HIGH SPEED LIFE

INSTRUCTION SHEET

I. INTRODUCTION

The rules for this wonderful Game of Life were invented by a mathematician named John Horton Conway. The game is played on a square grid. The rules are as follows:

Survival Rule - Any cell with two or three neighbors will live on to the next generation.

Birth Rule - An empty space with exactly three neighbors will be a birth cell in the next generation.

Death Rule - Any cell with less than two or more than three neighbors will die in the next generation.

Fortunately you do not have to memorize these rules as the program is designed to execute them in a most rapid manner.

Our program is called "HIGH SPEED LIFE" because it runs at animated speeds for many formations. You can hear the speed of the program because it makes a click for each generation. WARNING, THIS PROGRAM IS ADDICTIVE !!!!!!!!!!!!!

II. HOW TO LOAD

CLOAD the tape onto your TRS-80* level II 16k microcomputer. There are several offloads of the program on the same side of the cassette. If one does not work then try another. LIST the program to make sure you have a good load. Do not be fooled by the pseudo-hex dump in the data statements. RUN the program. The first time you run the program there will be a 64 second delay. This delay is needed to prepare high memory with machine language routines. During this time you will see a little advertizing courtesy of Synergistic Solar. The program will give a READY signal. Type in RUN and ENTER. You will not see the title on subsequent RUNs.

III. HOW TO USE HIGH SPEED LIFE

This program is divided into two operating modes:

Mode One - This mode is a basic text program that is used for creating, manipulating, and entering patterns into the life matrix.

Mode Two - This mode is a machine language routine that runs the life patterns. Only the eleven single key functions are active in this mode.

A. The Command List

  1) RE-ENTER LIFE ROUTINE...Goes directly into Mode Two.
  2) PREPROGRAMMED PATTERNS...Goes to the list of 32 ready to go patterns.
  3) SPECIAL PATTERN GENERATORS...Goes to three special pattern routines.
  4) CREATE YOUR OWN PATTERNS...Goes to 5 routines that help you make
                              your own patterns.

B. SINGLE KEY FUNCTIONS AVAILABLE WHILE RUNNING LIFE PATTERNS

KEY			DESCRIPTION OF FUNCTIONS
E	=	ERASE & START OVER	Clears the life matrix and jumps back to Mode One.
V	=	SAVE & START OVER	Saves the pattern in the life matrix and jumps back to Mode One.
S	=	SINGLE STEP ON	Single step thru each generation (use any key). Other functions also work during single step.
O	=	SINGLE STEP OFF	
D	=	DELAY ON	Slows the program to between 60 and 100 gen/min.
F	=	DELAY OFF	
ARROWS	=	SCROLL	Scrolls the life pattern on display in eight
(↑↓ ←→)			different directions. The scroll feature slows down the program when in use.
N	=	SCROLL OFF	

C. PREPROGRAMMED PATTERNS

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C. <u>PREPROGRAMMED PATTERNS</u>

