUEST

These files are used to control the guest subsystem, described in section 9.

## 7.7 IMPORT

IMPORT will read UNIX files into the CP/M filesystem. It sets exact file sizes.

The syntax is:

```
IMPORT {/path/}hostfile { [O] }  
IMPORT du:=/path/hostfile { [O] }  
IMPORT du:cpmfile=x:/path/hostfile { [O] }
```

The first form imports the named file (or files) to the current drive and user area.

The second form imports the file (or files) to the specified drive and user area, keeping the original name(s).

The third form imports the files, changing their name(s) to match the provided CP/M filename(s).

If the [O] option is present, existing CP/M files with the same name as an imported file will be overwritten without asking. Otherwise you are asked for confirmation.

Both filenames may include wildcards, and the second and third forms can include CP/M driveletters and user numbers:

```
A: IMPORT \  
IMPORT>2F:*.ASC=/usr/doc/*.txt
```

will import all the .txt files in /usr/doc to drive F, group 2.

Filenames are expanded case-sensitively, so you will normally need to use the backslash, as above, to get lower-case letters into the command line.

## 7.8 QUIT

Syntax:

```
QUIT { number } { [O] }
```

QUIT will exit ANNE. With no parameters, it will check whether there are files on drive M: which may need saving, and if there are it will ask for confirmation.

The number parameter is the error level which ANNE should return. If there is no number parameter, ANNE returns 98.

The [O] option disables the M: drive check and quits immediately.

## 7.9 REDIR

REDIR allows you to use one or more PC directories as drives under CP/M. See the separate file REDIRECT.DOC for more information.

## 7.10 VGA and VGACOM

VGA.FID allows CP/M programs to make direct use of the PC screen and keyboard. This gives more text on the screen and faster output.

Once VGA.FID has loaded, type VGACOM ON to activate it, and VGACOM OFF to deactivate it.

Your PcW screen will now be 100 columns x 36 lines. Nearly all the normal PcW escape codes are supported, which should enable character-based programs to be run. Since screen output is now being done by the host PC's processor, you should notice an improvement in speed.

The following escape codes work differently in the 800x600 VGA mode:

**ESC b / ESC c** set colours (so the numbers in the PALETTE command actually have meaning).

**ESC y** sets 32x90 mode.

**ESC z** sets 36x100 mode.

## 8 ANNE utilities (PC hosted)

If you don't want to use ANNE's own methods for converting between disc files and image files, you can also use the DSKTRANS program, which is installed with ANNE.

The command to use is either:

```
dsktrans /dev/fdn dskfile  
- Floppy disc to image file
```

or

```
dsktrans dskfile /dev/fdn -otype floppy  
- Image to floppy disc.
```

DSKTRANS isn't as versatile as CPCTRANS (for example, it can only handle discs in recognisable PcW or +3DOS formats) but it doesn't need telling what sort of disc it is using, and it is a native (not DOS-hosted) program.

## 9 Guest Sessions

The Guest system allows a second copy of CP/M to be run. Currently two versions are supported: CP/M 2 and CP/M-86.

To start it, type

```
GUEST CPM2 { optional command to run }
```

or

```
GUEST CPM86 { optional command to run }
```

If GUEST launches successfully, you will see a message similar to:

```
JOYCE CP/M-86 guest BIOS 879K TPA
Boot drive is A:
Host drives: A: B: M:
Guest drives:
[CP/M-86] A>
```

At this point, you are inside the second CP/M system and have left the normal world of PCW CP/M behind. If you try to run one of the .COM files supplied with PCW CP/M, it may well fail to run (saying that it requires CP/M 3) or be plain ignored (if you are trying to use it under CP/M-86).

Two disc image files have been supplied to help you over this hurdle: cpm2.dsk contains the standard utilities for CP/M 2 (PIP, STAT, DDT etc.) and cpm86.dsk contains the corresponding utilities for CP/M-86 (PIP, STAT, DDT86...)

Both .DSK files also include a couple of example programs: SAVEPIC2.COM / SAVEPIC.COM will save the current screen display, in a PcW16-specific variant of the .PIC format used by Digital Research Logo. LOADPIC2.COM / LOADPIC.COM will load a file saved by the corresponding SAVEPIC.

Also supplied is ENDGUEST.COM / ENDGUEST.COM, which when run will close down the guest CP/M session and return you to original PCW CP/M.

### 9.0.1 Guest and Host Drives

The default for a guest CP/M session is to use the same disc drives as the PCW CP/M environment that started it. On stock PcW16 CP/M this will be drives A:, B: and M:. If you are using ANNEDRV.FID to add emulated hard drives, there may be more letters (C: D: etc.). So you can create a file in PCW CP/M, switch to CP/M 2 or CP/M-86 and edit it, then switch back to PCW CP/M and examine the changes. These drives are referred to in the boot message as 'Host drives'.

It is also possible to have 'Guest drives' which are exclusively for the use of the guest system and are not visible to PCW CP/M. These are configured through the ANNE menu: Select f6=Settings, Guest systems, CP/M 2 or CP/M-86. It is then possible to configure for each drive letter whether it is a shared host drive or an independent guest drive (and, if the latter, what filename to use for it).

