Datel Electronic Limited

ACTION REPLAY VI

THE ULTIMATE UTILITY CARTRIDGE

INSTRUCTION MANUAL

Congratulations on purchasing the finest utility cartridge for your Commodore 64 or Commodore 128 in 64 mode.

Please read Section 1 of this manual before installing your Action Replay Cartridge.

CONTENTS

1 - GETTING STARTED

1.1 - INSTALLING THE CARTRIDGE
The cartridge fits into the expansion port of your computer. Looking from the front. this is on 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. 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 you to the Startup Menu. The contents of memory are not destroyed, but any Basic program will be "newed".

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 Rest Button or switch off and on again.
IMPORTANT:- Do not hold the Freeze Button down for more than a second or the program may not be frozen. Give it one quick press and then let it go. You cannot freeze an already "frozen" program.

1.4 - THE STARTUP MENU
F1 - RESET - Configure Memory.
F3 - RESET - Normal Reset.
F5 - UTILITIES - see Section 5.
F7 - INSTALL FASTLOAD - see Section 6.

RESET switches the cartridge off, making it "invisible" to the system. CONFIGURE MEMORY fills memory with a single Byte value before resetting. This makes Action Replay's Backup Compaction System more efficient. You should select this option before loading a program to be backed up.

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 - MAKING BACKUPS

2.1 - PREPARING TO MAKE A BACKUP
Have a blank tape or disk handy, for saving the backup. If a disk is new it needs to be formatted - see Section 5. Select RESET CONFIGURE MEMORY from the Startup Menu (Section 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. Select BACKUP from the Freeze Menu. The border will flash for 10-20 seconds while the compactor is operating, after which the program is ready to save.

2.3 - SAVING TO DISK
Before saving the program 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 via the Backup or Utilities Menu. Backups can be saved to disk in one or more of three styles:-

1. TURBO - Single file 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 Warp* 25.
3. STANDARD - Uses the normal kernal routines, or FAST DOS parallel routines if fitted. Programs over 202 blocks are 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. 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 - Save at 5-6 times standard speed - that's about the same speed as commercial Tape Turbos. This is a highly reliable speed which will never give loading problems. Use this if data is the primary consideration. Backups load in 3-4 minutes.
2. SUPERTURBO - Saves at 8-10 times standard speed - data is packed 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 cannot record 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 Turbotoader. 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. To ensure reliable loading, keep the tape deck away from the computer or TV set and clean your tape heads regularly.
The best way to load disk programs is with the cartridge, via FASTLOAD.

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.
2. Move the cursor over the name of the file 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 formal 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. NOTE: The loader does not work with the 1581 drive.

2.6 - TROUBLE SHOOTING
1. PROGRAM WILL NOT SAVE TO DISK. Try switching the drive off and on before starling 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. Switch the computer off and on and select NORMAL RESET from the Startup Menu before loading the program. A few programs will not load if a disk drive is present. Switch the drive off and switch on after freezing the program.

3 - GRAPHICS FACILITIES

3.1 - THE SPRITE KILLER
To operate the Killer, freeze the program and select SPRITE KILLER. 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 program without losing a life! Results will vary from program to program. 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 programs.

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

3.3 - SAVING HIRES PICTURES

Multicolour pictures may be saved to disk or tape. Freeze the program when the required picture is displayed, select PICTURE SAVE from the menu and follow the on-screen prompts. If the display mode is not Multicolour HiRes, you will receive an error. Press RUN/STOP to return to the Main Menu-Pictures can be Saved in numerous formats to tape or disk, for loading into various graphics programs. When entering the filename, you should omit any special prefix, as this will be added automatically.
Pictures most be saved in Blazing Paddles format if you want to display them with the built-in Tape Slideshow (see Section 5.5).

3.4 - 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 colours can be changed if you wish, with F3 and F5.
3. Select PRINTER DUMP and enter the appropriate PRINT TYPE NUMBER (described below). Adjust the paper position.
4. Press RETURN to start printing. When the dump is complete, or if you press RUN/ STOP, you will return to the Freeze Menu.
The printer dump can be used in any graphics mode, but it performs best in multicolour bitmap mode - shades of gray 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.

3.5 - TROUBLE SHOOTING

Some serial printers "hang" on the serial bus - you may need to switch the printer off and on to reinitialise it. If you have a parallel interface connected to the serial port, you may need to send a command string to initialise it. You can do this via the machine code monitor with the @P command - see Section 6.6 for details of this. The print type numbers are described below:-

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.

