

ADVENTURE BUILDER SYSTEM



INSTRUCTIONS



THE ADVENTURE BUILDER SYSTEM

An adventure written entirely in BASIC has reaction times which compare very badly with machine coded programs. The slow sections are readily identifiable as the parsing routine, word recognition through long FOR ... NEXT loops or through large numbers of IF ... THEN lines, and identifying which few objects should appear at a location or in the player's INVENTORY.

The ADVENTURE BUILDER SYSTEM (ABS) can substantially decrease the above delays such that an adventure written predominantly in BASIC can operate at a speed approaching that of machine code.

The ABS consists of two programs ... one to generate the required CODE with the other being a short BASIC core program which will utilise this CODE.

Before using the system it is advisable for the adventure to be outlined to a reasonably advanced stage. The map should be constructed with each location numbered and all objects well identified as to description and starting location. Details on how to use the system will make reference to the short demonstration adventure for which the DATA and map are provided.

The BASIC adventure program follows the convention of:

- a) PRINTs location description (plus graphics, if included).
- b) PRINTs any objects visible at this location.
- c) Asks "What next?" and awaits input.
- d) Accepts input from keyboard and PRINTs on screen.
- e) Analyses input (usually into VERB and NOUN).
- f) Sends control of program to a sub-routine specific to that VERB.

The CODE GENERATOR program includes the DATA for movement input (GO NORTH or N etc) and also for the commonly used VERBS:

```

GET (or TAKE)
DROP
LOOK (or L or R)
EXAMINE
QUIT (or STOP)
INVENTORY (or I or LIST)
SAVE
LOAD

```

METHOD OF OPERATION

1. Prepare a tape for copy of CODE GENERATOR with DATA for the adventure with loader program:
 - 10 CLEAR 52000
 - 20 LOAD ""CODE
 - 25 LOAD ""
 - 30 SAVE "loader" LINE 10

2. LOAD the CODE GENERATOR program, add your adventure DATA then SAVE on to the above tape by GOTO 9990 (Tape A).
3. Make a copy of the BASIC adventure core program. "VERIFY" as a direct command and do NOT rewind. (Tape B).
4. LOAD Tape A and supply the information required by the on screen prompts then SAVE the DATA on Tape B. Make a note of the CLEAR number.
5. Enter as a direct command: CLEAR number: LOAD "" and LOAD Tape B. Stop the tape when prompted, delete line 9949 then GOTO 9950 and re-start the tape.
6. "BREAK" and alter line 9991 to:
9991 SAVE "SYSTEM"CODE save, len
7. Add the remainder of the BASIC program (VERB sub-routines and screen display DATA etc).
8. SAVE at the start of a blank tape (by GOTO 30) the following loader:
10 CLEAR number
20 LOAD ""
30 SAVE "LOADER"LINE 10
9. SAVE the adventure after this loader (by GOTO 9990).

N.B. The enclosed tape contains two copies of each of the following programs:

DEMONSTRATION ADVENTURE (with BLACK or WHITE background)

Blank CODE GENERATOR

Blank BASIC core program

CODE GENERATOR with the DATA used for the two DEMONSTRATION ADVENTURES.

In order to use the ABS, the DATA for the adventure must be added to the CODE GENERATOR program and the on screen prompts satisfied in the following manner. Responses for the demonstration adventure are indicated after each section heading, and they refer to the version with BLACK background.

A) HOW MANY VERBS (17)

The DATA for these is entered in lines 1003 to 1999 in the format:

DATA "OPEN",9,"UNLOCK",10

i.e. The VERB (in full), followed by the assigned number. As the verb numbers (vb) 0 to 8 are already assigned the first additional verb takes the value 9.

Synonymous verbs (e.g. SHUT and CLOSE) are allocated the same number but count as separate entries when responding to HOW MANY VERBS.

B) VERB LENGTH CHECK (5)

The ABS offers a choice (between 3 and 7) for the number of leading letters which will be used to determine a match between input and database. The selection of 4 or 5 is usual. If 3 is selected confusion could arise between such inputs as FEED and FEEL, both of which would be considered as FEE.

C) HOW MANY OBJECTS (9)

This refers to the objects which could be included in the INVENTORY of the adventurer.

(For DATA entry details, see section E).

D) MAXIMUM LENGTH OF OBJECT DESCRIPTION (22)

Enter here the number of characters in the longest object description.

E) HOW MANY OBJECTS WHICH CAN HAVE AN ALTERED DESCRIPTION (2)

This refers to items such as "A small TORCH" and "A lit TORCH". The DATA for these objects is entered in lines 2000 2018 in the following format:

```
DATA "COAT",1,"A tartan COAT", "A tartan  
COAT (worn)".
```

```
DATA "TORCH",2,"A small TORCH","A lit  
TORCH".
```

i.e. The word which would be typed, the assigned number, the original description, the changed description.

The description of objects is held in the string array o (x,y), where x is the total number of objects and y is the character length of the longest description.

These objects which can alter during the course of the adventure must be allocated the first and last numbers of the string array. See list of DATA for demonstration program where "A tartan COAT" and "A small TORCH" are objects 1 and 2 while their corresponding changed versions are objects 8 and 9.

The DATA for the remaining objects (from section C) is entered in lines 2020 to 2188 in the format:

```
DATA "BOX"3,"A wooden BOX","SPADE",  
4,"A short SPADE", . . . etc.
```

F) NOUN LENGTH CHECK (5)

This is similar to VERB LENGTH CHECK . . . select between 3 and 7. The value can be different from that chosen for VERBS.

G) OTHER WORDS (13)

The first assigned number for these words (DOOR, STAIRS, etc) is calculated as follows:

Total number objects + 7 (i.e. 9+7=16 for
demo adventure)

The DATA is entered in lines 2190 to 2988 in the format:

```
DATA "DOOR",16,"CUPBOARD",17, . . . etc.
```

H) MAXIMUM INVENTORY (3)

Enter here the maximum number of items which the adventurer is allowed to carry at any one time.

I) NUMBER OF LOCATION (15)

Enter here the total number of locations in the adventure.

