

# **3D CONSTRUCTION KIT**

**C64, SPECTRUM & AMSTRAD CPC**

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## *INTRODUCTION*

Welcome to the 3D Construction Kit. We had often been asked when a Freescape creator would be made, so here it is! It represents a total of four and a half years of actual development, and many more man-years.

The program uses an advanced version of the Freescape 3D System, and will allow you to design and create your own 3D Virtual Worlds. These could be your living room, your office, an ideal home or even a space station!

You may then walk or fly through the three dimensional environment as if you were actually there. Look around, up and down, move forward and back, go inside buildings and even interact with objects you find. The facilities to make a fully fledged action adventure game are even included: just add imagination...

Most of all, though, just have fun creating, experimenting, colouring and playing in 3D - You can easily lose all track of time.

I hope you enjoy using the 3D Construction Kit as much as we enjoyed creating it.

Have fun !



Ian Andrew

## REGISTRATION

It is essential to register as a 3D Construction Kit user, as support can only be given to registered owners. The registration form is included with the package.

All correspondence should be sent to Mandy Rodrigues, at the address shown below. If a reply is required a stamped addressed envelope must be enclosed.

## THE 3D CONSTRUCTION KIT USER'S CLUB

The Club is provided to offer additional help and advice for users of the 3D Construction Kit and will consist of a bi-monthly newsletter packed full of news, information, hints and tips on the system to allow everyone to use it to its full potential. It will also act as a forum for users to exchange ideas and information. To apply for membership to the club, just fill in the relevant section of the registration card and further details and information will be sent to you. All registration forms should be sent to:

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# ***LOADING INSTRUCTIONS***

## **AMSTRAD CPC**

Cassette - 64K CPC models (CPC 464, CPC 464, CPC 664 with cassette recorder).

### **Loading The Environment Editor**

Insert Cassette 1 with Side 1 facing upwards and rewind.

On machines with Disc Drives attached, type '|tape ' followed by <return> (the '|' character is obtained by pressing the Shift key and '@' together.)

Type 'RUN "' followed by <return> and follow on-screen instructions.

### **Loading The Condition Editor**

Insert Cassette 1 with Side 2 facing upwards and rewind.

On machines with Disc Drives attached, type '|tape ' followed by <return> (the '|' character is obtained by pressing the Shift key and '@' together.)

Type 'RUN "' followed by <return> and follow on-screen instructions.

### **Loading The Freescape Compiler**

Insert Cassette 2 with Side 2 facing upwards and rewind. On machines with Disc Drives attached, type '|tape ' followed by <return> (the '|' character is obtained by pressing the Shift key and '@' together.) Type 'RUN "compiler"' (no spaces) followed by <return> and follow on-screen instructions.

Please note: it will take a while before the compiler starts loading since various data files are located at the beginning of this side.

Cassette - 128K CPC Models

### **Loading The 128K 3D Construction Kit**

Insert Cassette 2 with Side 1 facing upwards and rewind. On machines with Disc Drives attached, type '|tape ' followed by <return> (the '|' character is obtained by pressing the Shift key and '@' together.) Type 'RUN "' followed by <return> and follow on-screen instructions.

### **Loading The Freescape Compiler**

Follow instructions for loading the compiler on 64k models.

Amstrad Disc

Insert disc with Side 1 facing upwards. Type 'run"disc' followed by <return> key and follow the on-screen instructions.

### **Data Files:**

To save your 3D worlds onto disc, you will need to format a blank data disc using the supplied formatting utility. N.B. DON'T FORMAT YOUR CONSTRUCTION KIT DISC.

Format a disc in the normal manner if you wish to save a stand-alone data set from the compiler.

Example data files - The 3dkit game' and border graphics are located on side 2 of the disc. Ensure this side is inserted upwards when loading the sample data into the Construction Kit.

## **SPECTRUM**

Cassette - 48K models

### **Loading The Environment Editor**

Insert Cassette 1 with Side 1 facing upwards and rewind. Type load"" (no spaces) followed by <return> and press PLAY on the cassette player.

### **Loading The Condition Editor**

Insert Cassette 1 with Side 2 facing upwards and rewind.

Type load"" (no spaces) followed by <return> and press PLAY on the cassette player.

### **Loading The Freescape Compiler**

Insert Cassette 2 with Side 2 facing upwards and rewind. Type load"" (no spaces) followed by <return> and press PLAY on the cassette player.

Please note: it will take a while before the compiler starts loading since various data files are located at the beginning of this side.

Cassette - 128K Models

### **Loading The 128K 3D Construction Kit**

Insert Cassette 2 with Side 1 facing upwards and rewind. Use loader option (refer to Spectrum manual) and press PLAY on the cassette player.

### **Loading The Freescape Compiler**

Follow instructions for loading the compiler on Spectrum 48K models.

SPECTRUM +3 Disc

Insert disc with Side 1 facing upwards and use loader option (refer to Spectrum manual). Follow on-screen instructions.

### **Data Files:**

To save your 3D worlds onto disc, you will need to format a blank data disc using the supplied formatting utility. N.B. DON'T FORMAT YOUR CONSTRUCTION KIT DISC.

Format a disc in the normal manner if you wish to save a stand-alone data set from the compiler.

Example data files - 'The 3dkit game' and border graphics are located on Side 2 of the disc. Ensure this side is inserted upwards when loading the sample data into the Construction Kit.

#### *NOTE:*

Upon loading an editor, a screen will appear which asks for one of the following options to be selected:

1. Sinclair Joystick.
2. Cursor keys (0 = fire).
3. Kempson Joystick.

The cursor keys option emulates a joystick and pressing the 0 key emulates the joystick fire button.

## **COMMODORE 64**

Commodore 128 users must enter C64 mode before loading (refer to manual)

Cassette

### **Loading The Environment Editor**

Insert Cassette 1 with Side 1 facing upwards and rewind. Press SHIFT and RUN-STOP together and press PLAY on the cassette player.

### **Loading The Condition Editor**

Insert Cassette 1 with Side 2 facing upwards and rewind. Press SHIFT and RUN-STOP together and press PLAY on the cassette player.

### **Loading The Freescape Compiler**

Insert Cassette 2 with Side 2 facing upwards and rewind. Press SHIFT and RUN-STOP together and press PLAY on the cassette player.

Commodore Disc

Insert disc with the label facing upwards and Type LOAD":\*",8,1 followed by <return> key (refer to commodore manual). Follow on-screen instructions.

### **Data Files:**

Ensure you have some blank, formatted disks at hand with which to save data. DO NOT FORMAT, OR SAVE ONTO, YOUR PROGRAM DISK !

# INTRODUCTION TO FREESCAPE

The 3D CONSTRUCTION KIT uses an enhanced version of the FREESCAPE® system. The system allows you to represent a virtual world that you can move around and interact with. This world is represented in three dimensions, known as X, Y and Z.

X is equivalent to left and right.

Y is equivalent to up and down.

Z is equivalent to near and far.

Movement around the world is achieved by using the icons in the editor (refer to later sections), or by using the keys listed in the appendix. Pressing the CONTROL key on Amstrad or Commodore, or SYMBOL SHIFT on Spectrum, whilst moving or turning speeds up the action.

## AREAS

The world is divided into regions known as "AREAS". Each area is like a box and has a set size of 8192 (X) \* 4096 (Y) \* 8192 (Z) units. These units are an arbitrary form of measurement which could easily be thought of as being millimetres, centimetres or metres. One unit is the smallest distance that you can move through.

## XYZ

A co-ordinate of X=0 Y=0 Z=0 (View: 0000,0000,0000) represents the nearest bottom, left hand corner of an area.

The world is seen from a single viewpoint which occupies one unit, looking in different directions. The direction is represented by three angles:

X rotation represents looking up or down (pitch)

Y rotation represents looking left or right (yaw)

Z rotation represents looking sideways (tilting your head) (roll)

These rotations are measured in degrees and 360 degrees means that you have turned full circle. Rotations are limited to multiples of 5 degree steps.

Rotations of X=0 Y=0 Z=0 (ROT: 000,000,000) means that you are looking straight ahead. Changing the Y rotation by 180 (ROT: 000,180,000) by doing a U-turn, means that you are looking directly behind you.

Changing the X rotation to 90 (ROT: 090,000,000) means that you are looking straight down. An X rotation of 270 (ROT: 270,000,000) means that you are looking straight up.

There can be up to 254 different AREAS defined by the user. An AREA can be used to represent a room of a house or an "outdoor" region. You can not travel beyond the boundary of an area.

AREAS have no geographical relation to each other, but are tied together by ENTRANCES. An ENTRANCE has a position and view direction. The user can then be placed at an ENTRANCE position in a specific AREA by some form of trigger (i.e. walking into a door. This could effectively "move" the viewer from a hall (one AREA) into a room (another AREA).

## OBJECTS

Objects can be placed into an area to make the environment. These are solid and, as such, cannot be passed through when moving. Objects can have different sizes in X, Y and Z directions. Object position and size are measured in a different co-ordinate system to the 3D world.

One unit in Object co-ordinates is equal to 64 units in the 3D world system, i.e. an Object with a size of 1 unit takes up 64 units in the 3D world. Objects must be placed at 64 world unit boundaries, i.e. it is not possible to place an object at co-ordinate 32 in world units.

There are several basic object types ("PRIMITIVES") which can be re-sized and combined to make larger, more complicated objects such as buildings, trees etc.

The primitive objects consist of:

### CUBOIDS

3 Dimensional boxes where the sides can be stretched and shrunk in 3 directions (X, Y and Z).

## **PYRAMIDS**

FREESCAPE pyramids are similar to conventional pyramids but are truncated at the top. (They are initially flat on the top). A FREESCAPE pyramid, like the cube, can be stretched and shrunk in 3 directions, but can have its sides pushed in to form a true pyramid or pushed out to form a cuboid. The pyramid can be rotated so that its base is on any of its six sides.

## **RECTANGLES**

Flat (2 dimensional) boxes whose sides can be stretched and shrunk in three directions at any time.

## **LINES**

Two points in 3D space joined together form a line. These two points may be moved in three directions.

## **TRIANGLES**

Three points in 3D space form a triangle. These points may be moved in three directions.

## **QUADRILATERALS**

Four points in 3D space form a quadrilateral. This can be non rectangular. These points may be moved in three directions.

## **PENTAGONS**

As triangles but with five points.

