SPOT
a local aid for the radio amateur
A program for the Sinclair
ZX Spectrum 48K or Spectrum Plus

by
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USERS GUIDE

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SPOT is straightforward to use. After trying out all its facilities once you will probably have no more need for these instructions. However, you are encouraged to start by reading the following section on what SPOT will do, then load the program and try out the various options as they are described in section 2 on how to use SPOT.

1.   WHAT SPOT WILL DO
After loading, SPOT displays a panel in which you can define the location of your station. This is known as the "home" station. You can enter the location in any one of four forms :
> a Universal (IARU) Locator ("Maidenhead"),
> a QRA ("European QTH") Locator,
> a National Grid Reference (within the UK only),
> a latitude and longitude specified in degrees and decimal degrees.

See section 3.1 for a brief description of these four forms.

Which ever form you choose, SPOT will convert to the other three forms and display all four, with an indication of which letters or digits are uncertain in each case. These uncertainties arise from the overlap of squares (see section 3.2). The most accurate definition of the location is obtainable by specifying a latitude and longitude, although a full national grid reference is usually as good.

You can use this home station locator panel repeatedly if you wish, to provide locator conversions for a number of locations.

When you have specified a home location, you may opt to see a graphic map of Europe on which the location will be displayed (rpovided it is within the bounds of the map, of course.). The grid lines delineating the major square boundaries of the locator system may be added if you like. We shall be seeing more of this map later.

Let's suppose you've entered the location of your station as the home station. You may then move on to define the location of another station, known as the "distant" station. This is

done on a panel similar to that used for the home station, and again any one of the four location reference forms may be used. This time SPOT displays the following information: the distance (km) between the home and distant station, the no. of contest points (in the RSGB radial ring system) that this gives, the bearing (i.e. beam heading) to the distant station from the home station, and the "return" bearing, i.e. that of the home station seen from the distant station. (The bearing and return bearing are not exactly 180° different, particularly over long paths, thanks to the wonders of spherical geometry).

Again, this may be repeated for any number of distant stations. For each one the European graphic map can be brought back, and now it will show the locations of both stations and the path between. This path is not a straight line but is slightly curved as it indicates the great circle path (more noticeable over long distances).

Instead of going to the distant station panel after specifying the home location, the contest log scoring facility may be chosen instead. A blank table is displayed on the screen with spaces for 25 QSOs. For each one you enter either the universal IARU locator, the QRA locator, or a distance in km (for use when a contact only gave the name of his town, for example) or mark the QSO as an invalid one (e.g. duplicate). SPOT completes the table with the distances and radial ring points, providing sub-totals at the end of each page of 25 QSOs (corresponding to standard RSGB contest log sheets).

When you have completed the entry of all the contest QSOs, SPOT gives the overall totals of both km (as used in IARU and microwave contests), and radial ring points (for most RSGB VHF/UHF contests). In addition it provides details of the "best dx" contact, and the points/contact average.

Now the European graphic map can be recalled for a grand finale! The locations of all your QSOs (up to a maximum of 1000) will be plotted. All the different locator squares worked will be shaded in on the map, and the total number of squares worked will be displayed (useful for contests with a squares multiplier).

Any of the various panels, contest log tables, or maps displayed by SPOT may be printed if a suitable printer, such as the ZX or Alphacom, is connected.

If you make an error in the entry of any locator, etc., SPOT will, of course, warn you, and will usually give you a brief description of the correct input required.

2.   HOW TO USE SPOT
Now on the the fine details. Having read the last section, you know what SPOT can do; actually doing it is simplicity itself. Start by loading the program (LOAD "SPOT" or just LOAD ""), then try out the various options as they are described below.

2.1 The Home Station Panel
You will see the four spaces for the alternatove ways of giving the location. The flashing cursor is in one of them. Use the up and down cursor keys (keys 6 & 7* on the older style keyboards) to move the cursor to the position of your choice then key in the locator, etc.

