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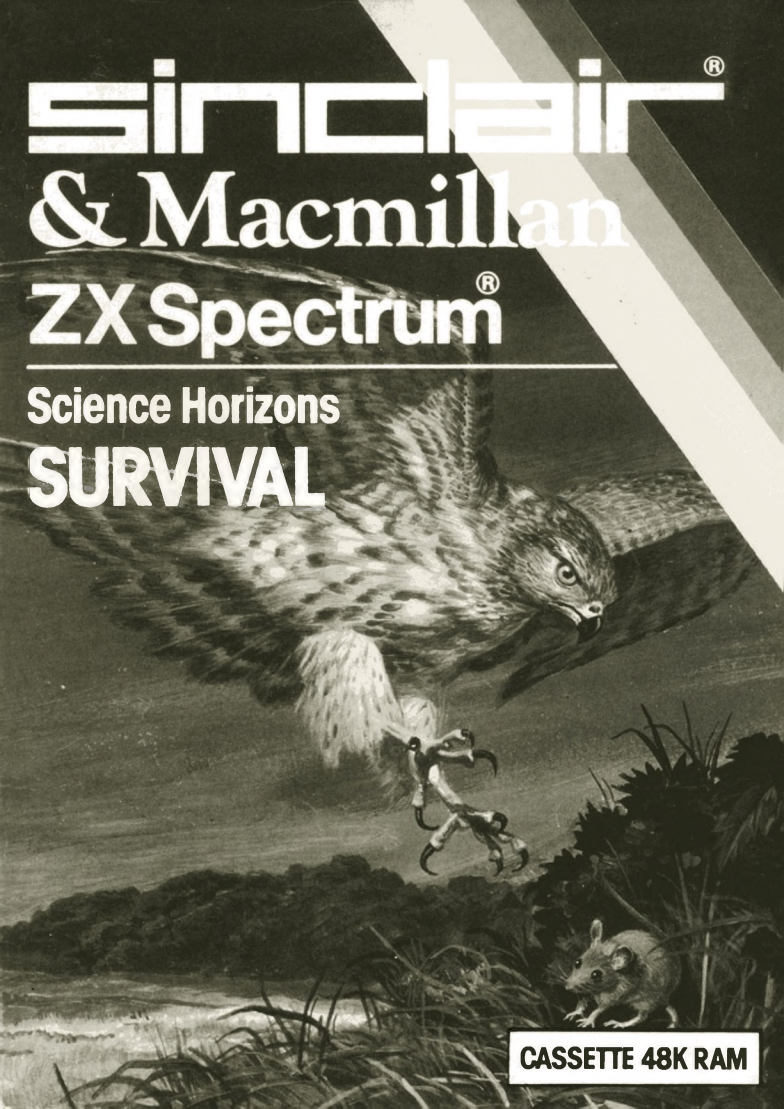
ZX Spectrum®

Science Horizons

SURVIVAL



CASSETTE 48K RAM

SCIENCE HORIZONS
SURVIVAL

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Contents

Educational aims

Survival introduces users to some of the principles of ecology (the interdependence of living things and their environment). By participating in the *Survival* 'game' players can clearly see some of the hazards that creatures must face in the wild. They must find enough food and water to stay alive, while keeping alert to escape from their enemies. The amount of food available and the likelihood of being killed by a predator both depend on the habitat in which the animal lives. The program illustrates how favourable or unfavourable habitats can be for different creatures.

As users become more familiar with the program, they will build up a profile of each type of creature – its energy requirements, predators, lifespan – and see how it makes up part of a food chain (hawks eat mice, which eat berries, for example).

Loading the program

Make sure your ZX Spectrum® is connected as explained in the Sinclair ZX Spectrum® manual.

Check that the tape is at the beginning.

Type **LOAD "SURVIVAL"** and press **ENTER** or
type **LOAD ""** and press **ENTER**
Start the tape.

The message **Loading please wait** should appear on the screen.
The program takes about 3 minutes to load.