Use number 33 or 161 if you find that the paper doesn't move up.
If you find that there is a narrow space between printed lines, try adding 64 to any of the above numbers e.g. 129 becomes 129+64=193.
Users of the STAR NL10 with CBM serial interlace can use the Epson numbers to give a higher density output.

3.6 - THE TEXT EDITOR

This allows you to edit a frozen text based screen. You can use all the normal screen editing keys, such as the CURSOR keys, INSERT, DELETE, etc.. plus some extra ones:-

CTRL-I   insert a line
CTRL-0   deletes a line
F3   changes the border colour
F5   changes the background colour

You can change the text colour in the normal way - hold down the CTRL or CBM key and press keys!-(. Press RETURN to exit. The editor works with text based screens only - you cannot get useful results on a bitmapped screen. Also, if the program uses a different character set, the display characters may not correspond with those printed on the keyboard - so a little experimentation may be necessary - try pressing SHIFT and CBM together to change characters. The screen editor can be used to insert your own messages on the game title screens. It is also a useful programming aid, because the cursor column and row, and the screen address are displayed - which helps in designing screen layouts. The editor replaces the Text Modifier in old editions of the cartridge. Text searching is more easily achieved via the monitor.
Enter the monitor and type .I (RETURN). This displays memory in the form of ASCII characters. You can scan through the whole of the memory looking for text strings - to change any text simply type over it and RETURN. Make sure you don't type over non-text areas. You can also display screen codes by typing, I* (RETURN). Type>X to leave the monitor.
Refer to Section 7 of this manual for more details of the monitor.

4 - POKES & 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. To reset the machine, press the RESET button and select NORMAL RESET from the startup Menu.
In addition, the cartridge allows you to enter pokes after a program has been frozen. Select POKES, enter the required poke or pokes (one at a time), and press RUN/STOP. The program can then be restarted.

4.2 - THE POKE FINDER GENERAL

This is an automatic infinite lives finder for games. Until now, finding pokes was a difficult, long-winded procedure requiring specialised knowledge. Using Pokefinder, you can generate that elusive poke, even if you don't understand a word of machine code! Just follow this procedure:-

1. Load up and run your game. When play starts, note how many lives you begin with and press the Freeze Button .
2. Select POKEFINDER. You will be asked "HOW MANY LIVES NOW?" - enter the number of lives you started with. Pokefinder will now analyse the memory and display a list of possible pokes. Usually there will be many of these, so you will be prompted to "LOSE A LIFE AND REFREEZE".
3. Restart the game and continue to play until you lose a life. Make sure that you lose ONE LIFE ONLY. Wait for any "death sequence" to complete. When play resumes, press the Freeze Button.
4. Select POKEFINDER again.   You will get one of three messages:-

a) LOSE A LIFE AND REFREEZE - go back to 3. above.
b) ABORTED - Pokefinder has failed.
c) INSTALLED - the poke {or pokes) have been found and entered into the program. Write down the displayed poke(s) for future use.
If Pokefinder fails it may be because the programmer used an unusual method of counting the number of lives remaining. However, it can be that you got the starling number of lives wrong, or accidentally lost more than one life between passes - so it is worth going through the procedure again in case you made a mistake the first time. Tests show a success rate of over 80% - very high for this type of program. Some multiload programs need a different poke for each level, in which case you should repeat the above procedure after each Load.

5 - THE UTILITIES MENU

The Utilities Menu is accessed from the Startup Menu. Some of the utilities can also be called from Fastload (see Section 6).

5.1 - FORMATTING A DISK
When a disk is new it 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 O.K. 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). Programs 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 tile 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 tiles which cannot be handled e.g. 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 have 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
The Disk Copier is for the 1541 (and compatibles) only.
You can use the copier with one or two 1541 drives.   With a single drive you will be prompted to insert the Source and Destination Disks in turn.

BAM COPY - if selected, only the occupied tracks will be copied - this can save a lot of time when copying partially filled disks.

IGNORE ERRORS - it selected, the written data will not be checked. Otherwise, the written data will be verified against memory -this takes longer but gives greater security for important data.

NOTE:- Any deleted Warp files on the disk may cause spurious error reports.

NOTE:- If you have any difficulty in using the disk copier with the 1570 or 1571 drives, enter the following disk command:-
@UO>MO (RETURN)   This forces the drive into 1541 mode.