## **HEXAGONS**

As triangles but with six points.

## **SENSORS**

Single 3D point which can be moved in three directions. Sensors have the ability to detect your presence within a defined distance and even to fire at you! These are described in greater detail later on.

Objects such as pyramids and triangles, which do not occupy a whole cube of space, act like solid cubes when moving around the 3D world. For example, it is not possible to stand on the slope of a pyramid. This cube is known as the object's BOUNDING CUBE.

When editing points within these object, the points are stored as a fraction of the total object size. This fraction is represented as a number between 0 and 63, where 0 means that the point is at one side (minimum) of the cube and 63 means it is at the opposite side (maximum). Each point has a different scale in each of the three directions (X,Y and Z) to show its position with the objects BOUNDING CUBE.

For example: to make a pyramid with the apex (the pointed top) in the middle of the face of the BOUNDING CUBE, the apex would have X and Z values of 32 and a Y value of 63.

## **OBJECT ATTRIBUTES**

Objects can exist in three states: VISIBLE, INVISIBLE or DESTROYED.

### **VISIBLE:**

The object is present in the world as a solid form.

### **INVISIBLE:**

The object is not present in the world but can be brought into the world by being made visible.

### **DESTROYED:**

Once an object is destroyed it is invisible and cannot be made visible again (until the world is reset).

## **OBJECT COLOURS (SHADES)**

Each side of an object can have a different shade. A shade is made up of a mixture of the colours available on the computer used.

The first shade (number 0) has a special property in that it is not drawn. This can be used to improve the speed of drawing the 3D world when used on object sides which are never seen, such as the under side of a house or the back of a door which is placed against a wall.

By painting all of the sides of an object with shade 0 it is possible to have an object which cannot be seen but which is solid and cannot be moved through. Note: In this case the object's attribute will be set to VISIBLE even though it cannot be seen. This can be used to produce invisible barriers or invisible triggers on floors.

## **GLOBALS**

In order to conserve memory, common objects may be stored in a reserved area known as the GLOBALS AREA (AREA 255). These objects can be placed in any area by using the GLOBAL option in the editor. For example:

A floor that would be duplicated in other areas could be defined once as an object in the GLOBALS AREA and displayed in each area that would have the same floor. However, an object that is used globally will only appear at the same co-ordinate position as it was defined in. So a tree defined in the corner of the GLOBALS AREA can only appear in the same corner of the AREAS it appears in.

## **INTERACTION WITH OBJECTS**

Events or reactions can be caused by interacting with objects within the environment. Objects may be triggered to respond to being shot, activated (touched/pressed/ manipulated), collided with or walked on.

In order to shoot or activate an object, a "sight" mode is selected (by pressing the SPACE BAR) whereupon a cross-hair appears and is controlled using the normal movement keys or joystick. After targeting an object, the fire button or 0 key, when pressed, will then shoot at that object. To activate a targeted object the "A" key is pressed. However, an object will only be "activated" if the object is within a predefined distance known as the ACTIVE RANGE.

## **SENSORS**

A SENSOR is a special type of object that will detect your presence if you are within a set distance from it. This allows reactions to occur when approaching an object. A Sensor can also be set to respond by firing back at you at a given rate.

## **CONDITIONS - THE FREESCAPE COMMAND LANGUAGE (FCL)**

In order to interact with objects, checks and actions have to be defined in the form of short programs called CONDITIONS.

CONDITIONS are written using instructions which make up the FREESCAPE COMMAND LANGUAGE (FCL). FCL has a very simple but powerful set of commands which allow you to manipulate and respond to any occurrences

There is also a bank of memory which can be used by the user to store and view information relating to the environment and events. Each memory cell is called a VARIABLE. A VARIABLE can store a value between 0 and 255. There are 128 of these memory cells and are numbered 0 - 127. The first 112 (0-111) are free for the user to use for storage, whilst the last 16 (112-127) are defined and used by the system but can be viewed by the user and acted upon, if desired.

There are various categories of instructions in FCL and they are as follows:

### **VARIABLE MANIPULATION**

This set of instructions act upon values stored in the VARIABLE memory cells. These include commands to add to and subtract values from VARIABLES, comparisons of values and setting a value.

### **OBJECT MANIPULATION**

This set of instructions can alter the attributes of a specified object. There are instructions to visible, invisible, destroy and swap the visibility of objects.

### **VEHICLE COMMANDS**

This set of instructions affect the type of movement you have within the environment. They allow you to set movement to crawling, walking, running and flying. A command is also available to move the user to a specified ENTRANCE in a specified AREA.

### **CONDITIONAL INSTRUCTIONS**

This set of instructions allow the execution of segments of programs depending on the outcome of specific checks, such as: If a particular object is shot. If a particular object is collided with, if a SENSOR has sensed you etc.

### **MISCELLANEOUS COMMANDS**

This set of instructions deal with functions such as printing text messages, setting colours, playing sounds and setting the TIMER. The TIMER is a device that can be set to trigger a set of conditions at a defined regular interval of time.



CONDITION ROUTINES (the short programs written in FCL), are stored as lists. Each list is given a number for identification. There are three types of groups of conditional lists. They are:

GENERAL CONDITIONS  
LOCAL CONDITIONS  
PROCEDURES

### **GENERAL CONDITIONS**

These are a set of conditional lists (programs) which are executed all the time. Conditions used in this form are useful for checking for "End Game" situations, maintaining counters, and general overseeing of the whole environment. The first CONDITION in this set is only executed when the environment is reset. This allows you to initialise any variables or events at the start.

### **LOCAL CONDITIONS**

These are a set of conditional lists which are also executed all the time. However, there is a set of local conditions for each AREA. Only the set of conditions associated with the current area will be executed. LOCAL CONDITIONS are useful for checking and acting upon collisions with objects in the current AREA, Sensor handling, or any other occurrences that are AREA specific.

### **PROCEDURES**

These are a special set of conditional lists that are only executed at the request of another condition. Their main use is to replace frequently used functions by conditions, only being written once, thus preserving memory. They can also be used to extend the length of a condition list if a condition exceeds the maximum number of lines allowed.

### **INSTRUMENTS**

An Instrument is a device which displays information to the user. Instruments are not visible whilst in the editor, but are visible on the TEST screen or in a Stand-alone environment. There are two types of Instrument: BARS and NUMERICAL.

BAR Instruments are used to display the value held in a variable as a bar of a length in pixels (dots) equal to that value. They are always one character wide and can either be horizontal or vertical.

NUMERICAL Instruments are used to display the value held in a variable as a decimal figure. They can be set to display to a length of 1 to 5 characters. To display four or five characters, two variables are used to hold the value (see section on "HOW TO USE VARIABLES" and "MORE ABOUT VARIABLES" in the manual).

### **MESSAGES**

Messages are a way of communicating to the user by way of printing text to the screen. They are only visible on the TEST screen or in a "Stand-alone" environment -Messages are stored in a list; each item in that list being a single line of text. Each message can be printed to the screen by referring to its message number and its position at which it should be placed. This allows frequently used messages to be stored once.

### **LIMITATIONS TO FREESCAPE**

As FREESCAPE uses extremely complex mathematical algorithms to represent the 3D world on a 2D screen, there are a few basic limitations to what you can do:

Objects should not overlap. The bounding cube of one object should not occupy the same 3D space as any other. This is especially true when you have GLOBAL OBJECTS or objects which are made visible which overlap with normal objects.

The number of visible objects in any one AREA is limited due to memory restrictions. Excess objects are not drawn. The maximum number of objects depends on the computer you are using.

### **THE 3D KIT PROGRAMS**

On 48K/64K machines such as the Spectrum 48K, CPC464, CPC664, CPC464+ or Commodore 64, the Kit is split up into three programs:

#### **THE ENVIRONMENT EDITOR**

This allows you to edit Objects, Areas, Entrances and Colours.

#### **THE CONDITION EDITOR**

This allows you to edit the Conditions, Instruments, Messages and to test the world without the Editor screen.

## THE FREESCAPE COMPILER

This allows you to combine your 3D world together with your own border to create a Stand-alone program which can run without the Kit.

DATA can be loaded and saved to and from each program to create the complete world.

On 128K machines such as Spectrum 128K, +2, +2A, +3, CPC6128 or CPC6128+ (excluding Commodore 128), the Environment Editor and the Condition Editor are combined and more memory is available to create larger worlds.

## INTRODUCTION TO THE EDITOR

The Main Screen (see figure 1) is divided into five main areas:

1. The MENU BAR showing a list of Menu headings and the amount of memory remaining.
2. The VIEW WINDOW which normally shows a 3D view of your world.
3. The STATUS LINE which shows you some useful information such as your position in the 3D world.
4. The FREESCAPE ICONS which allow you to move around the world.
5. FURTHER ICONS (these change depending on what you are doing).

The 3D Construction Kit is designed to be user-friendly with icons and pull-down menus enabling the user to quickly understand the working environment.

Editor functions can be selected in one of two main ways:

1. ICONS are small boxes with either images or text in them showing what the icon is used for.
2. MENUS contain lists of functions which can be selected.

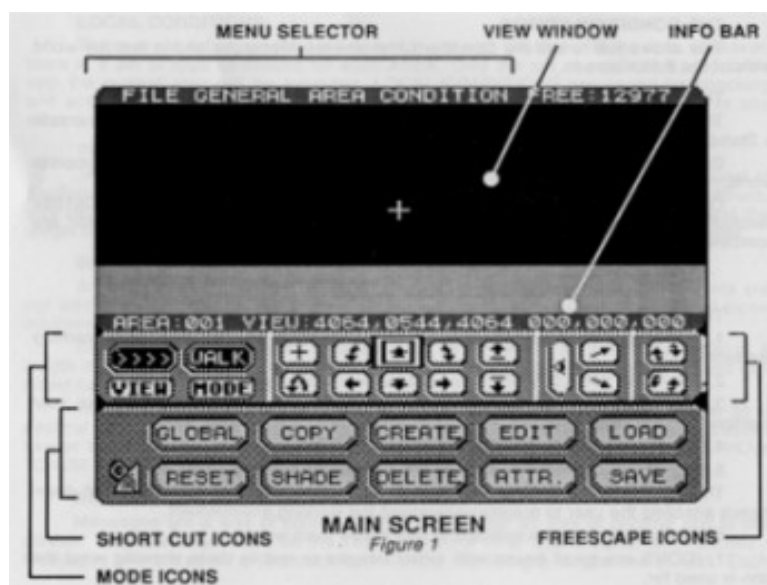
Upon loading the program you will see the Main Screen (Figure 1).