Running the program

When the program has loaded, pictures of 6 creatures appear on the screen:

hawk

robin

lion

mouse

fly

butterfly

Press **SPACE** to move to the animal of your choice.
Press **ENTER** to choose the animal and proceed to the next screen.
A grid appears which represents the *Survival* world in map form.
Rather like the real globe, there are ice caps to the North and South, with sea and land masses between.

You (the animal) are positioned in the middle of the letters

T Y U
G J
B N M

Press the appropriate letter if you wish to change your starting position (or use a joystick if you have one).
Note that the computer starts you in an environment which is favourable for your chosen animal. When you first start using the program it is wise to begin there. You can be more adventurous and explore the terrain later on.

Now the game begins.
At any time, press **P** to pause (and review the situation!)
Press **C** to continue the program when you are ready.
Your starting grid is shown on the left hand side.
If you wish to take a print from the screen, make sure your printer is connected as in the ZX Printer® manual, then press **CAPS SHIFT** and **Z** together.
Press **Q** to put the sound on or off.
A is the animal.
O represents food of some kind.
X represents a predator of some kind.

Habitats are shown in different colours.
Press **K** to see a key for the habitats at the bottom of the screen.
Press **K** again to remove this from the screen.
A close up grid of the animal's immediate environment is shown on the right hand side. You can see exactly what food and predators there are surrounding you.
Press **T Y U**
G J
B N M
to change your position (or use a joystick if you have one).
You can move one square at a time.
We advise that you make only one key press at a time, so you can see the results of your move and review the situation.
On the bottom left of the screen you can see your energy and water meters. You must keep renewing your stores by finding food and water, otherwise you can die.

Your first concern is to escape a predator. If there are any (shown as **X**) in the squares around you, use the position keys to move out of reach. When a predator moves on to your square then you will probably be caught and die. Sometimes, if the predator is old or weak, then you will come out alive.

Energy

You will see your energy decrease as the game goes on. Some creatures use energy more quickly than others, and at different rates depending on their activity at the time. To keep a store of energy you must move onto a food square. The food may be static, or it may be alive and moving from square to square, in which case you must actively pursue it.

Different kinds of food give different amounts of energy. When you land on the food square you will see and hear the energy meter register an increase. If you think you will get more than one burst of energy from the catch, then stay where you are to feed again until the meter stops rising.

Look out for predators while you do this!

If you wish to speed up the program, either for continued feeding or for any other purpose, then press **SPACE**. (Of course this will give *you* less time to plan your escape!)

With practice you will learn which foods provide most energy for a particular creature, and therefore what is worth hunting – a hawk gains more energy from a rabbit than from a worm, for example.

When your energy level becomes critically low, the meter turns black and makes a warning sound.

Water

To boost your water levels as they diminish you must move to a square *next to* fresh water. If you wish to take more than one 'drink', stay where you are. You will see and hear the water meter register an increase. (To speed up the drinking action you can press **SPACE** as explained in **Energy).**

As with the energy meter, there is a warning sound when the water level is critically low.

Warning! Any creature will freeze to death as soon as it moves on the ice caps at the north and south of the terrain (shown as white with black edges).

Key to symbols

Habitats

ice caps – white with black edge
sea water – blue
fresh water – cyan (pale blue)
grass – yellow
wood – green
hills – red
scrub – magenta (pink/purple)
town – black

To restart game at any time press **CAPS SHIFT** and **A** together.

To clear program from memory press **SYMBOL SHIFT** and **A** together.

Food and predators

dead hedgehog (or any dead animal or bird)

rabbit

mink

snail

small bird

insect

fly

butterfly

frog

mouse

hawk

vicious animal (for example cat)

zebra

human

human hunter

grass/leaves

berries

wheat

flower

fruit

vegetables

buds

bark

you have
been killed

The Survival program as a model

The program demonstrates the problems that creatures face in the wild. Even animals which appear to have few natural enemies rely on a delicate balance including weather, seasons, disease and injury, as well as the more obvious food and predators.

