

# THE ULTIMATE BACKUP CARTRIDGE IS HERE



**DATTEL**  
ELECTRONICS

PLEASE READ THIS SECTION BEFORE PROCEEDING ANY FURHER  
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This manual covers both the standard Action Replay Mk.IV and the Action Replay 'Professional' Mk.IV. The manual refers to several versions of the operating system.

All units are virtually identical in operation in both features and performance. The 'Professional' does, of course, have the extra powerful, fully-floating Machine Code monitor which will not corrupt any memory, as well as the fully integrated freezer-menu.

Please identify your version of the Action Replay Mk.IV and observe the notes and instructions pertinent to that version. See Section 1.1 to help you identify your model.

MK.IV CARTRIDGE

These will have the V4.0 or V4.1 operating systems.

MK.IV 'PROFESSIONAL' CARTRIDGE

This will have the V4.2 operating system.

NOTE

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The Action Replay Professional Cartridge now has V5.0 operating system. The additional and enhanced features are fully explained on the last page of this manual. All other features described in the manual remain the same and the last page need only be referred to for information relating to the new V5 disk turbo and notes for the 1571 and 1581 disk drives.

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## SECTION 1 - GETTING STARTED

**1.1 - INSTALLING THE CARTRIDGE.** The cartridge fits into the expansion port of your computer. Looking from the front this is at the right hand side at the rear of the machine. **IMPORTANT:** Before inserting or removing the cartridge, ensure that the computer is switched OFF, otherwise both cartridge and computer may be damaged.

Insert the cartridge with the label side uppermost and the two buttons to the right, looking from the front. Firm pressure may be necessary but excessive force should not be used. Now switch the computer on. If your computer is a 128 or 128D it will power up in 64 mode.

**V4.0** - The normal Commodore powerup screen will be displayed - no special message will appear.

**V4.1:V4.2** - The cartridge version and startup menu will be displayed.

**1.2 - THE RESET BUTTON.** This is the rightmost button at the rear of the cartridge. Pressing this returns the cartridge to its powerup state as described above. The contents of computer memory are not destroyed, but any basic program in memory will be "newed". **V4.0 only** - occasionally you may need to switch the computer off and on to return to the powerup screen.

**1.3 - THE FREEZE BUTTON.** This is the inner button at the rear of the cartridge. Pressing this interrupts the normal operation of the computer and transfers control to the **FREEZE MENU**, from which Action Replay's powerful Backup, Graphics and Monitor functions are accessed.

**IMPORTANT:** The Freeze button does not work if the computer has "crashed" i.e. if the microprocessor has stopped "processing". To re-enable the system, press the Reset button or switch the computer off and on.

**IMPORTANT:** Do not hold the Freeze button down for more than a second or so, or your program may not be frozen correctly. Give it one quick press and then let go. You cannot successfully freeze a "frozen" program.

### **1.4 - THE STARTUP MENU.**

**V4.0** - There is no separate Startup Menu. In this version the following options are obtained from the Freeze menu, which pops up when you press the Freeze button:

F1 - RESET - A. Configure Memory. B. Normal Reset.  
F3 - RUN - continues the program which was frozen.  
F5 - MENU - gives access to the freeze facilities.  
F8 (hold SHIFT and press F7) - **FASTLOAD** - installs the Fastload/Utilities system. (see section 6)  
Pressing F5 leads to a second, "duckshoot" menu. To select from this menu, use the cursor Keys to highlight the required option and press RETURN. You can go back to the Freeze menu by pressing RUN/STOP.

**V4.1:V4.2** F1 - RESET - Configure Memory.  
F3 - RESET - Normal Reset.  
F5 - UTILITIES - see section 5.  
F7 - **INSTALL FASTLOAD** - see section 6.

In all versions, selecting RESET will make the cartridge "invisible" to the system and therefore undetectable by software. **CONFIGURE MEMORY** will fill the computers memory with a single byte value - this makes Action Replay's Backup Compaction System more efficient.

## SECTION 2 - MAKING BACKUPS

A BACKUP is a complete, working copy of any program. Action Replay makes backups by taking a "snapshot" of the whole of the computers memory, together with all graphics and timing information, which is then saved in compacted form to disk or tape.

**2.1 - PREPARING TO MAKE A BACKUP.** Have a blank tape or disk handy, for saving the backup. If a disk is brand new it needs to be formatted - see section 5. Select RESET - CONFIGURE MEMORY from the cartridge STARTUP or FREEZE menu (see section 1.4).

**2.2 - THE BACKUP PROCESS.** Load the program you wish to copy. When the program has loaded and is running, it may be frozen at any time by pressing the FREEZE BUTTON. Normally it is best to freeze a program on the title screen, but most programs can be frozen at any time you wish. Select BACKUP from the freeze menu. V4.0:V4.1 - press F5 then RETURN to select the backup option. The border will flash for 10-20 seconds while the compactor is operating, after which the program is ready to save by selecting from the BACKUP MENU.

**2.3 - SAVING TO DISK.** Before saving the backup you may wish to add a LOADER to the disk which allows backups to be loaded independently of the cartridge. The loader uses spare blocks in the directory and is best saved as the first file on a disk. However the loader may be saved at any time by selecting this option from the Backup or Utilities menu. Certain parallel DOS systems may be switched out when you save the loader. Reset the drive to re-enable.

Backups can be saved to disk in one or more of 3 styles:

1. TURBO - Single file save using the Action Replay Standard Turbo.
2. WARP\*25 - single file save using a special format for superfast loading. (IMPORTANT: read SECTION 6.2 for a full description of the Warp\*25 disk turbo).
3. STANDARD - uses the normal kernal routines, or FAST DOS parallel routines if fitted to your drive. Programs over 202 blocks will be saved in two parts.

Select the required option and enter the filename of your choice (up to 15 characters). Press RETURN to start the save. If the drive fails to respond, switch it off and on and try again. This is not usually necessary, but may be important if the original was a commercial disk program. All being well, your Backup is now complete. You may now save again in a different style, restart the program, or exit as required.