A box-shaped cursor will appear over one of the icons in the centre of the screen. This cursor highlights the currently selected icon. Pressing up, down, left or right on the joystick allows you to move the cursor around the screen from icon to icon. Pressing fire on the joystick activates the icon. For example: If the cursor is over the MODE icon then the mode will change. Moving the cursor above the top row of icons activates the MENU BAR.

THE MENU BAR consists of a series of headings at the top of the screen such as FILE. One heading is highlighted at any time. Pressing left or right on the joystick moves to the other headings. Pressing down on the joystick moves the cursor back onto the icons. Pressing fire over a heading will make a list of options (known as a menu) appear in the View window and the highlight will move to the first of these options. For example:

In the FILE menu there are options for LOAD and SAVE (there may be others depending on which version of the Kit you are using).

By moving the joystick up or down you may move the highlight to the option that you want or you may leave that menu by moving the highlight above the first option in the list. Pressing fire will select the option.



Below the Menu Selector you will see the main VIEW window. This area is always used to display the current FREESCAPE view.

Below the VIEW window is the INFORMATION BAR. This initially reads AREA001 VIEW 4064,0544,4064 000,000,000 (This may vary depending on the type of computer used). This shows the current area, your present viewpoint co-ordinates (shown as X,Y,Z), and the angle of view (yaw, pitch and roll). When in edit mode this line will change to read the object name you are editing, its position in the environment and its size.

Below the Information Bar you will see a series of icons. These are the MODE and FREESCAPE icons. The MODE icons are on the left of the screen. The VIEW icon is very useful. Whenever selected, the editor's VIEWpoint of the environment will cycle through North, South, East, West and Top View. Alongside this you will see an icon called MODE. Mode cycles between WALK, FLY1 and FLY 2.

## THE USER INTERFACE

### DIALOGUE BOXES

There are various parts of the environment creation which will require input from you to set the parameters relating to the current function. These parameters will usually be set within a DIALOGUE BOX. (See figure 2).

The setting of parameters is achieved either by selection or by typing values (with the exception of entering/editing MESSAGES, which allow for alphanumeric characters).



To enter or edit a numerical parameter, you must highlight the value then select it. The value will be cleared and a cursor appears, allowing you to enter a numeric value. To end editing of a particular text item, simply press the RETURN or ENTER key whereupon the cursor will be removed and any restrictions on numerical values will be applied i.e. if you were to type in the number 900 for the activate range and as the maximum value is 255, it will automatically be restricted to 255 on pressing RETURN. Note that while editing a parameter it is impossible to exit the DIALOGUE BOX or edit any other items until you have finished editing the current parameter by pressing RETURN or ENTER.

### EDITING FCL CONDITIONS - THE LINE EDITOR

The Condition editing screen will appear after selecting a condition from a list for editing. Upon entering the condition editor, if the condition is empty, you will see a blank screen with a bar, of half the screen width, at the top. The word END is written on the left hand side. This word is in fact an FCL (Freescape Command Language) instruction. This instruction will always appear at the end of the command list (But you place more END instructions anywhere in a list to end the processing of a command list prematurely).

The bar serves to highlight the line selected for editing, or the line at which new instruction lines will be inserted.

Pressing a letter key starts the command entry. A cursor appears at the bottom of the screen, allowing you to edit what is being typed. The editor will only allow you to type up to eight characters before the cursor jumps ahead to new position in the line. This is because Freescape instructions are no longer than eight characters in length. The position that the cursor jumps to signifies the start of a parameter field. Pressing SPACE will also take you to the next field if the command has less than 8 characters. An FCL instruction can have from zero to three parameter fields (depending on the instruction). Each parameter field consists of a number between 0 and 255. Pressing the space bar moves the cursor to the next field. Only Alphabetic characters may be typed in the first field (instruction field), and only Numeric characters in the three fields following (parameter fields).

Pressing Return (Enter) will place the line into the instruction list at the line highlighted by the bar. However, if there is an error in the typing or format of the line, then it will not be placed in the instruction. The screen will flash red and the cursor will appear in the field where the error occurred

To correct errors, use the left and right cursor keys to move the cursor along the line. The delete (shift+0 Spectrum 48K) key will move the cursor left one character deleting the character it moved onto. It is also possible to type over characters that already exist on the line.

When not editing a line:

The up and down cursor keys will move the highlight bar through the instruction list (if there is more than one line).

Pressing shift+D will delete the line highlighted by the bar (it will not delete the last END instruction).

Pressing shift+E will allow you to edit the line highlighted by the bar (it will not edit the last END instruction).

Pressing shift+C will clear the whole condition list.

Pressing ESC(CPC), RUN-STOP(C64), BREAK/shift+SPACE (Spectrum) or shift+X (on all formats) will leave the condition editor.

(Spectrum users note: all references to Shift means the use of the Caps Shift key)

Note: If the instruction list reaches the bottom of the screen it continues in another column on the right hand side of the screen. The maximum number of lines that can be edited is two columns worth.

## MOVING AROUND THE 3D WORLD

The movement icons in the centre of the screen can be used to move up, down, forwards, backwards, left or right. The turn icons allow you to turn or tilt your head to look in a different direction. Select the eye level icon to look forwards if you get confused.



The U-turn icon is used to turn around 180 degrees so that you can look directly behind you. The cross hair icon turns the movement cross in the centre of the view window on or off.

Selecting the MODE icon changes your current mode of movement. The possible modes are:

**WALK:** This mode allows you to walk around various objects and to climb them if they are not too high. However, you are limited by gravity so that you cannot leave the ground. Pressing down and up in Walk mode allows you to crouch down or stand up again. When crouched you may be able to move under an object which you would not fit through when standing. However, when crouched you cannot move forwards as fast so it is a good idea to be standing most of the time.

**FLY 1 and FLY 2:** These two modes are very similar. They allow you to fly through the 3D world as if you are wearing a jet pack!! The difference between Fly 1 and Fly 2 is that when moving forwards in Fly 1 you move parallel to the ground (at a constant height) whereas in Fly 2, if you are looking down and you move forwards your height will decrease. Fly 2 flies in the direction you are looking.

The VIEW icon is useful for looking at the whole of the current area. Normally this icon shows arrows pointing to the Mode icon which means that the View mode is not operational. Selecting the View icon cycles between NORTH, SOUTH, EAST, WEST or PLAN which shows you the whole area from that direction. (PLAN shows you the area from directly above).

If you find using the FREESCAPE movement icons confusing, then you can also use the keys listed in the back of this manual to do most of the useful things.

Note that the EDIT and FREESCAPE icons remain on the screen and can be used at most times during editing.

After loading you will be able to see some more icons below the movement icons. These allow you to change your 3D world. These icons are marked GLOBAL, COPY, CREATE, EDIT, LOAD, RESET, SHADE, DELETE, ATTRIBUTES and SAVE. A description of what each of these icons consist of will be found later in the manual (see section on SHORTCUT ICONS).

## ***GETTING TO KNOW THE MOVEMENT AND VIEWPOINT CONTROLS***

In order to demonstrate some of the features of the 3D Kit an example Data File (3dkitgame) is included.

First load in the data file from the disc or cassette. Move-the pointer to the LOAD icon and press fire. A dialogue box will appear asking for the file number.

DISC USERS: The Kitgame is stored as File 9 on Side 2 of the disc. So insert the disc with Side 2 facing upwards and press 9.

CASSETTE USERS: Put in the Cassette marked "Data Files" and rewind to the beginning. Press <return> when the Dialogue Box asks for the file number, and the program will load the next file on the tape.

Now using the FREESCAPE icons experiment with moving around the new environment. Move in all the directions you can until you become completely familiar with how to move yourself around within the FREESCAPE landscape.

Pressing the SPACE BAR will bring up a cross-hair cursor within the view window (this can be redefined). This is your "sight" and can be moved around using the joystick or cursor keys (depending on which option is selected upon loading with the Spectrum version). When in this mode, pressing the Fire button on the joystick (or the B key) will "shoot", and the lines of the laser gun will appear on the screen, culminating at the cross-hair cursor. In this mode, pressing the "A" key will in turn ACTIVATE an object where the cross-hair cursor is positioned if the object is near enough. Note that activate will have no visible effect unless conditions are entered for this function to operate. Pressing the SPACE BAR once again will return control of movement.

## ***THE 3D KIT GAME***

This has been included as an example to illustrate some of the environments that are possible. This is supplied as a data file and can be played as a stand alone game by using the Freescape Compiler or within the condition editor. First, load the condition editor (128K users can load the 128K Construction Kit). Then, ensure that you insert the kitgame tape/disc into the player/drive. From within the kit select LOAD from the FILE MENU and load file number 9.

Select TEST from the GENERAL menu to play the game from within the Kit.

The object of the game is to escape from the mysterious world in which you find yourself, and return to Earth. Some sort of space vehicle will probably come in handy (large clue). Pressing ESC, BREAK or RUN/STOP (depending on which computer you are using) will return you to the Editor.

Advanced use has been made of conditions, and these can be examined and edited using the relevant functions. See if you can complete the game without cheating!

## ***CREATING AND EDITING YOUR FIRST OBJECT***

First the existing data file must be cleared from the VIEW window. If you are using a 128K version of the 3D Kit move the pointer up to the MENU SELECTOR and move along to the FILE menu. Move the pointer down until NEW is highlighted and press the fire button. An ALERT BOX will appear warning that all current data will be lost if the operation continues. Select OK and after a few moments the VIEW window will clear revealing an empty area. Non 128K users will have to reload the Editor.

Now move the pointer to the SHORTCUT icons and select CREATE. These icons will now be replaced with a further set of icons each showing a particular type of object for you to select. Move the pointer to the CUBE icon and select it. A cube will now appear in the VIEW window. Note that the SHORTCUT icons reappear once the cube has been created.

Next select the SHADE icon and you will see that a list of objects appears on the upper left of the screen. At present it should show:

```
EXIT
001 ENTRANCE
002 CUBE
```

Select the CUBE. The screen should now change to show the SHADE PANEL.