J) SCROLL ROUTINE (B)

The ABS contains a split-screen technique which can be used in two ways.

- 1) If it is required that the top x number of lines remain on screen, then an entry here of C, followed by x, will scroll "behind" these lines when the screen is full.
- 2) However if the number of lines required to remain on screen is variable (i.e. after **HERE YOU CAN SEE** section) then this can be achieved by entering B as this response.

If the normal SPECTRUM full screen scroll is required then select here.

K) STARTING LOCATION (7)

Enter here the number of the location at which the adventure commences.

L) MOVEMENT DATA

The DATA to control movement is entered in lines 3000 to 3998 as 7 numbers for each location as follows:

DATA 7,3,13,8,6,0,0

The first number is the location number, followed by the number of the six locations which would be reached by entering N,S,E,W,U,D respectively. An entry of 0 indicates no exit in that direction.

The DATA entered here should take no account of the need to remove obstacles or unlock doors, etc, as such restrictions can be accommodated by the BASIC program, in lines 1005 to 1089.

See example in demonstration adventure at lines 1005 and 1010.

A different approach is detailed later.

M) OBJECT STATUS TABLE

Each object will at any one time have one of the following numbers allocated to it:

- a) 0 the object is 'invisible'
- b) 99 the object is in the player's INVENTORY
- c) Location number. . . the object currently resides at this location and will appear on screen after HERE YOU CAN SEE when that location is visited.

The DATA for start-up positions is entered in lines 4000 onwards in the format:

DATA 4,10,0,1 etc

This indicates that object 1 is at location 4, objects 2 is at location 10 etc.

An entry must be made for each object. These values are then altered as necessary by the BASIC program as the adventure proceeds.

N) SAVE AND LOAD ROUTINES

These routines can be used on a temporary basis effecting a SAVE into and a LOAD from RAM or as a permanent measure as usual, to tape.

O) LOCATION DESCRIPTIONS

The DATA is entered in line 5001 and onwards in the following format:

```
5001 DATA 6, "You are in a very tidy BARN. The farmer who runs this farm is obviously very proud of his work Or is he?"
```

The number immediately after DATA refers to the INK colour for the text following. This number may be kept constant for all locations, but for special emphasis at some key locations a change of presentation can be effectively used as a highlight. The text within the quotes should be carefully constructed with regard to spaces and punctuation.

P) **HERE YOU CAN SEE** and **INVENTORY**

The phrases for these are entered in lines 6040 and 6254 for the former and in 6080 and 6254 for the latter, preceded by the PAPER, INK and BRIGHT values for that phrase. e.g.

6040 DATA 5, 0, 1, " Here you can see:- "

6254 DATA 5, 0, 1, " Nothing of interest "

The PAPER, INK and BRIGHT values for each OBJECT are entered (in order) in line 6140. A set of values MUST be entered for each object. If the choice of PAPER is not the same as the normal screen colour, then add spaces to the HERE YOU CAN SEE etc phrases to match the length of the longest OBJECT description.

Q) **CENTRALISATION OF PRINT**

The printing of HERE YOU CAN SEE and YOU HAVE WITH YOU followed by the relevant list of OBJECTS can be located in the centre of the screen or at the left of the screen... select either 0 or 1 when prompted.

R) **RESPONSES from within the M/C system** (1) (6)

The DATA for these (in numerical order) is entered in line 7090 and onwards as follows:

7090 DATA 6, "You really need some light in here!"

with the number again referring to the INK

colour, and the text being arranged for tidy printing to screen.

Three types of responses are considered

STANDARD . . . in lines 7090 to 7098

TERMINAL . . . entered in line 7100 onwards

ROUTINE entered in line 7150 onwards
but they are numbered in sequence without regard for type.

Hence, in the DATA for the DEMONSTRATION ADVENTURE as there are 9 STANDARD responses, 1 TERMINAL response and 6 ROUTINE responses the reference number for the first ROUTINE response is 11 and for the only TERMINAL response it is 10.

Any response which is identified as a TERMINAL response will automatically be followed on screen by the "Do you want to try again?" phrase.

S) BRIGHT VALUE (1)

Enter here the BRIGHT value of the main screen.

T) PERMANENT BACKGROUND COLOUR (0)

Enter here the colour value of PAPER for main screen.

DEFINED VARIABLES

The following variables have been used in the CODE GENERATOR listing and may prove useful to replace numbers and so obtain the maximum benefit from the program.

Ø=n	1=j	2=a	3=w	4=aa
5=ab	6=ac	7=ad	8=b	9=ae
1Ø=af	11=ag	12=ah	13=ai	14=aj
15=ak	16=c	17=al	18=am	19=an
2Ø=ao	22=ap	23=aq	24=ar	31=as
32=d	33=e	35=f	4Ø=g	42=at
48=au	5Ø=av	54=h	58=i	6Ø=k
61=l	62=m	7Ø=ax	79=ay	92=az
99=bj				
1ØØ=ba	115=bb	126=bc	137=bd	184=be
19Ø=bf	2ØØ=bg	2Ø1=o	2Ø2=p	2Ø5=q
215=u	25Ø=v	251=bi	254=r	255=s
4ØØ=t				

The following sections explain how the system works and how it may be used to write your own adventure.

ANALYSER ROUTINE

The ABS allows a maximum input of 30 characters as upper case letters or numbers.

The analyser routine examines the input and returns to BASIC with an allocated number for VERB (vb) and NOUN (no) which the BASIC program can utilise. Any unrecognised word returns a value of 200 for VERB and 201 for NOUN. This information can be used in various ways by the BASIC program but in the demonstration adventure, either situation produces the all-purpose cop-out of "You can't do that"!!

Possible single word inputs require some explanation. The parser routine analyses the input by considering the first word as the VERB and the last word as the NOUN so that "DROP THE SPADE" or "DROP THE SHORT SPADE" produces the same response as "DROP SPADE".

However, the one word input of, for example, LOOK gives both a VERB and NOUN of "LOOK" with values of vb=4 and no=201. This would produce a response of "You can't do that" due to the value of no=201. Such an outcome is prevented by including LOOK in the list of NOUNS and assigning it a default value of 99.