The program will not save correctly if there is insufficient space on the disk. You will receive the message "DISK FULL" or "FILE TOO LARGE". Insert a fresh, formatted disk and try again. On average, 3 backups will fit on one disk side.

**2.4 - SAVING TO TAPE.** There are two speed options:

1. TURBO - saves at 5-6 times standard speed - thats about the same speed as commercial tape turbos. This is a highly reliable speed which will never give loading problems. Use this if data security is the primary consideration. Backups load in 3-4 minutes.
2. SUPERTURBO - saves at 8-10 times standard speed - data is compressed much more and backups load in around 2 minutes. This speed requires a tape deck in good condition, and high quality, short length tape for reliable loading. Some tape decks are not capable of recording data at this speed. If you find that your programs do not load, then stick to Turbo speed.

**2.5 - HOW TO LOAD YOUR BACKUPS.** All tape backups have their own built in turboloader. Just press SHIFT/RUN in the normal way and the program will load and run. The cartridge does not need to be present. Ensure that the tape is wound to the correct point. Keep the tape deck away from the computer or TV set as these can cause electrical interference. Clean your tape heads regularly to ensure reliable loading.

The best way to load disk programs is with the cartridge, via FASTLOAD. To enable Fastload:

V4.1:4.2 - select INSTALL FASTLOAD from the startup menu.

V4.0 - Reset the computer. Hold the CBM key and press the FREEZE button. OR - Press the Freeze button, then press F8

V4.0 - The freeze button does not work when fastload is enabled. However, the cartridge is automatically reset after running a program which has previously been "backed up" by Action Replay, therefore such programs can be loaded by Fastload and subsequently frozen.

#### LOADING FROM THE DIRECTORY WITH FASTLOAD

1. Press F3 or \$ (dollar) to display the disk directory ( press STOP if a long directory scrolls the screen).
2. Move the cursor over the name of the program you wish to load.
3. Press F1 and the program will load and run.

#### LOADING WITHOUT THE CARTRIDGE PRESENT

1. Load "LOADER",8 and RUN. The loader must previously have been saved to the disk as described above.

2. Move the cursor over the name of the file you wish to load and press return.

Programs over 202 blocks in length, and all Warp\*25 files must be loaded either by the cartridge or the Loader. No alternative loading system can handle Warp files, but some can handle long, normal format files. Shorter programs and two part programs saved by the Standard save option can be loaded by the normal CBM kernal, or any sensibly written hardware based disk fastloader. If a two part program is loaded by the loader, only the first part will load at high speed.

#### 2.6 - TROUBLESHOOTING.

1. PROGRAM WILL NOT SAVE TO DISK. Try switching the drive off and on before starting to save. If you get "DRIVE NOT READY" it probably means that the disk is unformatted. Format the disk and try again. "DISK FULL" means that there is insufficient free space for the program. Use a fresh disk. Other error messages indicate a faulty disk.

2. PROGRAM TO BE COPIED WILL NOT LOAD. Certain programs can detect if the memory has been configured. Switch off and on and Select NORMAL RESET from the startup menu before loading the program. Also a few programs will not load if a disk drive is present. Switch the drive off and switch on after freezing the program.

3. PROGRAM COPIES OK BUT WILL NOT RUN WHEN RELOADED. Try switching off your drive after the program has loaded. Try freezing the program at a different point eg at "GAME OVER" screen. There are exceedingly few programs which cannot be successfully backed up by Action Replay. Several attempts may be necessary before certain programs which use intricate timing systems can be copied. Special "POKES" or parameters may be needed in some cases. See section 4.

## SECTION 3 - GRAPHICS FACILITIES

**3.1 - THE SPRITE KILLER.** To operate the Killer freeze the game and select SPRITE KILLER from the menu. You may then disable collisions between two sprites, or collisions between sprites and background data, or both. The program will then restart and, if successful, you will find that when two sprites collide, nothing happens. You can then sail through the whole game without losing a life! Results will vary from game to game. Shapes which appear to be sprites may actually be user defined characters, or the programmer may be using co-ordinate information rather than the VIC system to detect collisions. In such cases the sprite killer will have no effect. In general, the Killer is more effective on older games.

**3.2 - THE SPRITE MONITOR.** To enter the Sprite Monitor, freeze the program and select VIEW SPRITES from the menu. Any sprite shape in memory can now be displayed on screen. You can scan through the whole memory and the sprites will move across the display. Seven sprites at a time are displayed on screen. The central sprite is displayed double size, and is referred to as the CURRENT SPRITE. Key functions are:

- < and > Move up or down memory.
- B Change video bank. The computer has 4 video banks each of which can be accessed in turn
- M Change mode. Sprites have two display modes, Standard and Multicolour. Displayed colours will be different from the actual ones, but these will be restored when you restart the program.
- S Save. The current sprite can be saved to disk or tape.
- L Load. Any sprite previously saved can be loaded back in to the current sprite position.
- W Wipe. "Removes" the current sprite by making it invisible.

Using these functions you can customise your programs by altering the sprite shapes. Press RUN/STOP to exit. You can then restart or backup the program, together with any alterations you have made.

NOTES: Most sprite positions are not used and will be displayed as random patterns. When loading a sprite from tape, you must enter the exact filename, or you can press return to specify no name, and the next sprite on the tape will load. Press the RUN/STOP key to abort a load.

As with the Sprite Killer, there are many variations in the way sprites are handled in programs, so unexpected results may sometimes occur.

**3.3 - SAVING HIRES PICTURES.** Action Replay Mk III has the facility to save multicolour hiresolution pictures to tape or disk. These may be from game loading screens, graphic packages etc.

To save a picture, freeze the program when the required picture is displayed, select PICTURE SAVE from the menu and follow the onscreen prompts. If the current display mode is not Multicolour Hires, you will receive an error message. Press RUN/STOP to return to the main menu.