To the left of the SHADE PANEL you still see six numbered rectangles which represent the six sides of the cube, showing their current shades. To colour the cube, select the side you wish to shade with the cursor, by highlighting the values to the right of the shaded rectangles numbered one to six. These values correspond to the value of the shade shown as 16 shaded boxes numbered 0 to 15, on the right hand side of the panel.

Select a face and type in a number then press RETURN (or ENTER) to alter its shade to shade. Repeat this process until all six of the rectangles are coloured to your choice. You will also note that at the same time the cube in the VIEW window is also being coloured. Entering 0 will make a side invisible.

Now we will edit the cube. Move the pointer to the OK icon and press the fire button. The SHORTCUT icons will now reappear. Move the pointer to the EDIT icon and press the fire button to select it. Now select CUBE 2 from the object selector list.

The EDIT window shows five different groups of icons, POINT, TURN, SHRINK, STRETCH and MOVE. The POINT icons will not function on cubes and rectangles.

Move the pointer to the STRETCH icons and press the fire button when over the icon represented by an arrow pointing to the right. The cube will now stretch towards the right. SHRINK has the opposite effect to STRETCH.

Experiment a little with these icons until you are completely familiar with stretching, shrinking and turning/flipping the cube. Then try to bring the cube back to its original size (8,8,8).

When you have done this, move the mouse pointer to the OKAY icon and the SHORTCUT icons will reappear. Now move the pointer to the COPY icon. The item selector will appear in the usual way. Select the cube once again.

You will now see that the cube has been copied in the VIEW window. This will be called CUBE 003. The new cube can be edited in the same way by selecting the cube from the item selector in the usual way.

## ***FILE MENU OPTIONS***

*Name:* **SAVE**

*Function:* To save all the data in memory to disc or cassette as a datafile. On some versions of the kit, A dialogue box appears. Select Tape, Disc or Abort. If Tape is chosen then follow instructions for tape users. If Disc is chosen then follow instructions for disc users.

### **TAPE USERS**

*Action:* A message appears asking you to Enter a File Number (0-9). Pressing a numbered key will cause the machine to save the DATA FILE. Ensure the tape player is recording before pressing a numbered key.

*Response:* The current datafile will be saved to cassette.

### **DISC USERS**

*Action:* Insert into the disc drive, a formatted Kit data disc (formatted using the supplied format utility). A message appears asking you to Enter a File Number (0-9). Select a File number.

*Response:* The current data file will be saved to disc.

*Note:* On Amstrad and Spectrum the Kit uses its own file system to save data, and as such, the files will not appear to be present if the disc is catalogued. REMEMBER to use discs formatted with the supplied format utility.

*Name:* **LOAD**

*Function:* To load data file from disc or cassette. On some versions of the Kit, a dialogue box appears. Select Tape, Disc or Abort. If Tape is chosen then follow instructions for tape users. If Disc is chosen then follow instructions for disc users.

### **TAPE USERS**

*Action:* A message appears asking you to Enter a File Number (0-9). Press the relevant key to select the file number you wish to load or press the RETURN (ENTER) key to load the next data file on tape.

*Response:* The data file will be loaded.

### **DISC USERS**

*Action:* A message appears asking you to Enter a File Number (0-9). Ensure the relevant KITDATA disc is inserted in the disc drive. Press the relevant key to select the file number you wish to load.

*Response:* The data file will be loaded.

*Note 1:* Any data previously in memory will be over-written.

*Note 2:* See also notes for SAVE.

*Name:* **NEW** (128K versions only)

*Function:* To clear the current Data from memory and replace with the default area.

*Response:* Alert Box will appear requesting confirmation of the action.

*Action:* Select OK or ABORT from the Alert Box.

*Response:* If OK selected the current data will be cleared. If ABORT selected the Data will be left as it was.

## GENERAL MENU OPTIONS

*Name:* **RESET**  
*Function:* Resets the game/environment to the initial position as set in the defaults.  
*Response:* The game/environment will reset. The viewpoint will move to the start area and start entrance.  
*Note:* This also resets all objects to their initial status and clears all variables.

*Name:* **SETUP**  
*Function:* Set up the default game Parameters.  
*Action:* Within this DIALOGUE BOX you can alter:  
1. The climb ability  
2. The "safe" fall distance  
3. The Walk speed  
4. The Turn speed  
5. The start area  
6. The start entrance

*Note:* RESET should be selected to set these Defaults.

*Name:* **INSTRUMENT**  
*Function:* To edit the various parameters associated with Instruments. (See section INTRODUCTION TO FREESCAPE for further information on Instruments.)  
*Response:* A list of the 8 available Instruments will be displayed.  
*Action:* Select an Instrument from the Item Selector.  
*Response:* A dialogue box will be displayed. Six parameters are available for editing:

TYPE  
X POS  
Y POS  
LENGTH  
VARIABLE  
COLOUR

**TYPE** selecting type cycles the parameter through the four available kinds of instrument.

**TYPE: Blank** This makes the instrument inactive. All other parameters are ignored.

**TYPE: Number** This sets the instrument to display a decimal value.

**TYPE: H BAR** This sets the instrument to display a horizontal bar reflecting the value of a variable.

**TYPE: V BAR** This sets the instrument to display a vertical bar reflecting the value of a variable.

### X POS AND Y POS

Selecting X POS or Y POS brings up a cursor requiring you to enter a co-ordinate (X or Y respectively), in characters for the bottom (V BAR) or the left end (H BAR) of a BAR, if the instrument type is a bar. Otherwise, if the instrument type is set to Number, the co-ordinates entered locate in characters where on the play screen to display it's decimal value.

### LENGTH

Selecting the LENGTH parameter brings up a cursor requiring you to enter a value. In the case of a BAR Type instrument, the length parameter represents the length in characters of the bar. One pixel of the bar length (there are eight per character) represents one unit of the variables value. In the case of a Number Type instrument, the length parameter determines how many decimal characters are to be displayed. The maximum is five • characters. The length also determines how many variables are used to display this value. One variable is used if the length is 1, 2 or 3. Otherwise Two variables are used.

### VARIABLE

Selecting the VARIABLE parameter brings up a cursor requiring you to enter a value. The Variable parameter names the variable that is to be referenced by the instrument for display. In the case of a Number Type instrument with a length set to four or five, two variables are referenced. The named variable contains the LOW-BYTE value for display, and the next variable should contain the high byte of the displayed value. i.e. if variable 5 is selected then variables 5 and 6 are used.



## COLOUR

Selecting the COLOUR parameter brings up a cursor requiring you to enter a value. This parameter determines the colour of the foreground and background of the instrument. The Parameter values are dependant on the machine used.

SPECTRUM

(ink)+(paper x 8)+(64 if Bright required)+(128 if Flash required)

CPC

(ink)+(paper x 4)

C64

(ink)+(paper x 16)

*Name:*

### SET WINDOW

*Function:*

To set the size and position of the FREESCAPE view window in the Test screen.

*Response:*

A dialogue box will appear asking for the user to enter the size and position of the VIEW window. (Windows are defined in units of characters of 8" pixels).

*Action:*

Enter the desired co-ordinates by pressing the fire button or 0 key whereupon a cursor will appear. Type the numerical input. When you have entered the size to your satisfaction select OK and press the fire button to return to the main Edit window.

*Note 1:*

These are arranged as the X POS, Y POS, X SIZE and Y SIZE.

*Note 2:*

The maximum size of the FREESCAPE 3D window is 14 characters high by 32 characters wide.

*Name:*

### TEST

*Function:*

Go to the Test screen allowing the environment to be tested.

*Note 1:*

Pressing SHIFT and T in the condition editor (or from the editor in 128K versions) will also go to the TEST screen. Pressing ESC (Amstrad CPC versions), RUNSTOP/RESTORE (Commodore versions) or CAPS SHIFT and X (Spectrum versions) will exit the TEST screen and return to the EDIT screen once more. (Note for Spectrum users only: All references to SHIFT+ key mean the use of the caps shift key at the same time as normal key).

*Response:*

Instruments can only be viewed within the Kit via the TEST option. The joystick can be used to move around the environment. The view window size is determined by the SET WINDOW option.

## AREA MENU OPTIONS

*Name:*

### ADD AREA

*Function:*

Create a new area.

*Response:*

A new Area will be created and the viewpoint will be moved to this new Area.

*Note:*

All new Areas contain an Entrance near the centre (Entrance 001). If this is not required it may be deleted.

*Name:*

### EDIT AREA

*Function:*

Displays details of the current area and allows the user to edit the area scale.

*Response:*

A dialogue box will appear. This shows the area name, the number of objects in the area and the area scale. The scale may be edited in the usual dialogue box fashion.

*Note:*

The scale affects your size, height, speed, activate, fall and climb distances.

*Name:*

### GOTO AREA

*Function:*

To move viewpoint to another area.

*Response:*

A list of existing areas will be displayed.

*Action:*

Select an area to go to.

*Response:*

Will move the viewpoint to the new area selected.

*Note 1:*

The Globals Area (Area 255) will also be displayed within the list of existing areas.

*Name:* **DELETE AREA**  
*Function:* Delete a specified area.  
*Response:* A list of existing areas will be displayed in the item selector.  
*Action:* Select an area from the Item selector.  
*Response:* The entire contents of the selected area including objects and conditions will be removed from memory.  
*Note:* This function is irreversible so use carefully! Also note that you cannot delete the area you are currently in.

*Name:* **COLOUR AREA (Spectrum)**  
*Function:* To set the area colours from the palette  
*Response:* A dialogue box will appear which allows you to change ink (0-7), paper (0-7), bright (0-1) and border (0-7) colours for the current area.  
*Action:* When satisfied with the selected colours select OK.

*Name:* **COLOUR AREA (Amstrad CPC)**  
*Function:* To set the area colours from the palette  
*Response:* A dialogue box will appear in which any of the 4 colours may be changed on screen. (The first colour also includes the border colour) and may be set to any of the 27 colours available (0-26).  
*Action:* When satisfied with the selected colours select OK.

*Name:* **COLOUR AREA (Commodore)**  
*Function:* To set the area colours from the palette  
*Response:* A dialogue box will appear in which any of the 4 colours may be changed on screen (colours in the range of 0-15), the first colour also changes the border colour.  
*Action:* When satisfied with the selected colours select OK.