FASTLOAD is the turbo and utilities area of Action Replay. Operating in the Basic environment, numerous extra commands and facilities are available. To install, select INSTALL FASTLOAD from the Startup Menu, or hold down the CBM key when you power up or press the Reset Button.

6 - FASTLOAD UTILITIES

6.1 - THE RAM LOADER
RAMLOADER is a Disk Turbo - but a very special one. Special because it is fast - very fast! It uses standard GCR format, so it works with all your existing programs without special conversion. RAMLOADER will load a 200 block program in around 9 seconds, whereas a "normal" Disk Turbo would take between 20-30 seconds, and can load files of any length, It is fully independent of computer memory. It works with all drives from t the 1541 upwards (including the 1581, and the 1571 in two-sided mode).

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. However, some restrictions apply:-

1. 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 continuous tracks, therefore, 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.
To Save a program in Warp form, add the suffix ,W to the filename:-

        SAVE "PROGNAME,W"<8

NOTE:- Warp* 25 does NOT work with the 1581 or 1571 in two-sided mode.

Because the new Ramloader is so last, it is not really necessary to use Warp* 25, except when backups are to be loaded via the independent loader.   Warp is faster, but less convenient than normal format.
The Disk Turbo can be switched out with the command OFF. Load and Save will then be at slow speed (or parallel speed if such a device Is fitted to your system). Type ON to re-enable the Turbo.
The Ramloader can be switched off and on with the commands @K- and @K+. This reduces loading speed but doesn't blank the screen during load.

NOTE:- Some commercial programs will override the Disk Turbo.

6.3 - THE TURBO LINKER

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. This can be remedied by the Turbolinker.
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 it's own Turbo system, or does not use the normal Load/Save commands, the Turbolinker 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.

NOTES FOR THE 1571 DRIVE

Switch to double sided mode with the following:-

        @UO>M1   or   OPEN 15,8,15,"UO>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:-

        @UO>M)   or   OPEN 15,8,15,"UO>MO":CLOSE15
The drive powers up in 1541 mode when connected to a 64, so enter the aforementioned command if you wish to use double-sided mode.

NOTE:- 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:-

        @UO>BO or: OPEN 15,8,15."UO>BO"
        @UP>BO   PRINT£ 15,"UO>BO":CLOSE 15

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.

6.4 - 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:-

Fl - equivalent of LOAD"0:*",S,1.   Press F1 then RETURN to load the first file disk.
F2 - equivalent of LOAD "0:*",8,1 & RUN.
F3 - display disk directory without corrupting memory.
F4 - change background colour.
F5 - LIST.
F6 - goto Freeze Menu - just as if you had pressed the freeze button.
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 & RUN.
&PROGNAME - equivalent to VERIFV"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 coda programmer. Very long files can be saved with the £ command where the normal save command would give OUT OF MEMORY ERROR.

LOADING FROM THE DIRECTORY.

If you display the directory and then move the cursor onto a line containing an 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 OPEN 15,8,15,"COMMANDSTRING":CLOSE 15, you may use the "@" 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 (delete) a program from the disk.
@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, e.g. @9. Subsequent single stroke commands will be to device 9.
If a Filename contains leading or trailing spaces, it may be enclosed in quotes, e.g. /

"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.

6.5 - 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, e.g. MON will be interpreted the same as MONITOR.

OLD will recover a basic program which has just been NEWed.

DELETE will delete a block of program lines. Syntax is like LIST except that the first line to be deleted must be specified e.g. ;-
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 e.g.:-
LIN"PROGNAME",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 loads a basic program from disk and combines it with a program in memory. If two lines have the same number, the new line replaced the existing line. A program may also be merged with new line numbers, e.g.:-
MERGE"PROGNAME",8 merges a program with the program in memory.
MERGE"PROGNAME",8,1000,10 will renumber the lines before they are merged, starting with line 1000 and incrementing in steps of 10. GOTO & GOSUB statements will not be renumbered. Merging into along program is a lengthy process, so bs 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, e.g.:-
APP"PROGNAME",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 e.g.:-
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, e.g. if you have a program which you would normally load with LOAD"PROGNAME",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"PROGNAME",8.

PLIST will list any basic program directly from disk to a CBM printer (device 4), without overwriting the program in memory. Syntax PLIST"PROGNAME",8. This command can also be used to print the directory _PLIST"$",8. PLIST wont work with machine code and sequential files.