Pictures can be saved in either of two formats to disk:

1. BLAZING PADDLES. Pictures saved in this format can be loaded into Datel's graphic package of the same name, and the Multicolour Slideshow program available on the Enhancement Disk (supplied separately).
2. KOALA. For use with Koala Pad software and other graphic packages which use the same format.

Pictures may be saved to tape in Blazing Paddles format only. These may be loaded into the tape version of Blazing Paddles, and also by using the tape slideshow which is built into Action Replay (see SECTION 5).

After a picture has been saved the computer will reset. Pictures saved to disk are prefixed (PI. for Blaz.Paddles and a graphic character for Koala) in accordance with the conventions used by those programs.

**3.4 - THE PRINTER DUMP.** If you have a CBM printer with dot graphics capability or an Epson compatible printer (with suitable cable), this facility allows you to print out the contents of the screen. Follow this simple procedure:

1. Freeze the program when the screen you want to print is displayed.
2. Press F7 to view the screen which will be printed. The background colour can be changed if you wish - while holding down F7, press F3 and F5 to change background and border colours.
3. Ensure your printer is initialised - switch off and on and adjust the paper position.
4. Select PRINTER DUMP and enter the appropriate PRINT TYPE NUMBER (see below).
5. Press RETURN to start printing. When the dump is complete or if you press RUN/STOP, you will return to the freeze menu. Most programs can be restarted after dumping the screen.

The printer dump can be used in any graphics mode, but it performs best in multicolour bitmap mode - shades of grey are printed to simulate colour shading. Sprites will not be printed. Some screens are "raster split" - in such cases only part of the screen display will produce a sensible printed output. PRINT TYPE NUMBERS:

- 0 - for CBM 801,803 or equivalent.
- 1 - for Epson compatibles.
- 128 - same as 0 but produces a "negative" printout.
- 129 - same as 1 but produces a "negative" printout.
- 33 - same as 1 but adds an extra linefeed.
- 161 - same as 129 but adds an extra linefeed.

If you find that there is a narrow blank space between printed lines, try adding 64 to any of the above numbers eg 129 becomes 129+64=193. This can help on some printers.

Users of the STAR NL10 with CBM serial interface can use the Epson numbers to give a higher density output.

**3.5 - THE TEXT MODIFIER.** Similar to the RENAME command for disk files - except that it works on names and other text in the computers memory. Before attempting to change any text, decide which word or words you want to change and write it down. Then select TEXT MODIFY from the freeze menu. Then enter the rename command in the form: NEWTEXT=OLDTEXT. eg. to change the words "FRED SMITH" to "JOHN BROWN" you enter:

JOHN BROWN-FRED SMITH

Then press return. Action Replay will search through memory for all occurrences of "FRED SMITH", and if found will change the text to "JOHN BROWN". After searching, the number of occurrences, if any, will be reported. The program may then be restarted or saved as required.

NOTES: You cannot search for a text string shorter than 4 characters. Ensure that the old text is entered EXACTLY as it appears on the screen. Any spelling mistakes will result in failure. The new text need not be the same length as the old text - any overspill characters in the new text will be ignored. Some times the changed text will not immediately appear on the screen - but you might find that it pops up later in the program! The modifier can search and replace both CBM ASCII and screen codes - many programs use different codes to represent characters - if this is the case then the text will not be found. Knowledgeable users can also use the Hunt and Interpret commands in the machine code monitor to search and replace text. See SECTION 8.

## SECTION 4 - POKES AND PARAMETERS

**4.1 - HOW TO ENTER "POKES".** Computer magazines often publish "Pokes" which can be entered into programs to add features such as infinite lives to game programs. These often require the machine to be reset. Action Replay's RESET BUTTON will reset the machine so that you can enter these published pokes.

In addition, the cartridge allows you to enter pokes after a program has been frozen. Select POKES after freezing the program, enter the required poke or pokes (one at a time) and press RUN/STOP. The program can then be restarted or saved as required. Some useful "pokes" are listed in section 8. We regret that we cannot answer queries about pokes for specific games.

**4.2 - MONITOR FUNCTIONS.** Sometimes pokes need to be entered in machine code. Action Replay's MONITOR LINE can perform this task. To display the monitor line select MONITOR or press "M" on the freeze menu.

**V4.2 - Selection of Monitor** will enter the full machine code monitor. See SECTION 7. The following notes do not apply to V4.2 owners.

A xxxx shows the restart address. Enter a new value (in hex) and press return to change the restart address.

M xxxx displays 8 bytes of memory in hex. Use the cursor keys to scroll up and down in memory. Values can be altered by typing over the byte and pressing return.

F fills memory eg F 4000 5000 AA will fill that memory range with the byte \$AA

Some important memory locations which may be altered are listed below:

\$0068	Location \$01	\$0069	Location \$00
\$006C	Stack pointer	\$0082	X register
\$0083	Y register	\$002D	NMI enable mask

The accumulator and status register are on the stack, followed by the restart address. Press RUN/STOP to exit the monitor line.

**4.3 - THE PARAMETER SYSTEM.** Action Replay has a built in system which can read special "parameter files" into a frozen program. The current ACTION REPLAY ENHANCEMENT DISK, which is available as a separate item, has a large collection of parameters which allow most multistage tape programs to be transferred to disk, with fastload of subsequent parts. The parameter system is disk only. One parameter is built into Action Replay - This is for transfer of NOVALOAD tape programs to disk (section 5.4).

**4.4 - MULTISTAGE PROGRAMS.** These are programs which load extra parts as the program progresses. Some multistage disk programs can be copied by freezing and saving the main part of the program, then copying the extra parts with the disk filecopier (see section 5). However most newer disk programs are protected against this and are best copied by a good disk nibbler, rather than by a backup cartridge. Tape based multistagers fall into two categories - 1. NOVALOADERS, eg Winter Games, Summer Games II, Infiltrator and many more. Most of these can be transferred to disk by Action Replay. Novaloaders are easily identified by their Novaload title screen. 2. INDIVIDUAL LOADERS - these require specific parameters and filecopy routines which are supplied separately on the Enhancement Disk.