Any additional VERBS which could be used as single word inputs should be included in both VERB and NOUN lists in a similar manner.

Alternatively, the NOUN number could be a true assigned number for use by the BASIC program. In the demonstration program such an approach has been used for DIG where it has been assigned the same NOUN number as HOLE as an input of "DIG" implies "DIG A HOLE".

NUMBER OF LOCATIONS

If your adventure contains more than 65 locations then line 7665 should be altered to $7005+(10 \times \text{number of locations})$.

CONTROL OF THE ADVENTURE

The adventure is controlled in the BASIC program by the following:

Variable vb (the VERB number)

Variable no (the NOUN number)

The OBJECT STATUS TABLE

The FLAG STATUS TABLE

All other controls are operated by the generated CODE.

a) OBJECT STATUS TABLE (OST)

Fifty entries are available in this TABLE and each object has at all times an entry here in the position identified by the number of the object.

e.g. Status of object number x is found by PEEK (o+X) and a change in status is effected by POKE (o+X), Y where Y indicates the new status.

b) FLAG STATUS TABLE (FST)

100 entries are provided by this TABLE with a few being reserved for specific uses.

FLAG (f+99) is used to control size of INVENTORY.

FLAG (f+98) is used by the GRAPHICS AID program.

FLAG (f+0) contains number of current location.

The first X entries are reserved for use by X objects which change description during the course of the adventure.

All other FLAGS are available for use by the BASIC program.

A FLAG may also be used as a counter to a maximum count value of 255.

A FLAG status is determined by PEEK (f+X) and a change in status is effected by POKE (f+X), Z where Z indicates the new status and X indicates the FLAG number.

As the adventure progresses the BASIC program will be required to update the values in OST and FST.

At start up all FLAGS (except f) have the value of 0.

e.g. In the demonstration adventure, the FLAGS (f+1) and (f+2) are altered to the value 1 when the COAT is worn and the TORCH is lit respectively, also (f+3) is altered to 1 when the CUPBOARD is open.

COMPLETION OF THE BASIC PROGRAM

1) VERB SUBROUTINES

100 lines are available for each subroutine commencing at lines 1000 + (vb x 100). If guidance on how to construct these is required then consult paragraph 5 of this section.

2) PRINTING OF RESPONSES

As it is most likely that a split-screen presentation will be selected, it is necessary to check for the need to scroll before each response is printed on screen. To remove the need to include such a check before each PRINT statement the responses MAY be identified as r\$(1), r\$(2), r\$(3), and r\$(4) which are then printed by the PRINT routine at line 50.

e.g. LET r\$(1) = "OK":GOTO 50

It is useful to employ this PRINT routine while testing and de-bugging sections of the adventure. However, the printing of responses can be incorporated into the machine code system by replacing the statement . . . LET r\$() = " " :GOTO 50 . . . with . . . LET r=x:GOTO 30 . . . where x=the response number held in the machine code system (see section R).

Seven responses in the DEMONSTRATION ADVENTURE have been incorporated into the machine code system . . . those in lines 208, 1092, 1100, 1105, 1110, 1915, 7070 and 7150. The difference in effect can be observed by comparing the response to OPEN CUPBOARD (in FRONT HALL) with DIG HOLE (in the GARDEN).

3) VARIABLES USED BY THE BASIC PROGRAM

Variables assigned in the core BASIC program are:

vb, no, f, o, MAX, SAVE, LEN, DMOV,
TRNO, PRIN, PRCAR, PRMS, PRHY,
SYS, SA, LO and QUIT.
rs(4,32)

4) LINE NUMBERS

It is important that lines 100 and 195 are retained in the BASIC program as is (except for alteration of the detail in line 100). These lines are on occasions pointed to by the machine code system and any change could be disastrous!

5) The method of construction of the VERB sub-routines can be observed by studying lines 1000 to 3300 of the DEMONSTRATION ADVENTURE. However, for a detailed examination (by way of an example) consider the input of LIGHT TORCH.

This will return a vb value of 12 and no. value of either 2 or 9 depending on whether the TORCH is lit or not (this check will have been automatically made by the code).

For a vb value of 12 control of the program will be directed to line 2200 (i.e. 1000 + (12 x 100)) as calculated in line 235).

Translation into ENGLISH of this section is as follows:

Line 2200

IF PEEK (o+9)=99 . . . If lit TORCH is being carried

AND no=9 . . . and NOUN = lit TORCH

THEN LET r\$(1) = "It's already lit!"
formulate response and PRINT it.

Line 2205

IF no=2 . . . If NOUN = a small TORCH

AND PEEK f(>)11 . . . location is NOT 11 (Cellar)

AND PEEK (o+2)=99 . . small TORCH is in
INVENTORY

THEN POKE (o+2),0 . . . remove TORCH
from INVENTORY
POKE (o+9),99 . . . place a lit TORCH in
INVENTORY
POKE (f+2),1 . . . set flag for TORCH is lit
LET rs(1)="OK . . . TORCH now lit" . . .
formulate response and PRINT it.

Line 2210

Similar to line 2205 but player must be in
CELLAR this time, so send program to line
100 to print full description as the player is
now carrying a lit TORCH.

Line 2215

Any other situation produces the cop-out
response!

An improvement would be to include a
response for the situation where the player
did not have the TORCH in his/her possession.