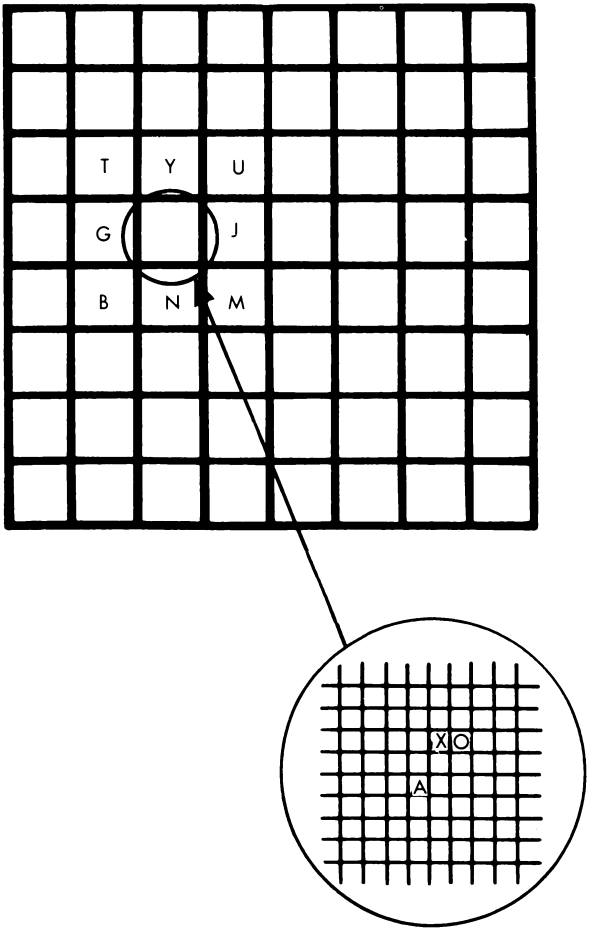
A creature's chances of survival depend on the advantages and disadvantages of its habitat, and this is demonstrated in the program. When you start to master the game and are able to escape predators for long enough, you can explore different habitats and see how favourable they are for each type of animal, bird or insect.

Chances of survival also vary with age. The young are generally very vulnerable and many die before adulthood. We start *Survival* with the animal as a young adult to avoid this very difficult stage. As the animal becomes older it will be slower and perhaps weaker and so will be less adept at catching its prey and escaping from danger. We have built ageing into the program so that, although you may land on a food square, you will not have such a high success rate at catching the food. At the same time you will notice that you seem to be more vulnerable to predators yourself. So when you are becoming practised at the game and have stayed alive for some time – beware – it becomes more difficult!

Survival takes into account the range of vision of the various living things. Compare the range of vision of a hawk, which hovers and attacks from a distance, to that of a butterfly. The program shows food and predators on the screen only when they are within sight range of that animal. For this reason, as a fly for example, you will see things appearing suddenly at close range, whereas as a hawk you will be able to see food over a wider range on the grid.

You may notice that the program has a 'drought zone' where, although water can be found, an animal loses water more easily than elsewhere. This resembles the desert zones found near the equator.

As you continue to use the program, you may like to build up your own map of the *Survival* world. You can explore new territory by adjusting your starting position each time. Remember that the starting grid (8 × 8 squares) represents the total world, with ice caps at the North and South. You are free to move right around the *Survival* 'globe' by going East or West. When you have chosen your starting position, the game proceeds with your starting square broken down into its small 10 × 10 squares shown on the left hand side of the screen. You could easily make up your own map using squared paper, colouring in the habitats as you explore them.


T
Y
U
G
J
B
N
M
X
O
A

Remember that the program can only represent a series of snap-shots of a creature's life. The length of time you manage to stay alive is not measured in 'real time', but has been specially calculated by the computer to provide a model for each animal, and so give you an insight into its life. The lifetime of an animal in the program cannot be related *directly* to the amount of food consumed or energy expended during the game.

Background information

Here are some brief notes about the animals featured in *Survival* which may help you to relate the program to the natural world.

In the program we have called all 6 creatures animals, but we could be more specific and call the lion and the mouse mammals, the hawk and the robin birds, and the fly and butterfly insects.