See SECTION 5.4 for how to transfer Novaload Multistagers to disk.

## SECTION 5 - THE UTILITIES MENU

The utilities menu is accessed either via the Freeze Menu, or from the Startup Menu ( V4.1 and 4.2 only ). Some of the utilities can also be called directly from Fastload (see SECTION 6). You cannot return to a frozen program from the utilities menu.

**5.1 - FORMATTING A DISK.** When a disk is new its needs to be "formatted" before it can store any programs. When you select this option you will be asked to enter the disk NAME, which can be any name up to 16 characters in length, and the ID number which can be any two characters. Press RETURN and the disk will be formatted at high speed. The directory of the disk will be displayed. Occasionally, fast formats do not "take" first time. If the directory does not show 664 BLOCKS FREE, try again and everything should be OK. If a disk persistently fails to format, a faulty disk is indicated. NOTE: Formatting a disk destroys any previous information which may have been on the disk. Be certain that you have the correct disk inserted before selecting this option.

**5.2 - THE DISK FILECOPIER.** The filecopier will handle Program, Sequential, User and Warp\*25 files up to 247 blocks in length (255 in the case of Warp files). Program may also be converted from PRG to WARP\*25 or vice versa). The utility can be used with one or two drives. The MULTI-OUTPUT option allows several copies to be taken from each pass.

When you have selected your options, press space and each file in the directory will be displayed in turn. Press Y if you want to copy that file, otherwise press N and it will be ignored. Any files which cannot be handled eg Relative files, will be skipped. At the end of the directory, the selected files will be loaded. Several passes may be necessary depending on the length and number of files selected. You will be prompted to swap disks when necessary. The SOURCE DISK is the disk which is being loaded FROM, and the OUTPUT DISK is the disk which is being saved TO. The output disk (or disks if you selected multi-output) should be formatted in advance. NOTE: The filecopier cannot copy the Action Replay Loader. This must be saved using the separate option on the utilities menu.

**5.3 - THE WHOLE DISK COPIER.** This is a very fast, single drive copier for unprotected disks. The process requires three passes - you will be prompted to insert your source and output disks in turn. The output disk need not be formatted in advance, but remember that all previous data will be lost from the output disk - so put a write protect tab on the source disk to avoid losing data if you get the disks mixed up. A whole disk will be copied in about 2 minutes. If you press Y when prompted: VERIFY SAVE? (Y/N), the data is written twice to the drive to perform a full verify operation. This lengthens the process somewhat, but gives a complete check of the written data. Protected or faulty disks will return errors if verify is selected.

**IMPORTANT:** WARP\*25 programs use a special data encoding system. Disks containing Warp files cannot be copied by this utility. Use the filecopier instead, or use a GCR or "nibble" type whole disk copier.

**5.4 - NOVA TRANSFER TO DISK.** A system for transferring most Novaload tape programs to disk is built into Action Replay, as described in SECTION 4.4. This is the procedure to follow in order to transfer multistage programs:

1. Load the main program up to the title screen. DONT rewind the tape.
2. Freeze the program and select PARAMETERS from the menu.
3. Enter NOVA when asked for the parameter code.
4. Press RUN/STOP to return to the main menu and save the program to disk, as described in Section 2.3.
5. After saving the program, select EXIT TO UTILITIES. Select NOVA TRANSFER from the Utilities menu.
6. The extra parts may now be transferred to disk. If no transfer occurs then the extra parts do not use the Nova system. Most newer titles use individually programmed loaders and special Parameters and file transfer programs are available for these on the ACTION REPLAY ENHANCEMENT DISK.

**POINTS TO NOTE.** Extra parts are often repeated on tape to avoid excessive tape winding. These files need only be transferred once, and the drive will ignore the repeated files. Some multistagers are very long and require two or more disk sides, so have at least one extra formatted disk ready.

**NOTE:** Transfer of the main section should be made from the original tape version of the program, otherwise the Nova parameter routine may not work correctly.

The extra parts are saved in normal form, but may be converted to Warp\*25 format by the filecopier. Please note that not all multistagers will successfully load extra parts in Warp form as this loader uses a little of the computer memory which may conflict with the program. The main part, however, can be saved in Warp form.

#### **LOADING MULTISTAGERS.**

Install FASTLOAD if you want the extra stages to load at turbo speed. When extra parts spread over more than one disk side, if a file is not found the drive light will flash. Insert the other disk and press SPACE. The drive will then load the required file. Sometimes you may need to press play on your tape deck before a file will load from disk. Multistagers will also load independently of the cartridge (at standard speed). **IMPORTANT: V4.0:** - You cannot freeze a program which has had a multistage parameter added, unless you load the main part of the program via the loader with fastload disabled. **V4.1 only:** Though the freeze button is active, stopping and starting a multipart program is NOT reliable if the main part of the program was loaded via Fastload - this is because the fastloader, if enabled, is linked into the main program when it runs. Fastload is switched out on restart.

**NOTE:** Nova transfer also allows you to copy normal (very slow) load tape program files to disk. Use this option for Kennedy Approach.

**5.5 - THE TAPE SLIDESHOW.** - Tape users have the benefit of a slideshow program for display of hires pictures which have been saved by Action Replay. See SECTION 3.3 for how to save hires pictures. To use the slideshow, insert the tape which contains the picture or pictures and press SPACE or FIRE and the picture will be loaded and displayed. If you have several pictures on the tape, press space or fire to load the next picture. Press RUN and RESTORE together to exit from the slideshow.

The disk slideshow was more complex and lengthy to program and could not be fitted into the cartridge. This is supplied as part of the Enhancement disk, supplied separately.

## SECTION 6 - FASTLOAD UTILITIES

FASTLOAD is the turbo and utilities area of Action Replay. Operating in the Basic environment, numerous extra commands and facilities are available. To install Fastload:

V4.0 - Press the Freeze button, then hit FB (SHIFT and F7).