There are 32 preprogrammed patterns ready to go. They can be placed almost anywhere on the life matrix (see the diagram of the life matrix on the other side). <u>Until you are used to the size and shape of the patterns it is best to place them at the middle of the life matrix.</u> The "N" and "SE" and other letters in front of the gliders and spaceships are compass headings showing the direction of travel. If you do any research on the history of the Game of Life you will find that most of the common patterns have been named for things that they resemble. The preprogrammed patterns we have picked are some of the most interesting formations.

```
  NW    N   NE
    \   |   /
  W ———*——— E
    /   |   \
  SW    S   SE
```
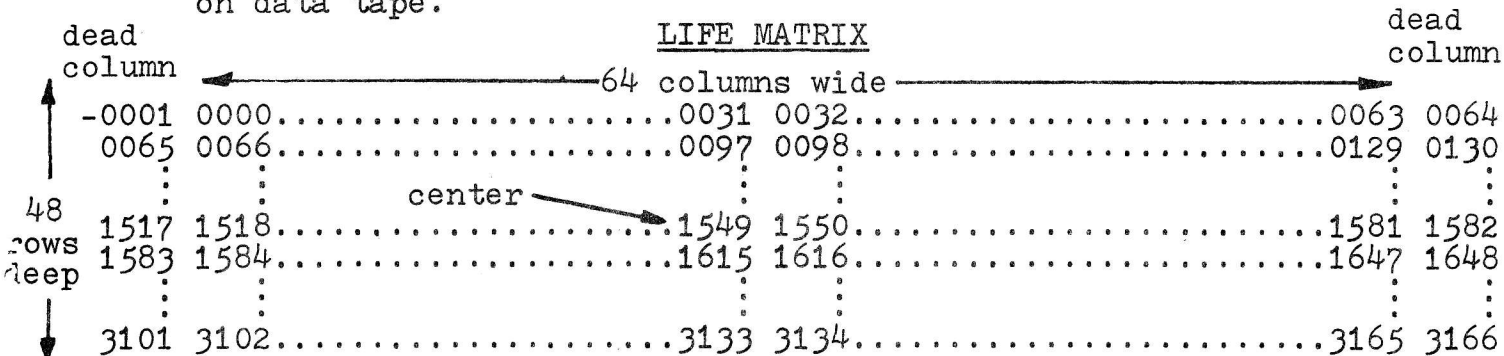COMPASS HEADINGS
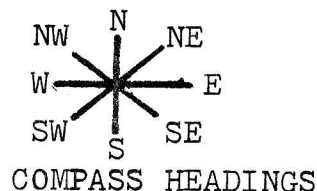
*TRS-80 is a trademark of Tandy Corp.

D. SPECIAL PATTERN GENERATORS

There are three special pattern generators which give you some very interesting effects.
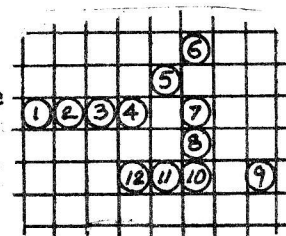
1) FILL WITH BLOCKS-The life matrix is filled with blocks (a stable life pattern). The blocks can be "infected" with a foreign pattern with bizarre effects.
2) FILL WITH 1/3 RANDOM FIELD - This routine randomly fills the life matrix with a density of approximately one third.
3) 10 X 10 RANDOM PATTERN - A 10 x 10 area in the middle of the life matrix is filled with a user selected density between .01 and .99 . You can get some very interesting patterns out of this function.

E. CREATE YOUR OWN PATTERNS

1) CREATE YOUR OWN PATTERN (UP TO 200 CELLS) - The life matrix is numbered sequentially from 0 to 3165. By entering the location numbers into a storage array you can repeat, edit, and save your patterns on data tape.

```
dead                              LIFE MATRIX                    dead
column                                                           column
          ◄──────────────64 columns wide────────────────────►
-0001 0000...................0031 0032.........................0063 0064
 0065 0066...................0097 0098.........................0129 0130
                 center ────►
 1517 1518...................1549 1550.........................1581 1582
 1583 1584...................1615 1616.........................1647 1648

 3101 3102...................3133 3134.........................3165 3166
```

48 rows deep

EXAMPLE: Let's make the pattern shown on the right. Start by plotting the pattern on a piece of graph paper. Find a convenient starting cell and give it a matrix No. near the center of the life matrix. Then step by step label each cell by adding or subtracting from the previous cell matrix No. To go up one row subtract 66, to go down one row add 66, to go one column to the right add one, and to go to the left subtract one. The dead columns are chopped to prevent wrap around.

cell	matrix number	operation
1	1615	starting number
2	1616	one right, add 1 to 1615
3	1617	one right, add 1 to 1616
4	1618	one right, add 1 to 1617
5	1553	one up & one right, subtract 65 from 1618
6	1488	one up & one right, subtract 65 from 1553
7	1620	two down, add 66 x 2 = 132 to 1488
8	1686	one down, add 66 to 1620
9	1754	one down & two right, add 68 to 1686
10	1752	two left, subtract 2 from 1754
11	1751	one left, subtract 1 from 1752
12	1750	one left, subtract 1 from 1751
	9999	Enter 9999 to signal the end of the sequence.