One use for guest drives might be to store programs and data files which are only meaningful to the guest CP/M system, so that they don't get mixed up with PCW CP/M files. They also have a speed advantage over host drives.

Guest drives are always 8Mb hard drives.

Host drives that are not supported at a BIOS level (for example, folders mapped using REDIR or CP/Net network drives) will not be made available to the guest CP/M system.

### 9.0.2 Leaving a guest system

The best way to return to PCW CP/M is to use the ENDGUEST command.

If the guest system has crashed, or you don't have a copy of ENDGUEST.CMD to hand, it's also possible to try to return to PCW CP/M by doing an 'emergency stop' - from the ANNE menu, select 'f8=Action' and select 'Guest Emergency Stop'. If all goes well, you should be unceremoniously dropped back at the original A> prompt. This is however something of a last resort, and should be avoided if possible.

It's also possible that a crash of the CP/M-86 system will return you to PCW CP/M without asking - for example, if a CP/M-86 program calls an unexpected interrupt, or tries to divide by zero.

### 9.0.3 Viewing guest system memory

When you have finished a CP/M 2 or CP/M-86 session, its memory is retained. The GDUMP utility can be used to view it. The intention is that if you are using the guest environment for software development / testing, GDUMP can be used to examine memory after a crash and possibly determine what went wrong.

At its simplest, type

```
GDUMP CPM2 *
```

or

```
GDUMP CPM86 *
```

You will see the beginning of the guest CP/M system's memory. If you have run a session this will contain valid data; otherwise, it will be blank. Press STOP / Control-C to return to CP/M when the [More] prompt appears.

It is also possible to specify which part of memory should be viewed:

```
GDUMP CPM86 * [FIRST=510, LAST=57f]
```

will display 112 bytes from the start of the CP/M-86 CCP.

If the \* is replaced with a filename, the contents of memory will be saved to that file. So

```
GDUMP CPM86 SAVED.MEM [FIRST=510, LAST=57f]
```

will save those same 112 bytes to the file SAVED.MEM.

### 9.0.4 The CP/M 2 environment for programmers

The CP/M 2 environment is a fairly standard CP/M 2 system. There is a signature 69h bytes from the start of the BIOS (so 66h bytes from the WBOOT entry point) which can be used to detect this particular environment:

```
DB 'JOYCE', 1, 0
```



There is also an entry point three bytes before (66h bytes from BIOS start, 63h bytes from WBOOT) which can be called with:

**A=0** terminates the CP/M guest system, as ENDGUEST would.

**A=0E3h** is a version of the PCW system call CD VERSION. It returns A = host system type (1 for PCW, 41h for PcW16); BC = BIOS version; HL = hardware detected.

Currently the CP/M 2 system runs with interrupts disabled, so it's not a good idea to execute a HALT.

Character device reassignment (using STAT) is not supported. To reassign devices use DEVICE under PCW CP/M before launching GUEST.

The CP/M 3 BIOS calls MOVE and XMOVE are implemented, at the same locations and with the same parameters as on a genuine CP/M 3 system. These are used to move memory between the guest system (bank 1) and the host system (bank 0FFh) or its video RAM (bank 0FEh). Other CP/M 3 calls (eg CONOST, MULTIO, TIME) are not implemented.

### 9.0.5 The CP/M-86 environment for programmers

If you are used to CP/M-86 for the IBM PC, the CP/M-86 environment here may feel rather stripped-down. There are no PC BIOS facilities available (for example, no screen services on INT 10h). You should use only the documented CP/M BIOS and BDOS services.

If you need to detect this particular environment, find the address of the INT 0D0h handler. Two bytes after that will be a 7-byte signature:

```
DB 'JOYCE', 1, 0
```

INT 0D0h itself provides only a couple of minimal services:

**AH=0** terminates the CP/M guest system, as ENDGUEST would.

**AH=0E3h** is a version of the PCW system call CD VERSION. It returns AL = host system type (1 for PCW, 41h for PcW16); BX = hardware detected; CX = BIOS version.

The TOD command will display the current clock time (if set under PCW CP/M) but cannot change it.

Character device reassignment (using STAT) is not supported. To reassign devices use DEVICE under PCW CP/M before launching GUEST.

CP/M-86 has the use of memory up to 0E0000h.

The 0E0000h-0EFFFFh contains the host PCW's 64k TPA. For example, you will see the PCW BDOS at E000:F600, and the running GUEST.COM at E000:0100. Writes are only permitted to an area marked by GUEST.COM as writeable, so it is not possible to overwrite the PCW's zero page or BDOS from CP/M-86.

The 0F0000h-0FFFFEF range contains the PCW screen, mapped as a linear array of 256 rows each containing 90 bytes (rather than the more complicated memory layout seen when accessing the screen memory from PCW CP/M). It also contains the PCW font (at F000:7800-F000:7FFF).

Further information may be gleaned from the source code of ENDGUEST, LOADPIC and SAVEPIC.