OR - Hold the CBM key and press the Freeze button. IMPORTANT: The Freeze button does NOT work when fastload is installed. To re-enable, press the Reset button.

V4.1.4.2 - select INSTALL FASTLOAD from the startup menu.

6.1 - THE STANDARD DISK TURBO. When Fastload is enabled, all loads and saves occur at 6-7 times the normal rate. The disk turbo is independent of computer memory so it should never interfere with your program. The standard turbo saves in normal GCR format, therefore saved programs are fully compatible with other loading systems. The save routine uses a more efficient disk sector interleave - maximum loading speed is obtained only if that program has been saved by Fastload. Programs saved by the normal kernal routines will not load quite as fast. Some parallel systems use a very short sector interleave. Loading speed is considerably reduced when Fastload (and other serial turbos) is used to load files saved by such systems. The filecopier (SECTION 5.2) automatically converts files to the optimum sector interleave for Fastload.

Fastload always loads and saves RAM locations. The disk turbo can be switched in and out if required by the OFF and ON commands (SECTION 6.4). Most commercial programs incorporate their own fastloader which will override fastload.

6.2 - THE WARP\*25 DISK TURBO. Warp\*25 is, we believe, the fastest serial disk loader in the world. It will load an Action Replay program in 6-7 seconds. This speed rivals that of the best parallel systems. To achieve its great speed, a few restrictions apply:

1. In common with other "superfast" loaders, WARP\*25 files are saved in a special form which the normal CBM DOS cannot recognise. This means that WARP files can ONLY be loaded by Fastload or the independent loader, if present on the disk.
2. Warp files are slightly longer than normal files.
3. You cannot Validate a disk which contains Warp files.
4. Warp files need to be saved on contiguous tracks, therefore sometimes you may find that the system will return "DISK FULL" when there is apparently ample space on the disk. To avoid this it is best not to mix normal and warp files on the same disk. The filecopier (SECTION 5.2) can be used to "pack" warp files, thus making additional disk space available.
5. The normal Scratch command does not work on Warp files. However a special command is available.
6. Fastload uses the same command structure when dealing with both normal and Warp files. The load commands are identical for both types. When SAVING or SCRATCHING Warp files, you need to tell Fastload which filetype to use. This is achieved by adding a suffix (.W) to the filename:

SAVE"PROGNAME,W",8 - will save a Basic program in Warp form.  
@S:PROGNAME,W - will scratch a Warp file.

NOTE: @ is the "at" key, next to "P" on the keyboard.

The area from \$F900 - \$FFFF is used by the Warp save routine - Warp files cannot be saved from this area. The Warp loader does not overwrite this area.

### 6.3 - SINGLE STROKE COMMANDS.

To make your programming life easier, a number of single stroke commands are available from Fastload:

#### 1. FUNCTION KEYS. These are defined as follows:

- F1 - equivalent of LOAD"0:\*".,8,1 Press F1 then RETURN to load the first file on the disk.
- F2 - equivalent of LOAD"0:\*".,8,1 and RUN.
- F3 - display disk directory without corrupting memory.
- F4 - change background colour.
- F5 - LIST.
- F6 - change border colour.
- F7 - RUN.
- F8 - enter the Machine Code Monitor (See SECTION 7).

#### 2. EASY LOAD/SAVE COMMANDS.

```
/PROGNAME - equivalent to LOAD"PROGNAME",8,1
↑PROGNAME - equivalent to LOAD"PROGNAME",8 and RUN
&PROGNAME - equivalent to VERIFY"PROGNAME",8,1
‡PROGNAME - equivalent to SAVE"PROGNAME",8
‡PROGNAME.W - as above but saves in WARP*25 form.
```

Loading with these commands will only set the basic end pointers if the program loads to the start of Basic. Also, the filename does not corrupt the basic string area - two points useful to the machine code programmer. Very long files can be saved with the ‡ command where the normal save comand would give OUT OF MEMORY ERROR.

LOADING FROM THE DIRECTORY. If you display the directory and then move the cursor onto a line containing a directory entry, you can load that program simply by pressing F1 to load and run, or F2 to load without running. This is a very convenient way of loading a program.

#### 3. EASY ACCESS TO THE ERROR CHANNEL.

Instead of using OPEN15,8,15,"COMMANDSTRING":CLOSE15 , you may use the "G" key to send disk commands and read the error channel:

```
@ or @8 or @9 - reads the error channel.
@I - initialise the drive.
@V - Validate (cannot be used on Warp*25 disks).
@R:NEWNAME=OLDNAME - rename a file.
@N:NAME - clear the directory of a previously used disk.
@N:NAME,ID - format a new disk.
@$ or $ - display directory.
@S:PROGNAME - scratch a normal file.
@S:PROGNAME,W - scratch a WARP*25 file.
@H:NAME,ID - a new command not available in the normal DOS. This changes the name and ID of the disk without clearing the directory.
If you use a two drive system, the second drive can be accessed by reading its error channel eg @9 . Subsequent single stroke commands will be to device 9.
If a filename contains leading or trailing spaces, it may be enclosed in quotes eg. @S" progname"
When the format or scratch command is entered, you are prompted "ARE YOU SURE?". Press Y to continue. Any other key to quit. Consult your disk drive manual for further information about the error channel.
```

**6.4 - TOOLKIT COMMANDS.** A number of extra basic commands are provided, which operate in direct mode. The commands may be abbreviated by typing just the first three characters eg: MON will be interpreted the same as MONITOR.

OLD will recover a basic program which has been NEWed, or after pressing the reset button.

DELETE will delete a block of program lines. Syntax is the same as LIST except that the first line to be deleted must be specified.

example DEL 1000-2000 will delete lines 1000 to 2000 inclusive.  
DEL 1000- will delete from line 1000 to the end of the program,

LINESAVE will save to disk a section of a basic program.

example LIN"PROGRAM",8,1000-2000 will save program lines from 1000 to 2000 inclusive. Lines saved in this way may be loaded back as separate basic programs, or MERGED into other programs.