2) REPEAT YOUR PATTERN - This reloads your pattern into the life matrix.
3) REVIEW & EDIT YOUR PATTERN - This allows you to make changes.
4) SAVE YOUR PATTERN ON DATA TAPE - Name your pattern & save it on tape.
5) LOAD YOUR PATTERN FROM DATA TAPE - Loads patterns you have saved.

Note: Do not load anything using command No. 5 except a data tape made with command No. 4.

Programmer's Comment: Although the above pattern entry method shown is a bit more complicated than other methods, it is the most precise and the most flexible. It is very useful for entering large complicated patterns.

IV. SOUND

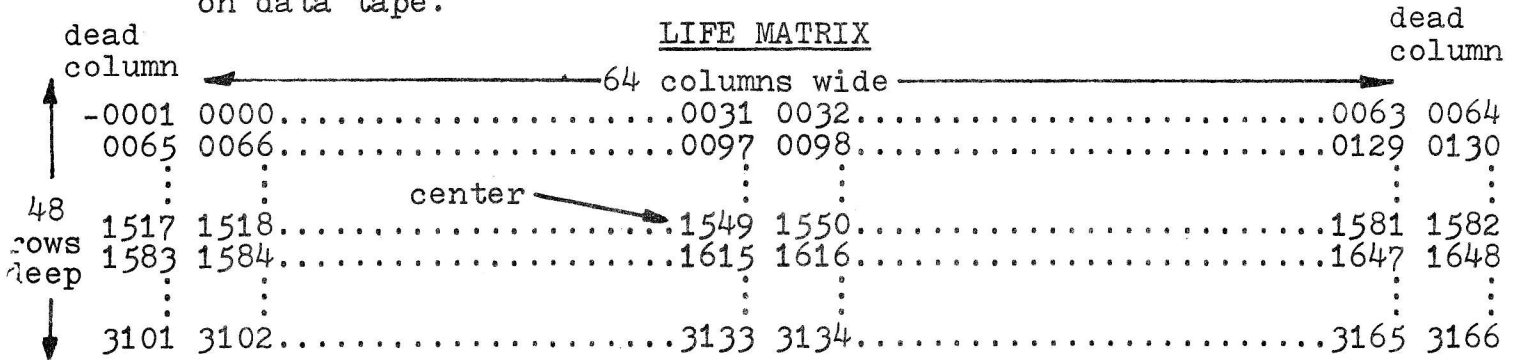To get a clicking sound you must connect a speaker-amplifier to the

SPEED TABLE

population size	approx. gen/min
5	3300

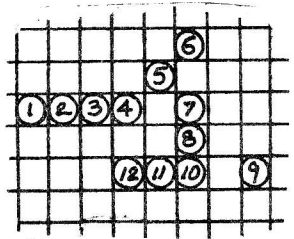is filled with a user selected density between ??? and ???.
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```
dead                         LIFE MATRIX                              dead
column      ←————————————64 columns wide————————————→              column
      ↑
  -0001 0000...................0031 0032...................0063 0064
   0065 0066...................0097 0098...................0129 0130
48 :         :                  :    :                       :
rows                center           →
deep  1517 1518...............1549 1550...................1581 1582
   1583 1584...................1615 1616...................1647 1648
      :    :                  :    :                       :
   3101 3102...................3133 3134...................3165 3166
      ↓
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To get a clicking sound you must connect a speaker-amplifer to the large gray pin of the cassette interface.

from computer — large black — large gray → to amplifier speaker system — small gray
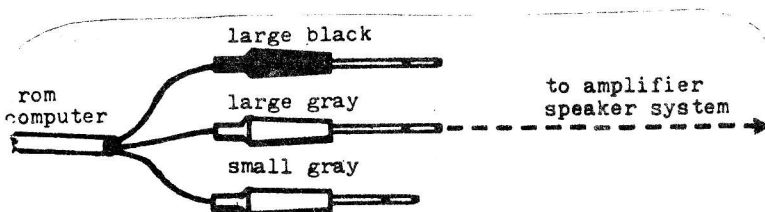
SPEED TABLE

population size	approx. gen/min
5	2290
10	2070
50	1110
100	860
500	310
1000	190
1344	160

The above speeds were measured using a TRS-80* level II 16k computer with a 1.77 MHz clock rate. The speed will vary with pop. size, orientation, and functions in use.