SLIEST is the same as PLIST except that output is to the screen.

OFF & ON - used to switch the disk turbo routines off and on.

COPY or @C - Filecopy - see Section 5.2.

BACKUP or @B - Whole Disk Backup - see Section 5.3.

Hex ($), binary (%) and octal (&) numbers can also be included in basic expressions, e.g. SYS 49152 could be entered as SYS $C000.

6.6 - 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 enter @1 again: TAPE TURBO OFF.
So it is easy to convert your existing, slowload programs to Turbo:-

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 simple precautions:
a) Keep your 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 and Keep a note of the laps 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 as 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 OFF again.

LOAD"PROGNAME",7 - Turbo ON for that load and subsequent loads.

LOAD"PROGNAME",6 - 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 Fastload Turbo. Commercial tape programs should be loaded with the cartridge switched out (see Section 2).

6.7 - CENTRONICS PRINTER INTERFACE.
ARVI can drive a Centronics printer connected to the computer's parallel port. Any output to the printer (device 4) will automatically be sent to the parallel port if a parallel device is connected and active. Note that you need a suitable connecting cable before you can use a parallel printer. The interface will normally perform any necessary character translation, including most graphic characters, but you can also send un-translated characters or "escape codes" e.g. to change style and formatting. To print a Basic program enter: OPEN 4,4: CMD4: LIST
When printing is complete enter: PRINT£4: CLOSE 4

To send special printer codes and untranslated characters you need to open a special channel (channel 9). Here is an example:-

10 OPEN 4,4: REM OPEN A NORMAL CHANNEL TO THE PRINTER
20 OPEN 9,4,9: REM OPEN A "COMMAND" CHANNEL
30 PRINT£9, CHR$(27)+CHR$(87)+CHR$(1);: REM EXPANDED PRINT ON
40 PRINT£4, "THE QUICK BROWN FOX"
50 PRINT£9,CHR$(27)+CHR$(87)+CHR£(0);: REM EXPANDED PRINT OFF
60 PRINT£4. "THE QUICK BROWN FOX"
70 PRINT£4: CLOSE4:CLOSE9: REM CLOSE PRINTER CHANNELS

This short example should print "THE QUICK BROWN FOX" in double width characters and again in normal size characters. Note the semi-colon (;) at the end of the command string - this prevents a carriage return from being sent at the end of the command siring. Refer to your printer manual for details of other special commands. Most, but not all, commands begin with the "escape character" CHR${27).
The interface prints according to the screen mode - you switch between "Business" and "Graphics" modes by pressing SHIFT 8 CBM together.
If you find that everything gets printed on the same line, you need to set a special "Dip Switch" on your printer to make the paper move down at the end of each line (a "Linefeed").   Again, refer to your printer manual.

If your primer cannot do this, you can send a special command to Action Replay which forces a linefeed with each carriage return:-
@P LF - causes a linefeed to be sent with every carriage return.
You can also print characters direction with @P, e.g.:-

@P "THE QUICK BROWN FOX"
@P 27,87,1 "THE QUICK BROWN FOX" 27,87,0 "THE QUICK BROWN FOX"

The second example does the same as the Basic program listed above. Note how you can mix command sequences and strings on the same line. The @P command works in Direct mode, or in the Machine Code Monitor, but not from within a program.

@P* - dumps the entire text content of the screen.

@P** - works in the Freeze Monitor, it dumps the frozen screen.

Refer to Section 3.4 of the manual for details of the graphic screen dumps.

7 - THE MACHINE CODE MONITOR

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

The Monitor is also available from the Freeze Menu.   In this mode all of the 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 Freeze Monitor. Any alterations made will be incorporated into the program when it is restarted or saved.

A working knowledge of 6502 assembly language and Hex 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 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 the printer (device 4).

B - Execute a Basic command.

L,S,V - Load, Save, Verify.

IO - Displays I.O registers (freeze mode only).

@ - Read error channel or send disk command.

$ - Display director.

@*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

NOTE: When an end address is specified it should be exclusive. The end address is one Byte greater than the last address to be operated on e.g.:-

.S"PROGNAME",8,C000,D000 saves up to but not including D000.