MERGE will load a basic program from disk and combine it with a program in memory. If two lines have the same number, the new line will replace the existing line. A program may also be merged with new line numbers.

eg: MERGE"PROGRAM",8 merges the program on disk with the prog in memory.

MERGE"PROGRAM",8,1000,10 will renumber the lines before they are merged, starting with line 1000 and incrementing in steps of 10. GOTO and GOSUB statements will not be renumbered. Merging into a long program is a lengthy process, so be patient.

APPEND differs from MERGE in that the new program is tagged onto the end of the previous one. It also occurs at turbo speed. eg APP"PROGRAM",8 loads the program, starting at the end of the previous one. For append to be useful the program to be appended should have line numbers greater than the existing program.

AUTO provides automatic line numbering as you type in a program. eg AUTO 1000,10 starts automatic line numbering at line 1000 and increments in steps of 10. To turn AUTO off, press return against a blank line. If you subsequently want to continue automatic numbering, type AUTO on its own, and numbering will continue from the last line number which was automatically displayed.

BOOT will load a machine code file and jump to the first address loaded. Eg if you have a program (say a basic extension) which you would normally load with LOAD"PROGRAM",8,1 followed by a SYS number, BOOT will perform the same function. Note that BOOT will only work when the program is started by SYSing to the first address loaded. Syntax BOOT"PROGRAM",8

PLIST will list any Basic program directly from disk to a CBM printer (device 4), without overwriting the program in memory. Syntax PLIST"PROGRAM",8. This command can also be used to print the directory - PLIST"\$",8. PLIST does not work with machine code and sequential files.

SLIST same as PLIST except that output is to the Screen.

OFF and ON - used to switch the disk turbo routines off and on. Useful if you have a parallel system installed.

COPY or @C - FILECOPY - see SECTION 5.2

BACKUP or @B - WHOLE DISK BACKUP - see SECTION 5.3

## 6.5 - THE TAPE TURBO.

A programmers tape turbo is built into Fastload. This is quite different from the tape turbo used on backups. All tape backups load completely independently of the cartridge.

An important point to note about tape turbos is that all different tape turbos use their own special format for saving programs to tape. This means that this tape turbo can only load programs which have been saved by itself. Normal speed programs and those recorded by other tape turbos CANNOT be loaded by the Fastload Tape Turbo.

When you enable Fastload, the tape turbo is OFF. It can be switched in and out as required by the following command:

```
@1 (press RETURN)
```

You get the message:

```
TAPE TURBO ON
```

To switch the turbo out again enter the @1 command again. You get the message:

```
TAPE TURBO OFF
```

From this you can see that your existing, slowload programs can easily be converted to turbo format:

1. Switch the tape turbo OFF with @1 (RETURN).
2. Load your slowload program.
3. Switch the tape turbo ON with @1 (RETURN).
4. Insert a new tape and save the program with SAVE"PROGNAME".

The turbo works exactly like the standard, slow routines, except that speed is increased by 5-6 times - a very reliable speed which will never give loading problems, provided that you take the usual precautions when using tape:

- a) Keep your tape heads clean.
- b) Keep the tape deck away from sources of electromagnetic interference such as the computer or TV set.
- c) Leave a gap between programs on the tape and keep a note of the tape counter reading for each program, so that you can easily locate it on the tape.

This tape turbo also works with sequential files. Speed increase is not quite so great, because time needs to be allowed for the tape motor to pick up speed as each buffer is loaded.

An alternative method of switching between Slow and Turbo tape speed is by means of the device number. Normally, the device number is 1 for tape. Device 7 switches the turbo ON and device 6 switches it off again.

```
LOAD"PROGNAME",7 switches the turbo ON for that load and subsequent loads.
```

```
LOAD"PROGNAME",6 switches the turbo OFF for that load and subsequent loads.
```

Remember, you can only load a program with Fastload's Tape Turbo if it was previously saved by the Fastload turbo. Commercial tape programs should be loaded with the cartridge switched out. See SECTION 2.

## SECTION 7 - THE MACHINE CODE MONITOR

Action Replay includes a powerful, extended Machine Code Monitor. To call the monitor from Fastload, enter MON or press F8

V4.2 ONLY - the full Monitor is available from the Freeze Menu. All of the computers memory including the screen, stack and zero page, may be examined in its condition at the point at which the program was frozen. All 64K of memory remains unaffected by the monitor. Any alterations made by the user will be incorporated into the program when it is restarted or saved to disk or tape.

A working knowledge of 6502 assembly language and hexadecimal notation is required by the user if the Monitor is to be used effectively. Some of the monitor instructions can cause the system to crash if the user is not fully aware of what is going on.

### 7.1 - COMMAND SUMMARY.

X	- Exit to Basic or Freeze Menu.
A	- Assemble
D	- Disassemble
M	- Display memory in Hex
I	- Interpret memory as ASCII codes
I*	- Interpret memory as CBM screen codes
*	- toggle RAM/ROM modes.
R	- Display registers at entry or freeze time.
F	- Fill memory.
C	- Compare memory.
T	- Transfer memory.
G	- Execute program as per register display.
N	- Number conversion.
P	- (prefix). Direct output to a CBM printer
B	- execute a Basic command.
L	- Load.
S	- Save.
V	- Verify.
@	- read error channel or send disk command.
\$	- display directory.
@*8	- access drive memory (device 8)
@*9	- access drive memory (device 9)
@*	- return access to computer memory
@ME	- execute memory in disk drive.
@BR	- Read a Disk sector into computer memory.
@BW	- Write a sector from computer memory to Disk.