For the locator, QRA and national grid reference entries, you will use up all the spaces in the relevant box, SPOT will "beep" and do its conversion. For latitude and longitude entry, first type the latitude (in decimal degrees, e.g. 51.536) and press enter; the cursor will move

along and wait for you to press N or S for north or south. Then it will be in the longitude box - enter this in the same way, after pressing enter an E or W will be required.

The results displayed by SPOT on this panel indicate possible conversion uncertainties by the colours used to display each character :

a character displayed in <u>black on a white background</u> is unambiguous;
in <u>black on a yellow background</u> is uncertain by one unit, i.e. it may actually be the adjacent one in latitude or longitude as appropriate;
in <u>red on a yellow background</u> is uncertain by more than one unit (this usually applies, for example, to the least significant digits of a NGR when converting from a locator).

For a further discussion of these uncertainties, see section 3.2.

While entering data on the home panel, or indeed anywhere in SPOT, the delete key can be used to make corrections (but if you delete <u>all</u> the letters you have just entered, you will have to press enter before using the up/down cursor keys, should you need to).

After SPOT has displayed its conversion results and the uncertainties, it will show a menu of options. Just press the single key shown to select your chosen option, P to print the information (if a suitable printer is connected), K to display the map, H to repeat the home location entry, D to go to the distant location panel, or L to start a contest log scoring entry. This sort of single key-press selection of options is used throughout SPOT, and a summary of the available options is always displayed.

* with Caps Shift

2.2 The Graphic Map
When this has been displayed, the options will be given as a one-line menu at the bottom of the screen. Pressing G will add the locator square grid lines to the map - pressing G a second time will remove them. Press P to copy the map to a printer. The H and D options enable you to go direct to the home or distant station panels.

2.3 The Distant Station Panel
Entering the location of the distant station is done here in exactly the same way as on the home panel - move the cursor with the up/down cursor keys and type in the locator, etc.

After the distance and bearing results have been shown, the option menu will again appear on a single line at the bottom of the screen. The K option will display the map, now with both home and distant locations and the great circle path between. Pressing D will, of course, enable you to repeatedly enter different distant locations.
Please note that the conversions between the different locator systems are not performed on this panel - to carry out such conversions you must use the "home" panel (see section 2.1).

2.4 Contest Log Scoring
This can only be reached by the L option after specifying a home station location. When you access the contest log facility, you will see the flashing cursor in the first position

of the table. As you type your entries it will move down the table, first the left-hand side of the screen, then the right. A blank line is automatically inserted after every five contacts, to aid copying the information to RSGB contest log sheets.

For each entry you may type one of the following :
a valid universal IARU locator;
a valid QRA locator;
a distance in km followed by the letter K, e.g. 27K to specify 27 km;
the single letter I or D to note that the contact was invalid and therefore non-scoring (it is still included so that the no. of QSOs is right and the entries remain in step with those on the log sheets at 25 entries per page).

If you type a universal locator, you will fill all 6 character in the space available, whereas for the alternatives (less than 6 characters), you should press enter after the last character. The delete key is available to correct mistakes.

As you procede, the QSO no. of the current entry is displayed below the table on the right.

If you make a mistake and enter something not recognized by SPOT as one of the above four types of entry, a warning message and error "buzz" will be given and the entry deleted to enable you to re-type it.

If you make a "null" entry (i.e. just press the enter key), input will stop, and you will see the sub-totals of km and points for the contacts on that page appear below the table on the right. The same thing happens when you have typed 25 entries on a page. The options given to you then include C, which will enable you to continue entering data starting at the next QSO, beginning a new page if appropriate. The E option signifies the end of the log, which will cause total scores and other summary information to be displayed.

A further option at this stage is A, to amend one of the entries you have already made on the page currently being shown. You will be asked for the QSO no. of the entry to be changed; the required locator etc. will blank out and the cursor placed ready for you to type in the corrected data. If you just press the enter key, the original entry will be restored.

If you are using a printer, you will want to print each page as it becomes complete before proceding. Without a printer, you will have to copy the data from the screen to your log sheets when you reach the end of each page (i.e. after every 25 QSOs).