Hawk

The hawk in the program represents the hawk and falcon family, which ranges from small birds, such as the sparrowhawk, up to the big fish eagles and ospreys. The hawk family has a characteristic hooked beak, strong feet with talons, and excellent eyesight, all of which help the hawk to catch its prey. Many hawks hunt from a height and dive on to their prey in a 'stoop', reaching high speeds as they do so.

The hawk's main threat is from humans. Many young hawks are caught illegally and sold to falconers. Gamekeepers often shoot or trap hawks and falcons to protect the game birds in their care. Protective laws seem to have made little progress towards increasing the wild populations.

During the 1960s another human threat – the use of pesticides – caused a decrease in the population. The hawk is particularly vulnerable to chemicals in this way. It is at the end of a food chain through which poisons have accumulated, resulting in vulnerable thin-shelled eggs or weak young.

Most members of the hawk family live for several years. Many are migratory, and in *Survival* you may need to move some distance to find food.

The average life of a hawk is 6–8 years.

Robin

The robin has many more enemies than larger mammals, including both wild and domestic animals and birds, such as pet cats, the carrion crow (which may rob the robin's nest), magpies and jays. For this reason, the robin should hide and take cover, rather than head for open spaces.

Winter is the biggest cause of death as the bird loses heat very rapidly and must find plenty of food to keep it alive.

Fortunately, the robin's diet is not selective, for it must feed frequently all year round.

The robin's average life span is shorter than might be expected – if you survive for 2 years in the program you have done well.

Lion

The lion appears to have few enemies apart from human hunters. However, the lion faces other threats, such as drought. Even where food appears to be abundant, the lion may be forced to venture further afield in search of water.

The lion relies on its ability as a hunter to obtain its food. An injury could mean a lion is too slow to catch its prey and may lead to a slow death by starvation. As lions get older they become less able hunters and must rely more and more on finding dead animals for food – possibly the remains of another lion's catch. The lion then comes into competition with scavenging animals. The boldest of these is the hyena, which may attack and kill a solitary exhausted lion. A lifespan of 10 or 12 years is reasonable for a lion.

The lion is strongest when it is between 3 and 12 years old. In the program we start the lion at 3 years of age, at which stage a male lion would normally be forced to leave the pride (group of lions) where he was born. If you manage to survive for 7 or 8 years in the program you will have reached old age.

Mouse

Mice and other similar rodents usually have a dangerous life, with constant threat from predators. Their lifespan is very short–about 5 or 6 months in summer, but less in winter–giving an average of 3 or 4 months. Counterbalancing these risks, the mouse has a high breeding rate, with short cycles and large litters.

It is best for mice to live under cover–in–wood or urban environment–rather than open space, where it can easily be seen.

The program is modelled on a field mouse which, unlike the house mouse, ventures into houses only occasionally in winter.

Fly

Flies have a very varied diet and can adapt to a range of climates, apart from extreme cold. The insect requires a certain minimum 'reaction temperature' below which it cannot move. The insect, unlike a mammal, cannot create its own body heat.

There are many living things whose diet includes flies. Also, due to the irritation and disease-carrying which flies cause, humans spend a considerable amount of time and money trying to kill them.

The lifespan of a fly varies from less than a day to 2 weeks, depending on whether it escapes its enemies.

Butterfly

Different types of butterfly have quite different lifestyles, and the program is not designed to illustrate any one in particular. Some

species of butterfly hibernate during winter and may live for several months. (You may find them hibernating in garden sheds, where they should be left undisturbed.)

The species used in the program is non-hibernating, and may live for 2 or 3 months. The main food source is nectar (the basic ingredient of which is sugar) which can be found in flowers. Different flowers produce nectar at different times of day, so if you see a flower suddenly disappear during the program, it simply means that it is the wrong time of day for that flower to produce nectar.

Butterflies often display splendid camouflage. Many have markings on their wings which resemble eyes, these act as a disguise and startle potential predators. Bright colours act as a warning that the butterfly tastes unpleasant. Some butterflies are coloured brown to blend with their woody habitat, or feature a pattern which makes their shape hard to distinguish from their background.