### 7.2 - DESCRIPTION OF COMMANDS.

1. EXAMINING MEMORY. Memory may be examined in Hex/Ascii, Disassembly, or Interpreted as Ascii or screen codes.Examples:

.D C000 D000	disassemble from \$C000 to \$D000
.M C000 D000	display memory from \$C000 to \$D000
.I C000 D000	interpret Ascii from \$C000 to \$D000
.D C000	disassemble one instruction at \$C000
.M C000-	display memory from \$C000 onwards
.D	disassemble from the current address onwards.
.I*	interpret Screen codes from the current address.

The display can be controlled in two ways:

a) Function keys F5 and F7 cause continual scrolling up or down respectively. Best for fast scanning through memory. Any other key will stop or start the display. F5 and F7 change direction of scroll. STOP or CURSOR DOWN returns to the input prompt.

b) Cursor up and Cursor down will scroll the display by one line at top and bottom of the screen and return to input prompt. Best for editing. Memory may be altered - type over any byte, code or mnemonic and press return. A question mark indicates an error.

BANK SWITCHING. On entry, the monitor is in RAM mode - all system Roms are switched out during memory access. To access the Roms and I/O devices, use the \* command, which toggles between the two modes.

2. ASSEMBLY. eg: .A C000 LDA #\$01

Assemble an instruction in standard 6502 mnemonics at \$C000. The next memory address will be displayed ready for the next instruction.

3. REGISTER DISPLAY. .R

The program counter, A, X, and Y registers, location 1 and the stack pointer are displayed in Hex. The Status register is displayed in Binary. Registers may be altered by typing over the relevant Byte or flag.

4. FILL MEMORY. eg: .F C000 D000 AA

Fill memory from \$C000 to \$D000 with the byte \$AA

5. HUNT MEMORY. eg: .H C000 D000 01 02 03  
.H C000 D000 "STRING"

Hunt through memory for a sequence of bytes or an Ascii string. If any occurrence is detected, the address will be displayed.

6. COMPARE. eg: .C C000 D000 E000

Compare the area of memory from \$C000 to \$D000 with memory starting at \$E000. If there is any discrepancy, the memory locations will be displayed together with the bytes at those locations.

7. TRANSFER MEMORY eg .T C000 D000 E000

Move memory starting at \$C000 and ending at \$D000 and move it to memory starting at \$E000. This is an intelligent transfer - memory areas may overlap and may be moved either up or down in memory.

8. GO eg: .G C000

Load registers as per the register display and start executing the machine code program starting at \$C000. The program may end with either a BRK or an RTS instruction.

9. NUMBER CONVERSION eg .N \$C000  
.N 49152  
.N %10101010

Number conversion. Displays a number in HEX, DECIMAL, and BINARY. If the number is a single byte value, the Ascii character of that number will also be displayed.

10. OUTPUT TO PRINTER eg: .PM C000 D000  
 .PD C000 D000  
 .PH C000 D000 "STRING"

P is used as a prefix to another command. Memory display will be directed to the printer (device 4). Hold STOP to quit. You will find this a very useful command.

11. EXECUTE A BASIC COMMAND eg: .BPRINT8\*256  
 .BPRINT"TEST"  
 .PBLIST

12. LOAD and SAVE eg: .L"PROGNAME"  
 .L"PROGNAME",8,C000  
 .L"",1,C000  
 .S"PROGNAME",8,C000,D000  
 .S"PROGNAME",8,C000,D000,E000  
 .V"PROGNAME"

Load, Save, Verify. If a load address is specified, the program will be loaded to that location, otherwise it will be loaded to the address from which it was saved. Save requires a start and end address, which should be one byte after the last address to be saved. If an additional address is added to the save addresses, this will be saved as the reload address of the program (disk only). All disk I/O uses RAM locations. NOTE: V4.2 ONLY - you cannot load and save memory below \$0A00 if the monitor was entered from the Freeze Menu.

7.3 - DISK MONITOR FUNCTIONS. Disk owners can use the monitor to access drive memory with the @\* command:

Syntax: @\* (read device)(write device)  
 Device 0 indicates that the "device" is computer Ram. If no write device is specified the write device will be set to the read device number. If no parameters are specified then the monitor reverts to its default (read and write to computer Ram).

eg: @\*8 Read and write to device 8.  
 @\*89 Read from device 8, write to device 9  
 @\*80 Read from device 8, write to computer Ram.  
 @\*08 Read from computer Ram, write to device 8.  
 @\* Return to default.

All the monitor's memory access commands can be used with drive memory. Memory can be transferred between devices by setting up the required parameters before using the T command. The Compare command does not work with drive memory.

OTHER DISK COMMANDS:

@ME (address) - executes a program in drive memory.  
 @BR (TRACK) (SECTOR) (MEMORY PAGE).  
 @BW (TRACK) (SECTOR) (MEMORY PAGE).

Block read and write commands. If no memory page is specified then page \$CF will be used.

eg: @BR 12 01 40 - read track 18,sector 1 to page \$4000.  
 @BW 11 00 40 - write page \$40 to track 17,sector 0.

Parameters should be entered in HEX. Take care when writing a disk block - if you specify the wrong parameters you could lose info from the disk.

## SECTION 8 - HINTS AND TIPS

**8.1 - SOME USEFUL "POKES".** Action Replay is the most powerful Backup Cartridge in existence. However, a few programs incorporate special anti-cartridge protection and need to be altered slightly to allow them to be backed up successfully. SECTION 4.1 of this manual describes in detail how to enter pokes. Note that each poke in a list of pokes should be entered separately. Pokes specific to a named program cannot be used successfully on other programs.

**WIZBALL.** There are two versions of this program. Try each set of pokes in turn, to see which one suits your version.

a) POKE 31866,41:POKE 37511,96:POKE 35588,96

b) POKE 45,127:POKE 31871,41:POKE 35602,96:POKE 37516,96

**EAGLES.** POKE 60392,96

**ZONE RANGER.** POKE 45,127:POKE46,0:POKE47,0

If you come across a program which will not copy, it may be worthwhile trying the following POKES, which disable the NMI timer interrupts (the most common form of anti-cartridge protection).