2.5 Contest QSO Map
At the end of the log entry, the K option is available to display the map, showing the locations of all QSOs for which locators or QRAs have been entered, with the squares worked "shaded in". If you were fortunate enough to have made more than 1000 contacts, only the first 1000 are included in the map. If the loactions entered include any outside the bounds of the map, a message to that effect is displayed, giving the no. of such locations; note that these QSOs are not included in the total number of squares as displayed.

Printing of this map, as with all other screens in SPOT, can be achieved by pressing P (if a suitable printer is attached). In this case, however, because some of the information is contained in the colours (i.e. the shading of the squares worked), before printing a stippled

pattern will be superimposed on the shades squares so that they are visible in a black & white print.

2.6 Making a copy of SPOT

Although SPOT is copyright, you are free to make a single back-up copy of the program for personal use, or to transfer the program to microdrive for convenience.

This is done via a "hidden" option on the home location panel. When this panel is displayed (before you have entered on it a locator, etc.), press symbol shift and S to bring up the save menu. You will see options for saving to tape or to microdrive.

In either case, three files are saved - a short BASIC program, filename "SPOT", and two files of code, names "SPOTC1" and "SPOTC2". If saving to microdrive, the cartridge inserted in drive no. 1 must not already contain files with these names.

To run the saved program, whether from tape or microdrive, it is necessary only to LOAD the file "SPOT" which will auto-run and load the other two.

2.7 Re-starting SPOT

If you halt the operation of SPOT using the break key, it may be re-started with the usual RUN command. Alternatively, if the short BASIC program has been removed, you can use RANDOMIZE USR 23792.

3.   GENERAL INFORMATION

3.1 The locator systems

A full description of these systems can be found in appropriate publications. A brief description only is provided here.

The universal locator (or IARU locator, sometimes called "Maidenhead" or "G4ANB" locator) is a latitude/longitude-based grid reference system covering the whole world. The first four characters define a "square" of 2° longitude, 1° latitude, and the resolution of a full 6-character locator is 5 minutes (0.083°) of longitude, 2½ minutes (0.042°) of latitude.

The QRA locator (for some years know as "QTH locator", now often called "European QTH locator") has been in use in Europe for some years, but is now officially replaced by the universal locator. However, operators in many countries are reluctant to change, and the QRA will undoubtedly be with us for some time yet. It is also a latitude/longitude-based grid reference, the squares defined by the first two letters having boundaries coinciding exactly with the squares of the universal locator. The numbering of the sub-divisions of these squares follows a somewhat curious scheme, and the resolution of the full 5-character QRA locator is 4 minutes (0.067°) of longitude, 2½ minutes (0.042°) of latitude.

The QRA system is not world-wide, in so far as the designation of squares repeats every 52° of longitude and 26° of latitude. SPOT will generate a QRA locator for any latitude and longitude in the world, but if you enter a QRA to SPOT, it will assume you mean the one lying between 10° W and 42° E and between 36° and 62° N.

The National Grid Reference (NGR) is a linear grid reference covering the United Kingdom. A full 8-character grid reference defines a square of 100 metre sides. The first two letters (which define the 100 km square) are commonly omitted when quoting a NGR locally,

but must, of course, always be entered in SPOT. Since the NGR system is intended for the UK only, SPOT will not calculate a NGR for locations outside the range 8° W to 2° E and 49° to 60° N.

A Worked All Britain (WAB) area is in fact a NGR quoted to 10 km accuracy, by giving the first two letters and the first and third digits (e.g. SU482351 lies in WAB square SU43). Thus this reference may also be obtained from SPOT.

Latitude and longitude are always entered in SPOT as degrees and decimal degrees. If you happen to have these in degrees and minutes for a location, divide the minutes value by 60 to obtain the decimal degrees (e.g. 51° 20' becomes 51.333°).