*Name:* **ADD ENTRANCE**  
*Function:* Create a new entrance in the current area.  
*Response:* A new entrance will be created at your present position.  
*Note:* The new entrance will contain the position and view direction of the viewpoint at the time of its creation, therefore to set up an entrance to a specific view simply move to that position and look in the desired direction. Then select ADD ENTRANCE and the view will be stored as the last entrance.

*Name:* **EDIT ENTRANCE**  
*Function:* Allows you to edit an existing entrance.  
*Response:* A list of all entrances will be displayed.  
*Action:* Select the entrance to be edited in the usual manner.  
*Note 1:* To Edit an Entrance, move to your new desired entrance position and select EDIT ENTRANCE. A panel will display the entrance position and view direction. The view from this entrance can be seen by selecting VIEW. To alter the entrance to your current location and view select SET and your current position and orientation will be copied to the entrance data.  
*Note 2:* The Status Bar and Entrance information should now display the same values. View will show the new entrance.

*Name:* **GOTO ENTRANCE**  
*Function:* Move to a specified entrance within the current area.  
*Response:* A list of available Entrances will be displayed.  
*Action:* Select an entrance in the usual manner.  
*Response:* The viewpoint will be moved to the selected entrance.

## **CONDITION MENU OPTIONS**

*Name:* **GENERAL**  
*Function:* To CREATE, EDIT or DELETE General Condition.  
*Response:* A dialogue box will appear in which any of the following options may be selected:  
CREATE: To create a General Condition ready for editing.  
EDIT: To edit a predefined (created) General Condition. A list of existing General Conditions will be displayed. Select the condition you wish to edit in the usual manner.  
DELETE: To delete an existing General Condition. A list of conditions will be displayed. Select a condition in the usual manner and the selected condition will be deleted from memory.  
*Note:* Condition 1 is the initial condition and cannot be deleted.

*Name:* **LOCAL**  
*Function:* To CREATE, EDIT or DELETE Local Conditions.  
*Response:* A dialogue box will appear in which any of the following options may be selected:  
CREATE: To create a Local Condition ready for editing.  
EDIT: To edit a predefined (created) Local Condition. A list of existing Local conditions will be displayed. Select the condition you wish to edit in the usual manner.  
DELETE: To delete an existing Local condition. A list of conditions will be displayed. Select a condition in the usual manner and the selected condition will be deleted from memory.

*Name:* **PROC (Procedure)**  
*Function:* To CREATE, EDIT or DELETE a PROC Condition.  
*Response:* A Dialogue box will appear in which any of the following options may be selected.  
CREATE: To create a Procedure condition ready for editing.  
EDIT: To edit a predefined (created) Procedure condition. A list of existing Procedure conditions will be displayed. Select the condition you wish to edit in the usual manner.  
DELETE: To delete an existing Procedure condition. A list of conditions will be displayed. Select a condition in the usual manner and the selected condition will be deleted from memory.

*Name:* **MESSAGE**  
*Function:* To CREATE, EDIT or DELETE a MESSAGE.  
*Response:* A dialogue box will appear in which any of the following options may be selected.  
CREATE: To create a message field ready for editing or entering a message.  
EDIT: To edit or enter a message whose field had previously been defined. A list of existing messages will be displayed. Select the message you wish to edit. The message may be edited using the cursor keys and the Delete key (Shift+0 spectrum 48K). Typing in-between characters will insert text into the message. Press RETURN(ENTER) to finish editing.  
DELETE: To delete an existing message. A list of messages will be displayed. Select a message in the usual manner and the selected message will be deleted from memory.

*Note 1:* To see a message use FCL PRINT NN XX YY. You will need to precede the PRINT command with a TEXTCOL instruction. This will tell the TEXT printer what colour to display the message.

*Note 2:* MESSAGES and INSTRUMENTS will only display in the TEST screen.

## **THE SHORTCUT ICONS**

The following details the shortcut icons for the Environment Editor and the 128K Editor. Descriptions of the shortcut icons for the condition editor duplicate functions from the menus. Refer to the relevant menu headings for details.

*Name:* **GLOBAL**

*Function:* To bring up a list of the GLOBAL OBJECTS already defined within the system.

*Response:* A list of predefined objects in the GLOBAL area will be displayed each followed by a + or - symbol. The + symbol denotes that the object is included within the current area and - denotes it is not included.

*Action:* Position the cursor over the desired object and press the fire button (or 0 key) to either select + or -. The fire button (or 0 key) will toggle between the + or - symbols.

*Response:* Any Global Objects selected with a + symbol will appear within the current area.

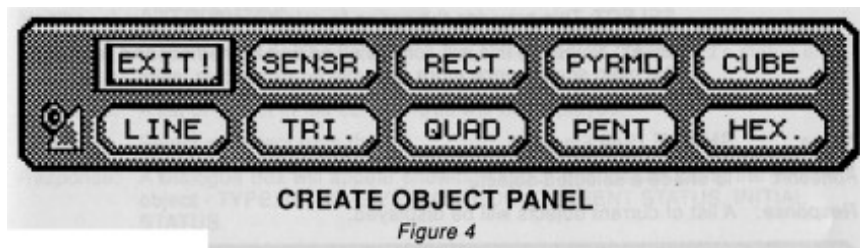
*Name:* **COPY**

*Function:* Create a duplicate of a specified object.

*Response:* A list of objects will be displayed.

*Action:* Select the object from the item selector.

*Response:* The new object will be created in the View window.



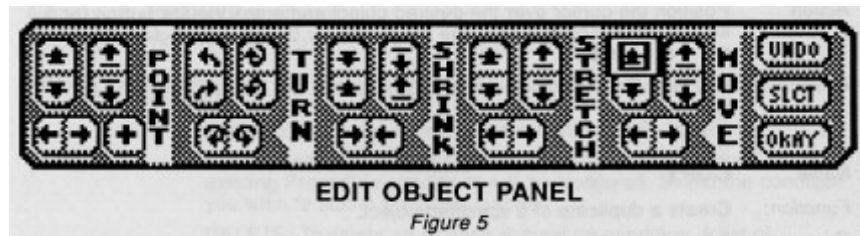
*Name:* **CREATE**

*Function:* Create a new object in the current area.

*Response:* A panel (see figure 4) will be displayed over the SHORTCUT icons showing the type of object available.

*Action:* Select an object type.

*Response:* The new object will be created within the View window.



*Name:* **EDIT**

*Function:* Edit a specified object.

*Response:* A list of the existing object within the current area will be displayed.

*Action:* Select an object in the usual manner.

*Response:* A new bank of icons (see figure 5) will be displayed over the SHORTCUT icons. The icons are split into five groups:

**POINT:** Alters the position of the point referred to in the INFO BAR. This function only applies to non rectangular facets and pyramids. In the case of facets all points may be moved.

*Note:* Stretching and shrinking will also move the points in the object.

**TURN:** Rotates the object in the direction of the arrows on the icons through 90 degrees.

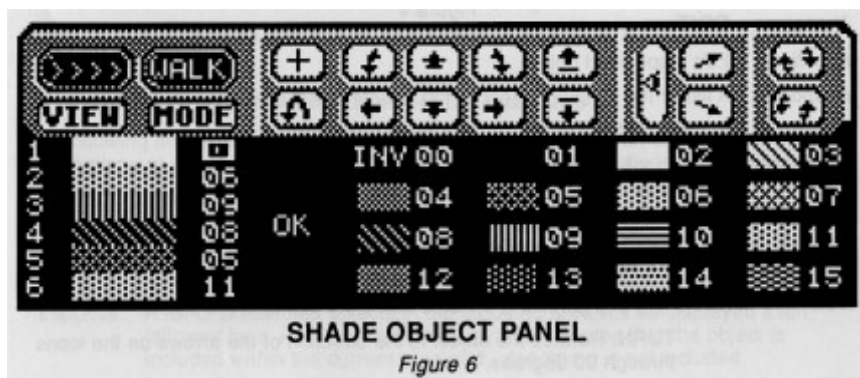
**SHRINK:** Decreases the size of the object in the direction of the arrows.

**STRETCH:** Increases the size of the object in the direction of the arrows. As with MOVE the object cannot be stretched beyond the boundary of the area.

**MOVE:** Move the object in the direction of the arrows. If an object being moved hits another object or the edge of the area it is butted against the obstruction.

To the right of the EDIT icons are three further icons as follows:

- UNDO: This function will undo any editing made on an object prior to selecting another object or using the OKAY icon.
- SELECT: This provides the option to select another object for editing.
- OKAY: Selecting this will commit all editing to memory and return to the main screen once more.



- Name:** SHADE (See Figure 6)
- Function:** To shade a selected object.
- Response:** A list of current objects will be displayed.
- Action:** Select an object for shading in the usual manner. To colour an object, select the side you wish to shade with the cursor. By highlighting the values to the right of the shaded rectangles numbered 1 to 6 (depending on which type of object you wish to shade). These values will correspond to the value of the shade, shown as 16 shaded boxes numbered 0 to 15 on the right hand side of the panel.
- Note:** The first shade is INVISIBLE and as such can be very useful for creating special effects and saving time when sides of an object will never be visible to the player by making them INVISIBLE.

- Name:** DELETE
- Function:** To delete a specified object from memory.
- Response:** A list of objects will be displayed in the Item Selector.
- Action:** Select an object from the Item Selector in the usual manner.
- Response:** The object will be deleted from memory.
- Note 1:** ENTRANCES may also be deleted from memory using this function. Just select the entrance from the Item Selector in the usual way and the selected Entrance will be deleted.
- Note 2:** This operation is irreversible, use with care!

- Name:** ATTRIBUTES
- Function:** View the position and status of a specified object. The object's status and initial status can be altered.
- Response:** A list of object in the current Area will be displayed. **Action:** Select an object from the list.
- Response:** A Dialogue Box will appear showing various information about the selected object -TYPE, NAME, SIZE, POSITION, CURRENT STATUS, INITIAL STATUS. CURRENT STATUS alters the status of the object between VISIBLE, INVISIBLE and DESTROYED. An invisible object may be made visible at some other point in the environment whereas a destroyed object is gone until the environment is restarted using RESET.

- INITIAL STATUS sets the status of the object when the environment is RESET, either VISIBLE or INVISIBLE.
- Note 1:** SENSORS have a range of (0-255), speed (in tenths of a second). These can be changed via ATTRIBUTES. A speed of 0 means that it will not shoot.
- Note 2:** Sensors do not have a direction and when off screen will not be obscured by other objects so they can fire through walls etc. To overcome this it is best to use a different form of check before activating a sensor such as a collision with the floor around the Sensor.