VERBS AND NOUNS INCLUDED

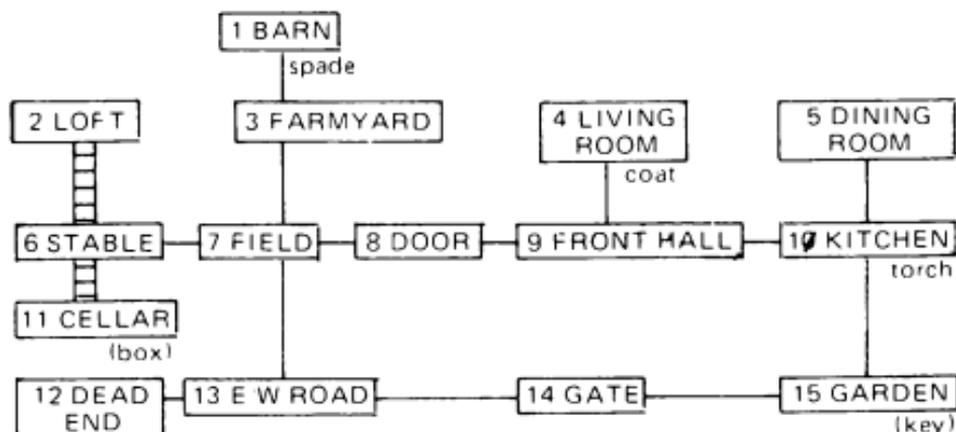
VERB	vb No.	NOUN	no No.
GO	Ø	N	1
N	Ø	NORTH	1
S	Ø	S	2
E	Ø	SOUTH	2
W	Ø	E	3
U	Ø	EAST	3
D	Ø	W	4
GET	1	WEST	4
TAKE	1	U	5
DROP	2	UP	5
EXAMINE	3	D	6
LOOK	4	DOWN	6
L	4	LOOK	99
R	4	L	99
INVENTORY	5	R	99
I	5	INVENTORY	99
LIST	5	I	99
QUIT	6	LIST	99
STOP	6	QUIT	99
SAVE	7	STOP	99
LOAD	8	SAVE	99
		LOAD	99

The following verb sub-routines are included in the core BASIC adventure listing:

LOOK. line 1400
INVENTORY line 1500
QUIT line 1600
SAVE. line 1700
LOAD. line 1800

The MOVEMENT sub-routine is partially completed only, starting at line 1000. It remains to insert any lines to account for temporary blocks such as closed doors or removal of guarding monsters!!

DEMONSTRATION ADVENTURE



NUMBER	OBJECT (o\$)	DATA	STARTING LOCATION
1	A tartan Coat	COAT	4
2	A small TORCH	TORCH	10
3	A wooden BOX	BOX	∅
4	A short SPADE	SPADE	1
5	A bronze KEY	KEY	∅
6	Splinters of WOOD	WOOD	∅
7	A large DIAMOND	DIAMOND	∅
8	A tartan COAT (worn)	COAT	∅
9	A lit TORCH	TORCH	∅

NUMBER	OTHER NOUNS	NUMBER	OTHER NOUNS
16	DOOR	23	GARDEN
17	CUPBOARD	24	FIELD
18	LAWN	25	SAFE
19	STAIRS	26	PATCH
20	LADDER	27	JUMP
21	GATE	22	DIG
22	HOLE		

DEMONSTRATION ADVENTURE

vb number	VERB	MOVEMENT DATA						
		location	N	S	E	W	U	D
9	OPEN	1	0	3	0	0	0	0
10	UNLOCK	2	0	0	0	0	0	6
11	DIG	3	1	7	0	0	0	0
12	LIGHT	4	0	9	5	0	0	0
13	EXTINGUISH	5	0	10	0	4	0	0
14	CLIMB	6	0	0	7	0	2	11
15	DESCEND	7	3	13	8	6	0	0
16	CLOSE	8	0	0	9	7	0	0
17	TOSS	9	4	0	10	7	0	0
18	FILL	10	5	15	0	9	0	0
19	LOCK	11	0	0	0	0	6	0
20	WEAR	12	0	0	13	0	0	0
21	REMOVE	13	7	0	14	12	0	0
14	ASCEND	14	0	0	15	13	0	0
16	SHUT	15	10	0	0	14	0	0
22	JUMP							
23	USE							

FLAG STATUS TABLE ASSIGNED VALUES

FLAG NUMBER	CONDITION FOR VALE=1
1	COAT worn (fixed allocation)
2	TORCH lit (fixed allocation)
3	CUPBOARD open
4	DOOR open
5	HOLE in field
6	HOLE in garden
7	GATE open
8	SAFE unlocked
9	Found BOX
10	Found KEY
11	First CUPBOARD open
.	
.	
.	
99	INVENTORY (fixed allocation)

OTHER CONSIDERATIONS RESPONSE TIME AND MEMORY

1) VARIABLES

When memory becomes a problem, the first consideration is usually to replace frequently used numbers with a variable. For example 0 and 1 abound in many BASIC adventure listings and the use of:

```
LET n=0  
LET j=1
```

followed by the replacement in the listing of each of these numbers by n or j can effect a considerable saving of memory. Such an approach, when applied to an extreme extent can have an adverse effect on response time. It is therefore necessary to strike a considered balance between speed and memory-saving. When the variables have been finally defined then all lines such as 9960 can be removed to increase the available memory.

2) SUB-ROUTINE STRUCTURE

The length of each sub-routine will affect the response time if the program is required to plough through a vast number of lines before reaching a conclusion. Careful construction can minimise this effect.

a) The "EXAMINE" sub-routine.

This is likely to be one of the longest in terms of number of lines but acceptable response times can be achieved by dividing the sub-routine into several sections.

The EXAMINE command in the first instance can be considered with two groups of objects those which can be carried (e.g. KEY) and those which are included in the location text (e.g. DOOR). A line such as ~~1300~~ in the demonstration adventure effectively produces two shorter "EXAMINE" sub-routines, each of which could be further divided if required.

b) The "MOVEMENT" sub-routine

This routine requires to be of almost instant response but can be slowed down if there are many considerations of locked doors etc to be evaluated by the BASIC program. This does not apply to the demonstration adventure as there are only two such lines. Removal of such lines, however, can be achieved by the following modifications.