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

.D C000 D000 - disassemble from $C000 to $D000

.M C000 D000 - display memory from $C000 to $0000

.I C000 D000 - interpret Ascii from $C000 to $0000

.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. Set for fast scanning through memory.   Any other key will stop or start the display.   F5 and F6 change the direction of the scroll. STOP or CURSOR DOWN returns to the input prompt.
b) Cursor Up and Cursor Down will scroll the display by one line at the top or 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 systems 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, e.g.:-
.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 & Y registers, location 1 and the stack pointer are displayed in Hex. The Status register is displayed in Binary. Alter registers by typing relevant byte or flag.

4. FILL MEMORY, e.g.:-
.F C000 D000 AA
Fill memory from $C000 to $0000 with the byte $AA.

5. HUNT MEMORY, e.g.:-
.H C000 D000 01 02 03
.H C000 D000 "STRING"
Hunt through memory for a sequence of bytes or an Ascii string. If and occurrence is detected, the address will be displayed.

6. COMPARE, e.g.:
.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, e.g.:-
.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. e.g.:-
.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, e.g.:-
.N $C000   .N49152   .N %10101010   .N $C000+$FF
.N $FF-1+$4000   .N $FF00/(2*$AA)
Displays the result of an expression in HEX, DECIMAL and BINARY. If the expression is a single byte value, a PETASCII character is displayed.

10. OUTPUT TO PRINTER. e.g.:-
.PM C000 D000   .PH C000 0000 "STRING"
P is used as a prefix to another command. Memory display will be directed to the printer (device 4).   Hold STOP to quit.

11. EXECUTE A BASIC COMMAND   e.g.:- BPRINT8*256
.BPRINT"TEST:
.BPLIST

12. LOAD, SAVE & VERIFY,   e.g.:-
.L"PROGNAME"
.L"PROGNAME",8,C000
.L"",1,C000
.S"PROGNAME",8,C00,D00
.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:- You cannot load and save memory below $0800 if the Monitor was entered from the Freeze Menu.

13. I/O REGISTERS. .10
Displays the I/O registers $DC00-$DC0F, $DD00-$DD0F & $D000-$D02E. Any alternations will be incorporated on Restart or Backup. This command only works if the Monitor was called from the Freeze Menu.

7.3 - DISK MONITOR FUNCTIONS.
You 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) e.g.:-
@*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.
@808 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).
These are block read and write commands. If no memory page is specified then page $CF will be used e.g.:-
@BR 12 01 40 - Read track 18, sector 1 to page $4000.
@BW 11 00 40 - Write page $40 to track 17, sector 0.
You can specify decimal notation for the track and sector numbers by prefixing with the + character.   Separate the parameters with a comma, e.g.:-
@BR+18,+1,40 - same as the above example.
Take care when writing a dish block - it you accidentally specify the wrong parameters you could trash the disk.

7.4 - FREEZE & BREAK POINTS.
From the Freeze Monitor, you can set explicit Freeze and Break points in a program. Up to five Freeze or Break points can be set, which are cleared when program control passes to the Monitor.   To set a Freeze point disassemble the required part of the program and type SF against the required address e.g.:-
.> C000 A9 41 LDA £$41
.> C002 20 D2 FF JSR $FFD2
.> C005 60 RTS
modify like this:- .> C002 SF D2 FF JSR $FFD2 <RETURN>
entering the line gives:- .> C002 20 D3 DF JSR $DFD3
enter:- .G C000 <RETURN>
Control will pass to the Freeze Monitor at address C002 and the original instruction (JSR $FFD2) is restored.
Break points are set in the same way except that you type SB instead of SF. You can explicitly clear a Freeze or Break point by typing CB or CF against the address.

Freeze and Break points act exactly as if you had pressed the freeze button, but you can precisely control the point al which the program is frozen. Breaks pass through the IRQ vector at $FFFE and the break vector at $0316, so they are not suitable for programs which modify these vectors. Freeze points don't use these vectors, so they are particularly useful for programs (e.g. most games) which switch out the kemal Rom. However, because they use three bytes of code, you need to be careful not to place a Freeze at a point where program control may hit the second or third bytes of the freeze instruction, or you will crash the machine. The I/O ROM ($D000) must also be switched in.

Freeze points can be set only from the Freeze Monitor. You can directly place a freeze instruction (JSR $0F03) using either Monitor, in which case it will act as a subroutine, calling the Freeze Monitor and returning to the next instruction, or you can call the freezer from a Basic program with SYS 57299. On restart, the program will continue.

Remember - if you find that a program will not toad 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.