# ***THE FREESCAPE COMMAND LANGUAGE***

The FREESCAPE system contains a simple language definition allowing functions to be performed when certain conditions occur within the FREESCAPE environment. The commands can be used in any of three places.

**GENERAL CONDITIONS:** These commands are executed every frame regardless of the area currently occupied.

**Note:** General Condition number one is only called after a RESET.

**LOCAL CONDITIONS:** Only the Local conditions defined in the currently occupied are processed. These commands are executed each frame.

**PROCEDURE CONDITIONS:** These commands are only called from other conditions by using the CALL command.

In the following list, P1, P2 and P3 or V1, V2 or V3 refer to parameters 1, 2 and 3 respectively. These can be either a literal number (referred to as P1, P2 or P3) or a variable number. In this case the contents of the variable will be used as the parameter value. Parameters which must be Variables are referred to as V1, V2, V3 e.g.:

SETV(P1,V2)

shows that the second parameter must be a variable and the first is an absolute value.

Optional parameters or commands are surrounded by square brackets [ ].

A list of the available commands follows along with a description of the required parameters and their functions:

## ***CONDITIONS***

### **ADCV**

Class - Variable Manipulation

ADD TO VARIABLE WITH CARRY

*Format:* ADCV P1 V2

*Function:* This adds the absolute value P1 to variable V2. If the "carry" flag was set before the execution of this instruct, one (the carry) is also added the result. If the result is greater than 255, then the value wraps around (becoming the would-be result minus 256) and the "carry" flag is set.

*See also* ADDV, SUBV, SBCV

### **ADDV**

Class - Variable Manipulation

ADD TO VARIABLE

*Format:* ADDV P1 V2

*Function:* This adds the absolute value P1 to variable V2. If the result is greater than 255, then the value wraps around (becoming the would-be result minus 256) and the "carry" flag is set.

*See also* ADCV, SUBV, SBCV

### **AND**

Class - Conditional Instruction

*Format:* IF<xx>  
AND  
IF<xx>  
THEN  
commands....  
[ELSE  
commands....]  
ENDIF

*Function:* This command combines the result of two or more condition checking commands and returns TRUE only if all of the specified checks are TRUE otherwise a FALSE result is returned.

*See also* IFEQ, IFLT, IFGT, THEN, ELSE, ENDIF, OR.

**ANDV** Class - Variable Manipulation  
 AND VARIABLE  
*Format:* ANDV P1 V2  
*Function:* This command performs a logical AND on the absolute value P1 and Variable number V2 and the result is stored in Variable number V2. This instruction requires some understanding of Binary and Logical functions.  
*See also* ORV, XORV.

**CMPV** Class - Variable Manipulation  
 COMPARE VARIABLE WITH ABSOLUTE VALUE  
*Format:* CMPV P1 V2  
*Function:* This command compares the value of P1 with V2. The value held in the variable specified as V2 is subtracted from the constant P1. The Zero and Carry flags are set accordingly. The contents of V2 remain unchanged. CMPV usually precedes an IFEQ, IFLT, IFGT instruction, as these act on the result of the comparison.

*Example:* Variable 23 holds a count of objects collected in a game. No more than 5 objects are allowed to be carried at any one time. To see if an object may be picked up would require a check to see if less than five objects are carried. This could be performed with the following:

```

  CMPV 5 23      (compare contents of V23 with 5)
  IFLT (if V23 is less than five)
  THEN (then)
  < PICK UP OBJECT>
  ELSE
  < OBJECT CAN NOT BE CARRIED>
  ENDIF
  
```

**CALL** Class - Misc. Instruction  
 CALL PROCEDURE  
*Format:* CALL P1  
*Function:* This calls the Procedure number P1. Processing will continue from the next instruction in the current condition list when the procedure exits.  
*Note:* Do not call a procedure from within itself or the computer will lock up!

**CROSS** Class - Misc. Instruction  
*Format:* CROSS P1 (either 0 or 1)  
*Function:* Turn the centre cross ON or OFF (0 is OFF and 1 is ON). It defaults to 0 (ON).

**COLOUR** Class - Misc. Instruction  
*Format:* COLOUR P1 P2  
*Function:* To change the 3D View window colour.

AMSTRAD CPC and C64  
 P1 refers to the colour number (0-3)  
 P2 refers to the palette value (CPC 0-26)(C64 0-15)

SPECTRUM  
 P1 refers to the attribute type  
 0 INK  
 1 PAPER  
 2 BRIGHT  
 3 FLASH  
 P2 refers to the relevant attribute value  
 INK 0-7  
 PAPER 0-7  
 BRIGHT 0-1  
 FLASH 0-1

**DELAY** Class - Misc. Instruction  
*Format:* DELAY P1  
*Function:* This command halts all FREESCAPE functions for the specified time. The specified time (P1) is in 50ths of a second.  
*Example:* DELAY 50 would halt execution for 1 second.

**DESTROY** Class - Object Manipulation  
*Format:* DESTROY P1 [P2] (object[,area])  
*Function:* This command marks the given object as destroyed. If no area is specified then it is assumed the object is in the current area.

*Example:* IFSHOT 4 2  
THEN  
DESTROY 4 2  
ENDIF  
This simply asks if object 4 in area 2 has been shot and if so destroy object 4 in area 2.

**ELSE** Class - Conditional Instruction  
*Format:* IF<xx>  
THEN  
commands....  
[ELSE  
commands....]  
ENDIF  
*Function:* This command exists only as part of an IF<xx>/THEN/ELSE/ENDIF combination. It marks the start of commands to execute only if the result of a previous condition was FALSE. The effectiveness of the command relies on the correct usage if the IF and THEN commands. For any condition checking to work it is essential that the Condition be preceded by an IF<xx> command and followed by a THEN and (if required) an ELSE statement.  
*See also* THEN, ENDIF

**END** Class - Misc. Instruction  
*Format:* IF<xx>  
THEN  
commands....  
END  
[ELSE  
commands....]  
ENDIF  
commands....  
*Function:* This command exits command processing before the end of the command list is reached, it allows the user to cut short the command execution on a particular condition being TRUE or FALSE. Used in the above format, if the result of the condition is true only the commands following the THEN statement will be executed and upon reaching the END command the processor would stop processing the commands from this list. Were there no END command the processor would continue executing from the command following the ENDIF statement.  
*Note:* If used in a procedure then processing returns to the command after the CALL instruction (in the condition list which called it).



**ENDGAME**

Class - Misc. Instruction

*Format:* ENDGAME*Function:* This command serves to reset the environment. This can be executed on a particular condition being TRUE or FALSE, i.e. if a counter being used to store game time reaches zero then the game finishes and a RESET of the environment is performed. Example: In this example, variable 10 has been assigned to store game time.

CMPV 0 10

IFEQ

THEN

ENDGAME

ENDIF

**ENDIF**

Class - Conditional Instruction

*Format:* IF<xx>

THEN

commands...

[ELSE

commands...]

ENDIF

*Function:* This command terminates a conditional section. Upon reaching an ENDIF command, execution continues as normal before the IF<xx>/THEN/ELSE combination. If the result of a Condition is TRUE the commands after the THEN statement are executed and those between the ELSE statement and the ENDIF are ignored. If the result is FALSE the commands between the THEN and the ELSE are ignored and those between the ELSE and the ENDIF are executed. In either case unless an END command has been issued, command processing will continue after the ENDIF statement.*See also* IF<xx> Interrogators, THEN, ELSE**GOTO**

Class - Vehicle Instruction

*Format:* GOTO P1 [P2] (entrance [,area])*Function:* This command is used to allow player movement between the various defined areas and/or entrances. Upon reaching this command the player will be moved to the ENTRANCE P1 in the AREA P2. If no area is specified the entrance is presumed to be in the current area. If a new area is specified, command processing will cease at this point otherwise normal command processing will continue.*Example:* IFSHOT 9

THEN

GOTO 1 2

ENDIF

The above example would be quite useful if it was desired that the player, upon shooting a doorway (object 9) would then be transported to Entrance 1 in area 2.

**IFACTIVE**

Class: Conditional Instruction (Interrogator)

*Format:* IFACTIVE P1[,P2] (P1 is an object number and P2 is an optional area number)

IFACTIVE o[a]

THEN

commands...

ENDIF

*Function:* This command checks whether the selected object has been activated.*Example:* IFACTIVE 4

THEN

INVIS 4

ENDIF

This condition simply informs the system that if object 4 is activated then make object 4 invisible.

*Note:* IF's cannot be nested!

**IFCRUSH**

Class: Conditional Instruction (Interrogator)

*Format:*IFCRUSH  
THEN  
commands....  
ENDIF*Function:*

This Interrogator checks if the player occupies the same space as another object in the same area. If so, a true is returned allowing the result of the check to be dealt with by a THEN/(ELSE)/ENDIF construct. A positive result from the interrogator is usually obtained when an object is VISibilised and that object's bounding cube encloses the players view point. It can also be obtained when the view point is moved (via a GOTO) to a space currently occupied by another object.

**IFEQ**

Class - Conditional Instruction

*Format:*IF EQUAL  
IFEQ  
THEN  
commands....  
[ELSE  
commands...]  
ENDIF*Function:*

This command returns a true result if the preceding command had a zero result. This instruction will normally follow a CMPV, ADDV, ADCV, SUBV or SBCV instruction and act on the result of it. A THEN/(ELSE)/ENDIF construct should follow this instruction.

*Note:*

IF's cannot be nested!

**IFFALL**

Class - Conditional Instruction (Interrogator)

*Format:*IFFALL  
THEN  
commands....  
[ELSE  
commands...]  
ENDIF*Function:*

This Interrogator returns true if the player has fallen past the safe fall height, specified as FALL ABILITY in the SETUP Menu. The result of the check can then be dealt with by a THEN/(ELSE)/ENDIF construct.

**IFGT**

Class - Conditional Instruction (Interrogator)

*Format:*IF GREATER THAN  
IFGT  
THEN  
commands....  
[ELSE  
commands...]  
ENDIF*Function:*

This command returns a true result if the preceding command had set the "carry" flag and the "zero" flag unset. This instruction will normally follow a CMPV, ADDV, ADCV, SUBV or SBCV instruction and act on the result of it. A THEN/(ELSE)/ENDIF construct should follow this instruction.