On return from RANDOMIZE USR 65005 the maximum value of PEEK 64115 will be the number of locations in the adventure (in this case, 15). Also, if the DOOR IS CLOSED then **that** response is required for an EAST move from location 8 and a WEST move from location 9. Currently in the MOVEMENT DATA, EAST from 8 has a value of 9 and WEST from 9 has a value of 7. Change both of these values to 16 in the DATA lines of the CODE GENERATOR program, or as a short cut the changes can be effected by the direct commands: POKE ((DMOV-7)+59), 16 and POKE ((DMOV-7)+67), 16 . Now make the following alterations to the BASIC listings:

1) Remove lines 1005, 1816, 7080, 7081

2) Add the following lines:

```
1820 IF PEEK (f+4)=1 THEN POKE
((DMOV-7)+59), 9:POKE ((DMOV-7)+67),7
1825 GOTO 100
```

```
1600 POKE ((DMOV-7)+59), 16: POKE
((DMOV-7)+67),16
```

```
Renumber 1090 as 1050 then delete 1090
Renumber 1092 as 1052 then delete 1092
1055 IF PEEK 64115<16 THEN GOTO 1060
1058 LET n$(1)=n$(PEEK 64115-15):GOTO 50
9972 DIM n$(2,9)
9973 LET n$(1)="The DOOR is closed!"
9974 LET n$(2)="The GATE is closed!"
```

3) Alter the following lines:

```
1900 after POKE(f+4),1: add—
    POKE ((DMOV-7)+59),9:POKE
    ((DMOV-7)+67),7
2600 after POKE(f+4),0: add—
    POKE ((DMOV-7)+59),16:POKE
    ((DMOV-7)+67),16
```

N.B. The calculation $((DMOV-7)+59)$ locates the position in the MOVEMENT DATA for the entry for an EAST movement from location 8.

The value 59 is found by $(\text{location number } (8) \times 7) + \text{direction value}$, where N=1, S=2, E=3, W=4, U=5, D=6.

$$\text{i.e. } (8 \times 7) + 3 = 59$$

As an exercise, similar changes should be made to permit the removal of line 1010.

When the program is complete then all expressions such as $((DMOV-7)+59)$ should be replaced by their numerical value.

PERSONALISATION

Certain features incorporated into the ADVENTURE BUILDER SYSTEM can be readily altered to provide characteristics of your own choice.

A) STANDARD PHRASES

The STANDARD phrase (e.g. "HERE YOU CAN SEE") can simply be altered by changing the DATA in the CODE GENERATOR. The only restriction would be to use a phrase no longer than the longest OBJECT description, for "HERE YOU CAN SEE.. etc, particularly if printing was centralised and/or a change in PAPER colour had been selected.

B) INPUT PROMPT AND BEEPS

By poking different values into the following locations it is possible to "personalise" your adventure.

LOCATION	CURRENT	RESULT
64510	62	Prints)
64528	42	Prints *
64633	50)	
64634	0)	
64636	200)	
64637	1) . .	Input keyboard BEEP
64049	5)	
64050	1)	
64052	125)	
64053	1)	BEEP for wrong key press

C) SCREEN PRESENTATION

An adventure with good puzzles and story line can be effectively ruined by poor screen presentation so considerable care should be taken to provide a good impression.

It appears that it has become almost universally acceptable that BORDER and PAPER are set to the same colour. This in turn affects the BRIGHT feature as the use of this provides a poor effect with background colours other than BLACK and to a lesser extent, BLUE. The value of BRIGHT is required by the ABS in order that the printing effected by the machine code system can provide an acceptable presentation.

GRAPHIC AID

for

THE ADVENTURE BUILDER SYSTEM

Also available from ALPHA OMEGA SOFTWARE ... a simple to use program which will incorporate INSTANT part-screen graphics into your masterpieces.

For use ONLY with the ADVENTURE BUILDER SYSTEM, and only £2.50 from

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ARTWORX V1.1

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*Portions of this program were created using the TIMACHINE compiler written by Cameron Hayne - copyright 1986.

†ARTWORX V1.1 and the accompanying documentation were written by Ariel S. Frailich and David C. Ridge.

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DEFINITION OF TERMS

ATTRIBUTE:

Attributes modify the appearance of the screen by applying PAPER and INK colours, BRIGHT and FLASH to specific areas.

CURSOR:

A screen reference marker, showing the current position for applying information to the screen (the arrow in the case of ARTWORX).

FONT

A generic term describing a specific character set.

GREY SCALE:

With the proper software, a full-sized dot-matrix printer can produce a copy of the screen using varying dot densities (shades) to represent the screen colours. This method of reproduction is known as "GREYSCALE".

INTERFACE:

A hardware device which allows the computer to communicate (hook up with) a specific peripheral device; e.g., printer, modem, disk drive, etc.

MENU:

A list of options on the screen allowing control and/or selection of the program features.

PIXEL:

The smallest addressable dot on the screen. This can be seen using the DOT feature of ARTWORX.

RAM:

Stands for "RANDOM ACCESS MEMORY" and is the amount of free space your computer has for your programs.

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You can erase by toggling INVERSE (under ATTR) on with the fire button (an asterisk indicates "on"), then select a brush. The brush will now erase when the fire button is held down. For a more thorough understanding of erasing, study INVERSE under the "DESCRIPTION OF FEATURES" section.

Okay, now you know the "fun"-damentals. At this point we urge you to read the "DESCRIPTION OF FEATURES" section and avoid experimenting blindly with all the features. By experimenting as you read, you will be sure to master all features in an hour. If we had a dime for all the times a customer asked about something which is explained in the manual, the plush, well-lit offices of NovelSoft would truly be plush and well lit! PLEASE READ!

DESCRIPTION OF FEATURES

TOOLS

VIEW

This feature allows the drawing screen to be viewed, uncluttered by the menu or cursor. Useful for screen photography or simply examining your creation. Note that during VIEW mode, the screen is "dead", i.e., no cursor or prompts. The menu is called back in the usual manner of two rapid presses of the fire button.

BRUSH

Provides six different brush shapes for free-hand sketching. Upon selection of BRUSH, a pull-down brush menu will appear. Note that the first brush, at the top of the brush menu, is blank. This is actually a brush, but it plots no ink and, therefore doesn't set any pixels. This brush is very handy for painting with attributes only.

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ROM:

Stands for "READ ONLY MEMORY" and is the brain of your computer. This section of memory cannot be written to or changed by the user. The ROM contains all instructions needed to tell the computer what to do.

SCREENS\$:

Pronounced "SCREEN STRING" - this is the Sinclair keyword (below the K key) which tells the computer to save the screen or picture as a byte file. Note that this command has no significance for the use of the ARTWORX program. The picture is sometimes referred to as a "SCREENS\$".