3.2 Conversion Uncertainties

The various locator and grid systems outlined above are based on grids which, in general, overlap each other. Thus if we define a location using one system, we have actually defined a small area which may overlap with two or more such areas defined by another system. Great care has to be taken, therefore, when "converting" from one system to another, as there is often more than one particular answer.

For example : my locator is IO91FP. This defines a small area. If I live at the eastern end of this area my QRA is ZL23E, whereas at the western end it would be ZL23F. Sometimes. you can be "lucky" with a conversion and the area defined may lie entirely within one such areas of the other system.

SPOT works out, for every conversion, the uncertainties involved, so that you know which, if any, of the letters and digits are likely to be in error.

If you enter a latitude and longitude or NGR to SPOT, it will assume that these are exact and will display the locator and QRA unambiguously, unless the lat/long defined lies on the boundary between two squares or sub-divisions. If your location happens to lie on such a boundary, it is up to you to decide which side of the boundary you are, and enter the lat/long accordingly (e.g. enter 51.0001°).

When you enter a universal or QRA locator to SPOT, it finds the atitude and longitude of the point at the centre of the small area defined, and performs the conversions based on that point. The uncertainties are then worked out and displayed by the shading of the characters as explained in section 2.1. This is done not only for the two locator systems but also for the NGR and digits or latitude and longitude.

The degree of uncertsinty depends, of course, on the form chosen to enter the location, and after experimenting, with this panel for a while you'll get a feel for the accuracy of the different locator and grid systems.

To avoid a confusing dislay, SPOT only indicates the one or two letter(s) of a locator or QRA which have an uncertainty. If this happens to be at the edge of a square, the uncertainty will of course imply that other digits might change. To take an extreme case as an example : if JO02AR is shown with the "A" displayed on a yellow background, the uncertainty is such that the true locator may be JO32BR in the easterly direction or IO92XR in the westerly direction.

The uses of this facility is illustrated by the finding of the WAB area of a station whose locator or QRA you know. Enter the locator or QRA on the home station panel. The four least significant digits in the national grid reference will always be shown in red (since a locator defines an area much larger than a NGR). But look at the other digits, the first and the third - are they displayed on a yellow background ? If so - hard luck - the locator and WAB areas overlap and you cannot be sure about the WAB. However, if both digits are shown on a white background, you do have the WAB area unambiguously. This happens when the area defined by the locator is wholly within one WAB area.

One last point about universal locator and QRA locator uncertainties : The divisions and sub-divisions of squares in both these systems are identical in latitude - so it is only in longitude that uncertainties exist when converting between these two. In particular, when the final letter of a QRA is shown as uncertain, it can only be a "sideways" uncertainty, not "up and down". It is impossible for SPOT to show this fact because of the odd way in which this letter in the QRA is dependent on both latitude and longitude.

3.3 Using locators
With a program like SPOT you will have at your fingertips all the locator information for any location you visit. There is a great temptation to show off this knowledge in every contact by grossly over-stating you QTH, by giving both forms of locator, WAB area and perhaps sundry other location details. The author is anxious to ensure that the use of SPOT does not encourage this practice. It is sufficient to quote just one locator - and a starndarization on the IARU recommended system seems sensible - having the information to hand in case the other operator asks for it.

Do remember, however, to have full location information printed on your QSL cards.

3.4 About the program
SPOT is written partly in machine code and partly in BASIC. The BASIC part has been compiled into p-code using the "BLAST" compiler by OCSS Ltd. This code occupies 19872 bytes starting at 23792, just below the microdrive maps if present.

The machine code part resides at 58299 and is 7237 bytes long including some UDS characters. The European map is part of this and you can use it in your own programs by the following sequence of commands :

CLEAR 58298
LOAD "SPOTC1" CODE

Play the SPOT tape from the start (you can stop the tape when loading is complete, about half-way through the tape). The use

RANDOMIZE USR 58443

to display the map whenever you want it. You can use standard PLOT and DRAW commands to plot on top of the map. A location given by x° N latitude and y° E longitute (use negative values for western longitutes) is addressed by, for example,

PLOT 8*x+112, 8*y-312   .