POKE45,127:POKE46,0:POKE47,0

There is no guarantee that this will work, but it's worth a try.

Remember - if you find that a program will not load when the cartridge is plugged in - switch the computer off and on, and select NORMAL RESET instead of configuring the memory, before loading the program.

**IMPORTANT NOTICE.** The V4 versions of Action Replay do not work with the multistage filetransfer utilities on the V1 and V2 Enhancement Disks. Return the disk for replacement. If you require the latest, extended edition of the disk, which contains many new additions, please enclose your old disk plus \3.00 upgrade fee.

## ADDITIONAL NOTES FOR ACTION REPLAY PROFESSIONAL

1. **RESET PROCEDURE.** When you switch on or press the reset button, the startup menu is normally displayed. If you hold down the CBM KEY during powerup or reset, you can go directly to FASTLOAD without needing to select this option from the menu. If you hold down the CTRL KEY, the computer will do a normal reset, leaving the cartridge disabled.

2. **THE TURBOLINKER.** An extra option on the freeze menu. When you load and run a commercial program with fastload, you will often find that the cartridge turbo system is disabled for any subsequent load/save operations. To use this option simply freeze the program, select TURBOLINKER from the menu, and select the device to be linked. Then restart the program. Loads and saves will now be redirected to that device. Note that if the program incorporates its own turbo system, or does not use the normal load/ save commands, the linker will not work. If you link the tape turbo, remember that you can only load programs if they have already been saved by the Fastload tape turbo.

3. **PICTURE SAVE.** Several extra options are available for different graphic packages. You can now restart a program after saving a picture to disk, but not if saved to tape. When entering the filename, leave out any prefix or suffix required by the program. This will be added automatically. When using tape you need not specify a filename, but if you do, this must be entered EXACTLY when you load the program, so write it down. The current version of the slideshow works ONLY with programs saved in BLAZING PADDLES format. (the disk slideshow is part of the Enhancement disk, supplied separately). If you have saved a picture with the tape turbo (device 7), you should use the turbo linker (see above) to link the tape turbo into the relevant graphic program. Pictures will then be loaded and saved by that program at turbo rather than slow speed. Tape turbo pictures saved in Blaz. Paddles format use a different turbo which is compatible with that program, and you should not use the linker.

4. **THE MONITOR.** An extra command is available to display the CIA and VIC registers at freeze time: .IO Displays the IO registers \$DC00-\$DC0F, \$DD00-\$DD0F, and \$D000-\$D02E. Any alterations will be incorporated on restart or backup. This command only works if the monitor was called from the freeze menu.

5. **POKES.** To obtain working backups of the following programs, you should first enter the following pokes (one at a time) from the freeze menu:

SCOOPY DOO..... POKE 12477,76: POKE 12478,234: POKE 12479,48  
BALLBLAZER..... POKE 224,13: POKE225,0  
YIE AR KUNG FU II. POKE 224,203: POKE225,227: POKE231,53  
URIDIUM PLUS..... POKE 1288,234: POKE1289,234  
GREEN BERET..... POKE 256,96

**IMPORTANT.** In the professional cartridge, the freeze button is active whenever the microprocessor is working. However it is NOT appropriate to freeze the system when fastload is waiting for input, as the freezer is much less reliable in this instance. However, if you load and run a program with fastload, the freeze works fine, but you should remember that a backup of such a program may not load and run correctly because the cartridge will be disabled. Most commercial programs will disable the cartridge anyway, and this will not be a problem. If you do encounter any problem, disable the cartridge via the startup menu before loading a program if you intend to make a backup.

## ACTION REPLAY PROFESSIONAL - V5 OPERATING SYSTEM

The following enhancements to the disk turbo system are incorporated:

1. The standard disk loader uses Action Replay's extra Ram as a "track cache". Data is loaded independently of the way the data sectors are arranged on the disk, which greatly increases loading speed of all normal format files. Typically, a 200 block file will load in around 9 seconds, whereas a "normal" disk turbo would take between 20 and 30 seconds. The new loader uses standard GCR format and can load files of any length.
2. The disk copy now works with either one or two drives. A BAM copy option is provided which can save a lot of time when copying disks which are not full. The copier is for unprotected disks only - it is not suitable for commercial disks, or those containing Warp files, which should be copied by the file copier.
3. Warp\*25 now uses no computer memory, therefore all multistage programs can be converted to Warp form (when disk space permits) without compatibility problems.
4. Fast load and save, and filecopy now also work with the new 1581 drive, and with the 1571 drive in double sided mode. Warp\*25 and the disk copier work with the 1541,1570,1571 in 1541 mode, Excelsior,Oceanic,Enhancer etc., but not with the 1581 or 1571 in double sided mode.
5. From the freeze monitor, memory may now be saved from \$0400 upwards, and loaded from \$0800 upwards. If you wish to save lower areas, move them to a higher address before saving.

### Notes for the 1571 drive.

Switch to double sided mode with the following:

```
@U0>M1          or:  OPEN 15,8,15,"U0>M1":CLOSE15
```

In this mode, both sides of the disk are used, giving twice the storage space when the disk is formatted.

To switch to single sided (1541) mode:

```
@U0>M0          or:  OPEN 5,8,15,"U0>M0":CLOSE15
```

The drive powers up in 1541 mode when connected to a 64, so enter the above command if you wish to use double sided mode. Side two of a double sided disk cannot be read by a 1541 drive.

### Notes for the 1581 drive.

Some samples of this drive are not very happy when working with a 64 or 128 in 64 mode. If you find that the system hangs when reading the directory or error channel, you should press RUN/RESTORE and enter the following commands:

```
@U0>B0          or:  OPEN 15,8,15,"U0>B0"  
@U0>B0          PRINT#15,"U0>B0":CLOSE15
```

Note how the same command is entered twice. It is only necessary with early samples of the drive, and should be entered each time you switch on the drive or reset the system. Thanks Commodore!

Warp\*25 does not operate with the 1581 or 1571 in double sided mode.

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