WINDOW:

A variable-sized box, used to define an area on the screen.

INSTALLING THE PROGRAM

The cassette contains programs in this order:

- ARTWORX V1.1

- ZXGALLERY

- Examples: ART1 to ART5

To load ARTWORX, simply type LOAD"" and press ENTER. In a few minutes, a blip will notify you that the program has finished.

NOTE: All references to control in this manual are for joystick use. If you are using keyboard control, then simply substitute the cursor keys (unshifted 5, 6, 7, 8) for the joystick and the Ø key for the fire button.

WARNING

ARTWORX uses a unique method for accessing the menu: two presses of the fire button in rapid succession. Bear this in mind at all times. If you get overly anxious while toggling a feature on, you may call the menu accidentally. A sloppy press of the fire button can cause "button bounce" and this too can cause accidental menu calls.

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You can use it to add BRIGHT, FLASH, or PAPER colour to a local area without disturbing or altering the pixels that are already set in that area. This concept may seem a little difficult to grasp at first so feel free to experiment. Refer to the ATTR section of this manual for a more thorough understanding of the attributes.

SPRAY

Provides a spray paint simulation which is active while the fire button is held down. Note that, as the speed of the cursor increases, the density of the spray will decrease slightly. Useful for shading effects.

FILL

Fills (sets all pixels) any enclosed shape with the current attribute selection. Note that if the walls (boundaries) of the shape being filled have any holes (gaps), the fill will leak out and either contact the next object or, if there is none, stop filling.

To activate FILL, simply move the cursor inside the boundary of the shape and press the fire button. When filling complex shapes, small pockets may be left unfilled. Just move the cursor to these pockets and press the fire button again.

ZOOM

This feature allows a small area of the screen to be magnified eight times for working at the pixel level. Upon selection, the "ZOOM window" will appear in the centre of the screen. Move the window over the area you wish to zoom in on and press the fire button. Everything in the window will now be blown up eight times with a grid indicating pixel locations.

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GETTING STARTED

Upon running ARTWORX, you are presented with a blank screen with the main menu pulled down. This menu is the only menu in the entire program so you don't have to worry about being confused by endless menus and sub-menus. The title of each feature category is listed along the top of the menu with the features themselves listed underneath. You will also notice that the rectangular selection box is already in the upper-left corner, surrounding the VIEW feature. The menu will always come down with the selection box in the upper-left corner.

Features are selected by moving the box to the feature you wish to select and pressing the fire button. Go ahead and use the joystick now, to get a feel for moving this box around the screen. All features of ARTWORX are controlled with the joystick. The only time you need to use the keyboard is for text entry.

ARTWORX is so friendly and natural to use that there is really only one rule for the novice user to remember: *The menu is called down by rapidly pressing the fire button twice.* Well, now we're ready to experiment a little!

Use the joystick to move the selection box to BRUSH and press the fire button. The BRUSH menu will pull down with the selection box appearing at the top. This menu provides six different brushes (the blank one at the top is also a brush, see BRUSH under DESCRIPTION OF FEATURES) for painting on the screen. Move the selection box to the bottom brush and press the fire button. Now the menu disappears and the arrow cursor is in the middle of the screen.

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You can now toggle individual pixels on or off with the fire button. When you're finished editing, press the fire button twice and the image will return to its original size in its new edited form.

CLS

This feature clears the screen. IF YOU CLEAR THE SCREEN ACCIDENTALLY, THERE IS NO NEED TO PANIC! Simply select UNDO immediately, and the picture will return (remember - UNDO will undo anything done since the last menu call). Always remember that when you clear the screen, your current ATTR settings will be applied to the entire screen. You can, therefore, use CLS to apply BRIGHT, FLASH or PAPER colour to the entire screen before drawing on it.

UNDO

Erases all information which has been added to the screen (picture) since the last menu call. So, if you're unhappy with what you've drawn since that last time you called the menu, just call the menu down and select UNDO. Note that UNDO must be selected immediately after calling the menu. After selecting UNDO, the screen is "dead" to allow you to contemplate the drawing and decide what to try next. Two pushes of the fire button and the menu is back.

WARNING

UNDO IS NOT AVAILABLE AFTER USING ZOOM - SEE UNDO.

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You will use this cursor to apply all features to the screen. Experiment with moving it around. Notice that this cursor has an automatic speed control. At first, its movement is slow and controllable. But, the longer you hold the stick in any direction, the faster the cursor will go! The speed will reset to slow when the stick returns to the rest position (cursor stopped).

This "intelligent cursor" is very handy indeed. It's smart enough to know that if you're doing a lot of starts and stops with the joystick, then you probably want a slow speed for detailed work. If you're holding the stick in one direction for more than a few seconds, then it's a fair bet that you want to cover a large portion of the screen, so the speed increases.

Now, remember that brush we selected? Well, it's still there, waiting to be used. Simply hold the fire button down and start moving the cursor. The brush is active only while the fire button is held down. Now, let's select a different brush. Press the fire button rapidly, two times, and the menu will come down.

This time, select the second BRUSH and draw a small enclosed shape. Make sure that there are no gaps around the edges of the shape. Now call the menu down and select FILL. Move the arrow inside the shape and press the fire button. Presto

Call the menu and move the selection box to INK (under ATTR). Use the fire button to cycle through the colours until you get to the one you want. Then move back to TOOLS and select SPRAY. Spray works just like BRUSH with the spray active while the fire button is held down.

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WINDOW

NOTE:

The window used in all the WINDOW features grows upward, and to the right of the cursor. When the window reaches its maximum size, it will simply stop growing. The maximum size of the window is determined by the area of the window. Thus, if you reduce it in one plane, it can be grown in another.

MOVE

This feature provides the ability to move large pieces of the picture anywhere on the screen! After selection, move the cursor to a suitable starting location for growing the window (remember that the window grows upward, and to the right of the cursor) and press the fire button. Next, use the joystick to grow the window around the object you wish to move and press the fire button again. Now you can move the image anywhere you like!