*Note:*

IF's cannot be nested!

**IFHIT**

Class - Conditional Instruction (Interrogator)

*Format:*

```
IFHIT P1
THEN
commands...
[ELSE
commands...]
ENDIF
```

*Function:*

This command checks if an object P1 has been collided with (or walked on). A true or false is returned.

*Example:*

```
IFHIT 4
THEN
INVIS 4
VIS 5
ENDIF
```

In this condition the system checks if object 4 has been collided with. If it has then object 4 becomes invisible and object 5 becomes visible. This could be used to remove a door (object 4) and replace it with an open doorway (object 5).

*Note:*

IF's cannot be nested!

*See also*

IFACTIVE, IFSHOT

**IFLT**

Class - Conditional Instruction (Interrogator)

*Format:*

```
IF LESS THAN
IFLT
THEN
commands...
[ELSE
commands...]
ENDIF
```

*Function:*

This command returns a true result if the preceding command had unset the "carry" and the "zero" flag. This instruction will normally follow a CMPV, ADDV, ADCV, SUBV or SBCV instruction and act on the result of it. A THEN/(ELSE)/ENDIF construct should follow this instruction.

*Note:*

IF's cannot be nested!

**IFSENSED**

Class - Conditional Instruction (Interrogator)

*Format:*

```
IFSENSED
THEN
commands...
[ELSE
commands...]
ENDIF
```

*Function:*

This Interrogator returns a true if the player is occupying space that is detectable by a sensor. The result of the interrogator is then acted on by a THEN/(ELSE)/ENDIF construct placed after it. The effectiveness of a sensor can be set by altering it's ATTRIBUTES.

**IFSHOT**

Class - Conditional Instruction (Interrogator)

*Format:*

```
IFSHOT object
THEN
commands...
[ELSE
commands...]
ENDIF
```

*Function:*

Checks if you have just shot object (o), returning a true or false.

**IFTIMER**

Class - Conditional Instruction (Interrogator)

*Format:* IFTIMER  
 THEN  
 commands....  
 [ELSE  
 commands....]  
 ENDIF

*Function:* This command checks the TIMER flag, the command returns a TRUE result if a timelapse of the amount specified in the setup section has passed, otherwise a FALSE result is returned. Use the TIMER command to set TIMER frequency.

**IFVIS**

Class - Conditional Instruction (Interrogator)

*Format:* IFVIS P1 [P2] (object [area])  
 THEN  
 commands....  
 [ELSE  
 commands....]  
 ENDIF

*Function:* This command checks the INVISIBLE flag in the status byte of OBJECT P1 in AREA P2. If no area is specified then the object is presumed to be in the current area. The command returns a TRUE result if the specified object is VISIBLE, otherwise a FALSE result is returned.

*Example:*

```
IFHIT 12
THEN
ELSE (if object 12 (a door, say) is not hit then end)
END
ENDIF (if it is then process the following )
IFVIS 4 (if object 4 (a switch, perhaps) is visible )
THEN (then)
GOTO 1 5 (go to entrance 1 in area 5)
ENDIF
```

*Example 2:* To check if an object is invisible, check to see if it is visible but act on a False outcome.

```
IFVIS 4
THEN
ELSE
(INsert YOUR COMMANDS HERE)
ENDIF
```

**INVIS**

Class - Object Manipulation

*Format:* INVIS P1 [P2]

*Function:* Makes the object P1 in area P2 (optional) invisible. If the area is not specified, then object P1 in the current area is made invisible.

*Example:*

```
IFSHOT 8
THEN
INVIS 9
ENDIF
```

A simple condition which states that if object 8 is shot then object 9 will become invisible.

*See also* INVIS, VIS

**MODE**

## Class - Vehicle Instruction

*Format:* MODE P1 (movement mode)*Function:* This command alters the current movement mode of the player, in the game. The player is restricted to CRAWL, WALK, RUN, FLY1 and FLY2. The value of the new mode P1 must be in the range of 0-4. Any value above this will be interpreted as 4 and any value less than 0 will be interpreted as 0. The parameter, and what it represents is listed below:

0 Crawl	3 Fly1
1 Walk	4 Fly2
2 Run	

**OR**

## Class - Conditional Instruction

*Format:* IF<xx>  
OR IF<xx>  
THEN  
commands....  
[ELSE  
commands....]  
ENDIF*Function:* This command combines the result of two or more condition checking commands and returns TRUE if any of the specified checks are TRUE otherwise a FALSE result is returned.*See also* IF<xx>, THEN, ELSE, ENDIF, AND**ORV**

## Class - Variable Manipulation

*Format:* ORV P1 V2*Function:* This command performs a logical binary OR on the two values specified, the value P1 is ORed with the variable V2 and the result is stored in the variable. Flags are set accordingly. This instruction requires some understanding of Binary and Logical functions.*Example:* IFSHOT 8 (object)

```
THEN
ORV 2 21
ENDIF
```

This uses Bit 2 of Variable V21 as a flag to say that object 8 has been shot. Using this method it is possible to use a Variable to store a number of ON/OFF flags. The flags can be checked using the ANDV command.

*Example:* ANDV 2 21  
IFEQ  
THEN  
commands....  
[ELSE  
commands....]  
ENDIF**PRINT**

## Class - Misc. Instruction

*Format:* PRINT mm xx yy (message and co-ordinates)*Function:* This command will PRINT the specified message (mm) from the message list at the X (xx) and Y (yy) co-ordinates specified. These coordinates are in characters.*Note:* You must use a TEXTCOL command to set the colour.**REDRAW**

## Class - Misc. Instruction

*Format:* REDRAW*Function:* This command will force an immediate redraw of the FREESCAPE view window. Any objects whose status have changed since the last frame update will be displayed in their new state.

<b>SETV</b>	Class - Variable Manipulation
<i>Format:</i>	SETV P1 V2
<i>Function:</i>	This command sets the variable V2 to the value P1.
<b>SOUND</b>	Class - Misc. Instruction
<i>Format:</i>	SOUND P1
<i>Function:</i>	This command will immediately perform the sound number P1. The parameter P1 must be in the range 0-12, the sounds corresponding to the value of the parameter are listed in the Appendix.
<b>SBCV</b>	Class - Variable Manipulation
	SUBTRACT WITH CARRY
<i>Format:</i>	SBCV P1 V2
<i>Function:</i>	This subtracts the absolute value P1 from Variable V2. If the "carry" flag was set before execution of this instruction, then the result is decremented further by one.
<i>See also:</i>	ADDV, ADCV, SUBV
<b>SUBV</b>	Class - Variable Manipulation
<i>Format:</i>	SUBV P1 V2
<i>Function:</i>	This subtracts the absolute value P1 from Variable V2.
<i>See also</i>	ADDV, ADCV, SBCV
<b>SYNCSND</b>	Class - Misc. Instruction
<i>Format:</i>	SYNCSND P1
<i>Function:</i>	This command will execute the specified sound P1 in sync with the next complete frame update. The parameter P1 must be in the range 0-12, the sounds corresponding to the value of the parameter are listed in the Appendix.
<i>See also</i>	SOUND
<b>TEXTCOL</b>	Class - Misc. Instruction
<i>Format:</i>	TEXTCOL cc (number of the desired colour)
<i>Function:</i>	This command is used to set the text and background colour for message printing, cc calculated as shown: SPECTRUM (ink)+(paper x 8)+(64 if Bright required)+(128 if Flash required) AMSTRAD CPC (ink)+(paper x 4) C64 (ink)+(paper x 16)
<b>THEN</b>	Class - Condition Statement
<i>Format:</i>	IF<xx> THEN commands... [ELSE commands...] ENDIF
<i>Function:</i>	This command checks the status of the ZERO flag in the CCR. If the contents are TRUE then the commands following the THEN statement are executed until either an ELSE or ENDIF statement is found. If an ELSE is found the commands following it are ignored up until an ENDIF or the end of the command list. If an ENDIF is found then normal command execution will continue with the following command. The THEN command is the only command which examines the result of a condition, so an IF<xx>, ELSE, ENDIF combination without a THEN command will produce incorrect results.

**TIMER** Class - Misc. Instruction  
*Format:* TIMER P1  
*Function:* The TMER instruction sets the frequency at which the timer flag is set for detection by an IFTIMER instruction. P1 is the interval time, and is in 50ths of a second.

**TOGVIS** Class - Object Manipulation  
*Format:* TOGVIS P1 [P2] (object [area])  
*Function:* This command will make an invisible object visible or a visible object invisible. If no area is specified the object is presumed to be in the current area.

**VIS** Class - Object Manipulation  
*Format:* VIS P1 [P2] (object [area])  
*Function:* This command makes an object visible.  
*See also* INVIS, IFINVIS, IFVIS, TOGVIS

**XORV** Class - Variable Manipulation  
*Format:* XORV P1 V2  
*Function:* This command performs a logical binary EXCLUSIVE OR (EOR/XOR) on the two values specified, the value P1 is ORed with the variable V2 and the result is stored in the variable. Flags are set accordingly. This instruction requires some understanding of Binary and Logical functions.

*Example:* IFACTIVE 12 (object)  
THEN  
ORV 8 21  
ENDIF  
This uses Bit 3 (the fourth bit) of Variable V21 as a flag to say that object 12 has been ACTIVATED OR DEACTIVATED. This allows us to toggle a flag using only one bit. Possible uses include keeping track of switches which toggle between on or off. Using this method it is possible to use a Variable to store up to eight of ON/OFF flags. The flags can be checked using the ANDV command.

*Example:* ANDV 8 21  
IFEQ  
THEN  
commands....  
[ELSE  
commands....]  
ENDIF

## ***EXAMPLES***

### **TO GO TO ANOTHER AREA**

As an example we will use object 3 which is our DOOR and object 4 which is our DOORWAY. For simplicity the doorway is a black RECTANGLE which is placed close against a wall and the door is a red CUBE which has been "flattened" by the use of the EDIT tools and placed close up in front of the doorway. The DOORWAY (rectangle) should be set to INVISIBLE via the ATTRIBUTES function both on START STATUS and PRESENT STATUS. We will use the IFACTIVE command to "open" the door and reveal the doorway as follows. Enter the following condition as a LOCAL condition (create one if required first):

```
IFACTIVE 3
THEN
INVIS 3
VIS 4
ENDIF
```

Now experiment by pressing the SPACE BAR and position the cursor on the door and press the A key. The door (object 3) should vanish and be replaced by the doorway (object 4).