## 10 Recent Changes

### New in v2.5.2:

- Added built-in LocoLink server, and support for emulating LocoLink using shared memory.

### New in v2.5.0:

- Added CP/M 2 and CP/M-86 guest subsystems, allowing programs for these versions of CP/M to be run within ANNE.
- Compilation fix: rename 'byte' type to 'zbyte' to avoid clashing with native C++ byte type.

### New in v2.2.12:

- Keyboard mapping has been corrected: the # and \ keys should now respond correctly under Windows.

### New in v2.2.7:

- Access to host system files by CP/M programs now prompts for each file being read / written.

### New in v2.2.1:

- Updated to the latest LibDsk and Lib765, to deal with a crash caused by buffer overflow.

### New in v2.2.0:

- Minor code cleanups only.

### New in v2.1.9:

- Added Meta+F9 as an alternative for Menu, allowing ANNE to be used in Mac OS X.
- Other changes to improve performance on OS X.
- Updated LibDsk to 1.1.9, fixing a bug in rcpmfs for files saved as User 1.

### New in v2.1.8:

- Exposed the 'rcpmfs' functionality in LibDsk, allowing folders to be used as disc images.

### New in v2.1.7:

- Native GSX driver, using Digital Research GEM code released under the GPL.
- Added 'Select PCW screen' command.

### **New in v2.1.4:**

- Bug fix in mouse acceleration; the mouse pointer can't go off the bottom of the screen any more.
- Bug fix: The floppy changeline is emulated correctly.
- Bug fix: ANNE can tell the difference between 720k and 1440k disc images. This allows CP/M to boot from a 720k disc image.

### **New in v2.1.3:**

- Bug fixes in the graphics and floppy acceleration code. Compatibility with the built-in applications is now much improved.
- Bug fix: Installing from a .CFI file now works correctly.
- When browsing for a disc image, does not default to the /dev directory (Unix) or drive A: (Windows).
- Floppy disc image files are formatted by ANNE when they are created.

### **New in v2.1.2:**

- Added native acceleration options.
- Compiles without modification under gcc 3.2 (if configured with the `--with-stl` option).

### **New in v2.1.0:**

- First release.

## **A For UNIX system administrators**

First and foremost, *don't run ANNE as the root user!* ANNE gives the PcW programs within it various methods to access the host filesystem; it is entirely possible that a malicious PcW program running within ANNE could damage important UNIX files.

It is possible to set up a system-wide installation of ANNE with default settings, boot discs and other discs. To do this, first set up the desired configuration as a normal user. Then copy the following files:

- From `~user/Joyce` to `/usr/local/share/Joyce`: `annehw.xml`
- From `~user/Joyce/Boot` to `/usr/local/share/Joyce/Boot`: `anne*.rom` and `annebt.xml`
- From `~user/Joyce/Disks` to `/usr/local/share/Joyce/Disks`: Any other `.disk` files that should be common.

This will then become the default configuration on your system. Users will still be able to change settings or add additional discs; these will be saved to their local configuration directories.

## B Keyboard codes

Note that many of these keys don't exist in a standard PC keyboard. For example, the PC keyboard has no "\$" key (it uses SHIFT + 4 instead) so assigning codes to that key will have no effect.

Code	Key
8	Backspace
9	Tab
12	Clear
13	Return
19	Pause
27	Escape
32	Space
33	!
34	“
35	#
36	\$
38	&
39	,
40	(
41	)
42	*
43	+
44	,
45	-
46	.
47	/
48	0
49	1
50	2
51	3
52	4
53	5
54	6
55	7
56	8
57	9
58	:
59	;
60	<
61	=
62	>
63	?
64	@
91	[
92	\
93	]

94	^
95	_
96	`
97	A
98	B
99	C
100	D
101	E
102	F
103	G
104	H
105	I
106	J
107	K
108	L
109	M
110	N
111	O
112	P
113	Q
114	R
115	S
116	T
117	U
118	V
119	W
120	X
121	Y
122	Z
127	Del
256	Keypad 0
257	Keypad 1
258	Keypad 2
259	Keypad 3
260	Keypad 4
261	Keypad 5
262	Keypad 6
263	Keypad 7
264	Keypad 8
265	Keypad 9
266	Keypad .
267	Keypad /
268	Keypad *
269	Keypad -
270	Keypad +
271	Keypad ENTER
272	Keypad =

273	Up arrow
274	Down arrow
275	Right arrow
276	Left arrow
277	Insert
278	Home
279	End
280	Page up
281	Page down
282	F1
283	F2
284	F3
285	F4
286	F5
287	F6
288	F7
289	F8
290	F9
291	F10
292	F11
293	F12
294	F13
295	F14
296	F15
300	Num lock
301	Caps lock
302	Scroll lock
303	Right shift
304	Left shift
305	Right control
306	Left control
307	Right Alt
308	Left Alt
309	Right Meta
310	Left Meta
311	Left Windows
312	Right Windows
313	Mode / Alt Gr
315	Help
316	Print screen
317	SysRq
318	Break
319	Menu
320	Power
321	Euro

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