Note that only pixels are moved. The attributes of the image will stay behind; e.g., if you have a white screen and you move an image containing some red PAPER colour, the red PAPER area will remain behind and the image will be applied to the screen using the current ATTR settings.

COPY:

Works the same as MOVE except that the original image remains on the screen, thus "duplicating" the image. Note that COPY can be used to change the colour of an image by selecting the desired colour, then defining and committing the image in the same location.

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TURN

After defining the window, the original image is erased, turned 90 degrees clockwise, and reproduced. The image can be rotated repeatedly. If the image would go off the screen when rotated, the feature will abort and the "ABORT" will flash at the bottom of the screen.

BIG

After defining the window, the original image is erased and is reproduced using a magnification factor of two. The image can be magnified repeatedly. Note that if the image being magnified will go off the screen, then the magnification will be aborted and the "ABORT" message will flash at the bottom of the screen.

SMALL

After defining the window, the original image is erased and is reproduced using a reduction factor of two. The image can be reduced repeatedly. When using SMALL, a certain amount of image distortion or "information loss" will take place. This will not be apparent while viewing the reduced image. However, it will be very apparent if you try to restore the image to its original size using BIG. Better to use UNDO in this case.

FLIPV

After defining the window, the image is erased and then mirrored vertically. This is like holding a mirror up to the top or bottom of the image.

FLIPH

After defining the window, the image is erased and then mirrored horizontally. This is like holding a mirror up to the side of the image.

CLEAR

After defining the window, the original image is erased.

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There is still a rough, blocky mess of green on the screen but since it is PAPER colour, it remains in the background and the INK colours are always in the foreground. In fact, if you change the PAPER colour back to white and erase the INK, you will see this to be true.

SPECIAL NOTE ABOUT INVERSE

ERASING

You may have noticed that "erase" features are conspicuous by their absence. Quite the opposite is true, however! Due to the sophisticated methods we have employed regarding attributes, virtually EVERY feature is an eraser when INVERSE is flagged. Since INVERSE unsets pixels, any feature which sets pixels will now unset them!

SHAPE

CIRCLE

(Circ)
Define the centre of the circle with the fire button, then grow the circle to the desired size using the joystick. The rate of growth is related to the speed of the cursor. The circle can be grown in any direction. Once the desired circle is defined, press the fire button to commit it.

ARC and OVAL

These features use a triangle for visual reference of the three boundaries. Use the fire button to define the starting point, then grow the first axis of the triangle to the length and angle you wish. Press the fire button again and you can now use the joystick and fire button to define the third point of the triangle. The shape will be drawn, using the tips of the triangle to determine the start, finish and deflection points.

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GETTING STARTED

Initially, GALLERY is empty and option 1 should be selected first. ARTWORX comes with five samples of artwork and these are located immediately after ZXGALLERY. We suggest that you load all five so that you can become familiar with GALLERY.

Section option 1 and enter 5 for the number of pictures. Next, position the tape just past ZXGALLERY, enter the name of the first sample (ART1) and play the tape. Stop the tape immediately after the first sample has loaded. You will be prompted to enter a BORDER colour, then to enter the name of the second sample and so on until all five have loaded.

After the last picture has loaded, the menu will return. You may now select option 4 to view GALLERY. Note that when viewing GALLERY, there are three hidden controls:

- you can "fast forward" the pictures by pressing "F".

- you can pause the screen by pressing "P".

- you can return to the menu by pressing the space bar.

There is no on-screen menu for these controls, so the screen will be free of distractions for the show.

Option 2 allows you to save the entire show under one filename so that it can be loaded back in at a later date using option 3.

Option 5 allows you to change the viewing time. The default setting is one second.

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ATTR

See "Attributes" in the "DEFINITION OF TERMS" section.

INK, PAPER and BORDER

(Ink, Pap, Bor)

These attributes are selected by positioning the selection box around the desired feature and then "cycling" through the different colours with the fire button. All eight colours are available with INK and PAPER also having a "transparent" setting - "tr". Transparent simply means that attributes already on the screen will remain dominant; i.e., if you have INK set at "tr", then whatever you draw on the screen will adopt the same INK colour as what you are drawing over. The same goes for PAPER.

INK is simply the colour the pixels will be set to. You're probably accustomed to thinking of PAPER colour as a global attribute, i.e., affecting the entire screen at once. ARTWORX allows you to apply PAPER colours locally! It may help you to understand if you think of local PAPER colour as a background colour and INK as the foreground colour.

Now, this is where things get a little tricky, so pay attention. Unfortunately, the Spectrum has "low resolution colour". This means that, although the computer is capable of relatively high resolution graphics (large numbers of addressable pixels), there are restrictions on how close different coloured pixels can be together.

Try to think of the screen as being divided up into two different resolutions. One is the "pixel" resolution of

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For best results, always try to define the amount of deflection (the third point) in the centre of, and perpendicular to, the first two points. Note that you can define the arc or oval at any angle!

If you create an arc which goes off the screen edge, then the error trapping routine will call the menu down. This is a universal response to system errors. If you create an oval which goes off the screen edge, the oval will simply stop drawing when it reaches the edge.

LINE and RAY

Define the starting position with the fire button and then use the joystick to grow the line to the desired length and angle. Press the fire button to commit the line. The only difference between LINE and RAY is that the lines in RAY have a common centre.

BOX

This feature works the same way as the WINDOW features except that there is no restriction on the size of the box.

TRIANGLE

(Tri)

You have already used this feature in ARC and OVAL. It works the same way except that the triangle remains on the screen.

DOT

Sets individual pixels each time the fire button is pressed.

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APPENDIX A

TIPS FOR GETTING PROFESSIONAL RESULTS

1. You will find it far easier and more natural to complete the outline of your drawing before adding any attributes (colour, BRIGHT, etc.).

2. Use ZOOM when creating small detailed images.

3. Fast and excellent results can be achieved by first tracing a picture or photograph onto clear acetate and then taping it to the T.V. or monitor. Then use the various tools available in ARTWORX to trace the image onto the screen. Use the ARC feature for best results when tracing complicated images.