Create a new AREA via the ADD AREA option and return to the Area 1 via the GOTO AREA option. Now add the following condition commands in the same way as above and enter the following: (they can be tapped onto the end of the previous set of instructions, or placed in a newly created local condition list in the same area.

```
IFHIT 4
THEN
GOTO 1 2
ENDIF
```

Now try walking towards the "doorway" until you collide with it. You will be transported instantly to ENTRANCE 1 in AREA 2.

### **TO MAKE AN OBJECT VISIBLE OR INVISIBLE**

As can be seen by the previous example, making objects vanish and reappear is a very simple matter. If, for example, we wish an object (say object 3) to become invisible when it is shot we would enter the following condition as a LOCAL condition (create one if required).

```
IFSHOT 3
THEN
INVIS 3
ENDIF
```

Shoot object 3 and see the effect.

### **TO MAKE A SOUND**

This example will make a ping when picking up an object (object 5).

```
IFACTIVE 5
THEN INVIS 5
SYNCSND 1
ENDIF
```



## ***HOW TO USE VARIABLES***

The format for using a VARIABLE can be handled in the same way through various types of conditions. We could for example, arrange for a variable to be increased to hold a higher value when an object is shot, as follows:

```
IFSHOT 3
THEN
ADDV 25 21
```

Thus adding 25 to the VARIABLE number 21. In a similar way a value can be deducted from a VARIABLE using the following example:

```
IFSHOT 3
THEN
SUBV 15 21
```

To set a VARIABLE to hold a specified number we could use the following GENERAL condition commands:

```
SETV 30 21
```

This same process can be incorporated into slightly more complicated conditions where we want to check the value of the variable and then if TRUE to set the variable to hold another value as follows:

```
CMPV 0 21
IFLT
THEN
SETV 30 21
ENDIF
```

Thus if Variable 21 holds a value greater than 0, Variable 21 will be set to hold the value 30.

### **MORE ABOUT VARIABLES**

The use of variables enables you to create a wide range of conditions, from the very simple to the complicated. The system has 112 (0-111) variables available for use by the COMMAND LANGUAGE. These variables are 8 bit storage areas (that is they can hold numbers in the range 0-255, which can be used to store and manipulate various numerical values within the environment e.g. player score, fuel supply or a timer. 16 of the available Variables (112 to 127) are used by the FREESCAPE II system. The contents of these variables are updated each frame by the system, and any changes to the variables are so noted by the system i.e. if a variable command were to change the value stored in variable 112 (the Viewpoint X position (low)) the next displayed frame would move the player to the new specified X position. A list of the contents of the system variables follows:

```
112 Viewpoint X position Low
113 Viewpoint X position High
114 Viewpoint Y position Low
115 Viewpoint Y position High
116 Viewpoint Z position Low
117 Viewpoint Z position High
118 Viewpoint X Rotations (0-71 increments of 5 degrees)
119 Viewpoint Y Rotations (0-71 increments of 5 degrees)
120 Viewpoint Z Rotations (0-71 increments of 5 degrees)
121 Current key presses (ASCII)
122 Interrupt counter Low
123 Interrupt counter High
124 Current Area/Data set
125 Ammo counter (if set to 0 the player cannot fire)
    (if set to 255 gives infinite ammo else decremented per shot)
126 Font pointer starting at character 32 Low(for advanced users only )
127 Font pointer starting at character 32 High      (for advanced users only )
```

## ***HANDLING VALUES GREATER THAN 255***

### **TWO BYTE VALUES (0-65535)**

If, for example we set variable 10 to hold the game score, for display via an Instrument as a 5 character number, two variables (bytes) are required to store this. Variable 10 stores the LOW byte (first) and variable 11 stores the HIGH byte (last).

To add 100 to the score the following would be performed:

```
ADDV 100  10  (Add 100 to variable 10)
ADCV  0    11  (Add the carry, if there is one to variable 11)
```

To add 300 to the score the 300 must be broken down to two bytes thus:

300 divided by 256 = 1 remainder 44

So to add 300 to our score:

```
ADDV 44  10
ADCV  1  11
```

And to subtract 300 from our score:

```
SUBV 44  10  (Take 44 from variable 10)
SBCV  1  11  (and take one with borrow (if there is one) from variable 11)
```

## ***USING THE COMPILER***

On some versions of the compiler you will *be* asked if you wish to load or save data from tape or disc. Make your selection by pressing T or D when prompted.

When the compiler is loaded you will be asked to insert the Destination Tape or Disc. This is the medium on which your runnable world will be located. Ensure that the DESTINATION Tape/Disc is not A DATA or PROGRAM tape/disc. In the case of disc users, the DESTINATION disc should be formatted normally, as instructed in your computer user's manual.

When the destination tape/disc is ready, press a key and the system will begin saving part of the runner program.

Eventually, you will be asked to load the DATAFILE. You will be required to enter the DATAFILE number (0-9), and instructed to insert your DATA tape/disc. This is the tape/disc which contains your DATA. When ready, press a key.

When the data has loaded you will be required to replace the DESTINATION tape/disc (a message will inform you of this). When you have done so, press a key. The DATA will then be copied to the DESTINATION tape/disc.

Finally, you will be asked if you require a border. If you have created a border to be included in your runnable environment, press Y, otherwise press N.

In the case of the Spectrum and the CPC, these are straight screen dumps. The border for the C64 must be in Advanced art studio format in multi-colour Lo-res bitmapped mode.

If you typed a Y, then you will be required to insert the tape/disc with the border image saved on it. Press a key when ready. The program will then ask for the name of the border file. Type the full name then press enter. The border should then load. When the border has loaded, you will then be asked to insert the DESTINATION tape/disc.

Insert the DESTINATION tape/disc and when ready press a key.

The compiler will now save the final sections of data to the Runnable DESTINATION tape/disc.

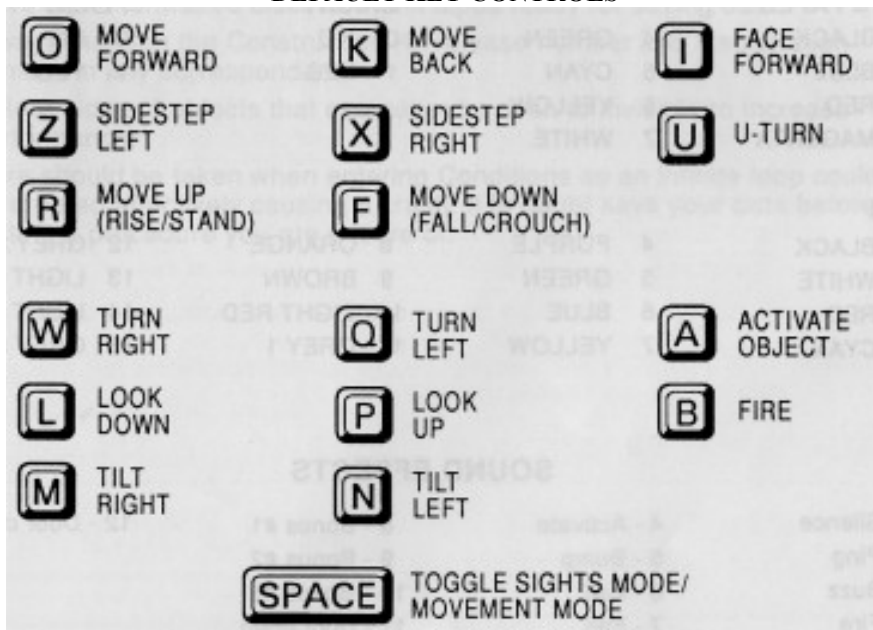
The runnable world has now been created. Pressing a key at this point will exit the compiler, resetting your machine.

You are free to distribute or sell the compiled runnable version of your environment. All that is required, is that you mention on your product that it was created using the 3D Construction Kit.

NOTE: It is an offence to sell or distribute copies of the 3D Construction Kit Editor or any part of the Editor or accompanying data.

# APPENDIX

## DEFAULT KEY CONTROLS



CTRL/SymbolShift - WHEN USED IN CONJUNCTION WITH MOVEMENT KEYS, IT WILL ACCELERATE THE MOVEMENT.

ESC/RUNSTOP/BREAK(ShiftSpace) - RESTART ENVIRONMENT (when in the TEST screen it will take you back to the EDITOR)

## PALLETTE VALUES

### AMSTRAD CPC

0 BLACK	9 GREEN	18 BRIGHT GREEN
1 BLUE	10 CYAN	19 SEA GREEN
2 BRIGHT BLUE	11 SKY BLUE	20 BRIGHT CYAN
3 RED	12 YELLOW	21 LIME GREEN
4 MAGENTA	13 WHITE	22 PASTEL GREEN
5 MAUVE	14 PASTEL BLUE	23 PASTEL CYAN
6 BRIGHT RED	15 ORANGE	24 BRIGHT YELLOW
7 PURPLE	16 PINK	25 PASTEL YELLOW
8 BRIGHT MAGENTA	17 PASTEL MAGENTA	26 BRIGHT WHITE

### SPECTRUM

#### INK & PAPER

0 BLACK	4 GREEN
1 BLUE	5 CYAN
2 RED	6 YELLOW
3 MAGENTA	7 WHITE

#### BRIGHT

0 NO
1 YES

#### FLASH

0 NO
1 YES

### C64

0 BLACK	4 PURPLE	8 ORANGE	12 GREY 2
1 WHITE	5 GREEN	9 BROWN	13 LIGHT GREEN
2 RED	6 BLUE	10 LIGHT RED	14 LIGHT BLUE
3 CYAN	7 YELLOW	11 GREY 1	15 GREY 3

## SOUND EFFECTS

0 - Silence	4 - Activate	8 - Bonus #1	12 - Door close
1 - Ping	5 - Bump	9 - Bonus #2	
2 - Buzz	6 - Fall	10 - Bonus #3	
3 - Fire	7 - Fail	11 - Door open	



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#####

This is a copy of the original manual supplied by the Commodore version of 3D Construction Kit, Nothing has been edited, but some correction have been made.  
Compiled by Allen Monks.



**Commodore Cheetah**

[www.commodorecheetah.co.uk](http://www.commodorecheetah.co.uk)

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