4. When using the WINDOW routines, note that the boundaries for movement around the screen are determined by the window size and not the shape within it. Therefore, be sure to "hug" the image closely when defining the window.

5. Different hues or tones of colour can be created by manually filling an area with individual dots, leaving a one pixel space between each. This is best done using the ZOOM feature.

6. Use OVER to apply text to an area which already has pixels set, e.g., a filled shape.

7. Use OVER with some of the larger brushes for a very interesting effect. This is caused by the brush half erasing itself while it is being drawn.

8. Use OVER with SPRAY to erase in a spray pattern.

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256 pixels horizontally and 176 pixels vertically. The second is the colour or "attributable" resolution of 32 horizontally and 22 vertically. The "pixel" resolution is made up of the smallest dots of the screen (see "Pixel" in the "Definition of Terms" section). The "attribute" resolution can be seen by selecting GRID.

Think of these GRID squares as "attribute blocks". The attributes INK, PAPER, BRIGHT and FLASH will affect an area *no smaller than one attribute block*. Read that last sentence again! What this all means is that you apply different BRIGHT, FLASH, PAPER or INK values to two or more different pixels sharing the same attribute block.

BRIGHT, FLASH, OVER, INVERSE

(Bri, Fla, Ovr, Inv)

These features are toggled on/off using the fire button, with an asterisk indicating "on".

BRIGHT will brighten the screen in attribute block locations and is used mainly for highlighting an area of the screen. It also effectively doubles the number of colours available in PAPER and INK due to the different shades it creates. Note that *all* BRIGHT areas of the screen will be removed by GRID.

FLASH also affects the screen in attribute block locations and is mainly used for highlighting or emphasizing.

OVER sometimes causes a little confusion, so listen carefully. It's quite simple, really. The pixels of the image being applied to the screen, will be set opposite to what is already there. In other words, if you are setting some pixels and there are already some pixels set in this area, then they will be "unset". If there are no pixels set in this area then they will set.

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TEXT

After selecting a text font, move the text cursor to the desired start location and press the fire button. Now you can enter text as you normally would from the keyboard. CAPS SHIFT and CAPS LOCK work as normal and DELETE provides a backspace. The text will automatically wrap around at the screen edge but will not justify.

When you are finished entering your text, press ENTER to return to the beginning of the feature. Remember that all ATTR settings are applicable to the text, so experiment. Note that the text is applied to the screen in attribute block locations but you may shift the position of the text anywhere you like using MOVE. Use GRID to help you plan where your text will go initially.

Also note that you are not limited to the four fonts which are provided. The text can be enhanced in many different ways with creative use of BIG, SMALL, ATTR, etc. Some distortion in the lower case ITALIC was unavoidable, so certain letters may seem a little unusual. This is due to the limitations of the computer.

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APPENDIX B

USING THE PICTURES IN YOUR OWN PROGRAMS

The pictures created with ARTWORX can be used as loading screens for your own programs. To load them into the computer when ARTWORX is not present, use the SCREEN\$ (extended mode/SYMBOL SHIFT K) command as follows:

LOAD "name" SCREEN\$

Follow the example below to create a suitable loader:

```
10 LOAD "name" SCREEN$
20 LOAD "your program"
```

Save the loader on the tape, then the picture, then your program. Note that ARTWORX saves the pictures as code, but the pictures can be loaded as SCREEN\$.

You will notice that when you load a SCREEN\$ into the computer, you are able to watch the picture being assembled as it loads. It is sometimes desirable to reveal the picture to the viewer after it has loaded. One easy way to do this is to set the INK and PAPER colours to the same value while the picture is loading. If this is done, the picture will not be revealed until the last few hundred bytes of the SCREEN\$ (the attribute file) are loading.

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To illustrate this, choose a brush and draw an enclosed shape. Now FILL the image. Call the menu and flag (turn on) OVER. Choose a brush and draw on the screen, both in the blank areas and through the filled shape. Notice that the unset pixels in the path of the brush are now set and the previously set pixels are now unset.

INVERSE is sort of like half an OVER! If INVERSE is flagged and no pixels in its path are set, they will be left unchanged. However, set pixels will be unset.

FILLING WITH ATTRIBUTES

Yes, just when you thought things couldn't possibly get any more complicated, you can fill with attributes! Try this example and you'll see how useful this can be. Select CIRCLE from the SHAPE category and create a circle about three inches in diameter (this is done by defining the centre point of the circle with the fire button, growing the circle with the joystick, then committing the circle with the fire button). Then create another circle, about two inches in diameter, in the centre of the first circle.

FILL the space between the two circles with red ink. Now, FILL the centre of the smaller circle with green ink. What a mess! Because of the bleeding, you might well think that curved surfaces in closed proximity to each other, such as this example, cannot be two different colours.

Well, that's true, but we can create the illusion that they can. Try this! Call the menu and select UNDO to get rid of the green mess. Now, flag INVERSE and select transparent (tr) INK and green PAPER. Okay, now FILL the smaller circle. Neat!

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FILE

LOAD and SAVE

This category provides I/O (input/output) for saving and loading your pictures to tape or Microdrive. Just answer the prompts and you can't go wrong! Note that the maximum length for a filename is ten characters. ARTWORX V1.1 supports both tape and Microdrive. The five sample pictures included with ARTWORX can be loaded into either GALLERY or ARTWORX. These samples are located immediately after ZXGALLERY.

If a tape error is encountered during loading or saving, you will receive a flashing warning and the program will restart with no loss of picture information.

WARNING

Microdrive errors are not trapped. If you get a Microdrive error during loading or saving, enter GOTU Ø to restart the program. DO NOT USE RUN OR YOU WILL LOSE YOUR PICTURE!

GALLERY

INSTALLING THE PROGRAM

GALLERY is an interesting little bonus program we provide with ARTWORX which allows you to create a slide show using your ARTWORX masterpieces! You may load in up to five pictures and cycle through them at any time interval you like. It is even possible to create some crude animation by selecting the fastest cycling time of .01 seconds (a smaller interval will cause GALLERY to pause).

ZXGALLERY is located on the tape immediately after ARTWORX. Simply enter LOAD "" or LOAD "ZXGALLERY".

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