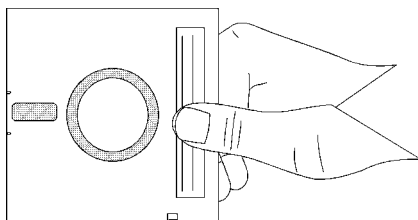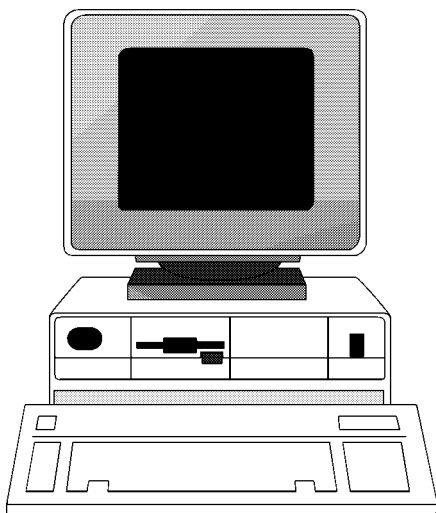# AORSC ~ Spectrum Coordinator

IBM-PC 'DOS environment' control software
for the AR3000A & AR3000 receivers

Total control at your fingertips!!!

*Supplied on both 3.5"
& 5.25" disk formats
(installation recommended
on a hard drive)
For XT/AT only, not for PCs
over 386 processors!*

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1. TERMS OF DISTRIBUTION

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Sole distribution is by:

> **AOR (UK) Ltd.,**
> **Adam Bede High Tech Centre,**
> **Derby Road,**
> **Wirksworth,**
> **Derbyshire,**
> **DE4 4BG**
> **England.**

The Borland BGI files are distributed according to the Borland International Licence statement for Turbo Pascal 4.0.

2. MINIMUM SYSTEM REQUIREMENTS

Computer :-

- IBM PC XT, AT or compatible running PC-DOS/MS-DOS 3.0 or higher
- Minimum memory: 490 kBytes (memory available for programs)
- One Serial Port (RS-232) either COM1 or COM2 (two are required for operation with a mouse) COM3 (at port 03E8) and COM4 (at port 02E8) can also be used
- Monochrome or colour graphics display (Hercules, CGA, EGA, VGA)
- Minimum of two 720k floppy disk drives **or** one 360k or 720k floppy and hard drive (Hard disk recommended)

AOR Receiver :-

- AOR AR-3000A Communications Receiver

or

- AOR AR-3000 Communications Receiver

Miscellaneous options :-

- Printer (80 or 132 column)
- Microsoft mouse or Microsoft compatible mouse (with driver)
- Joystick port (for use with AR-3000A only)

3. CONVENTIONS USED IN THIS MANUAL

Throughout this manual keyboard characters, which are to be entered into the program, appear between angled brackets (eg <F1> or <P>).

Many of the functions of the software are controlled using keyboard operations. An example of a keyboard operation is <ALT-L>, in this case the alternative key should be pressed just before the <L> key in one single action.

Whenever frequencies are to be entered into the program they should be entered in units of MHz. For example, to enter a frequency into the logbook type in "145.5" for 145.5 MHz.

Text windows are used throughout the software to allow you to control operation of the package in the simplest possible way. Highlighting is used to select fields in each window. The <UP>/<DN> arrow keys can be used to move the highlighting to the required field and the <ENTER> key used to select the field. When all fields are correct press <F10> to accept the data entered or <ESC> to abort.

4. INSTALLATION OF AORSC

Installation programs have been provided with will automatically install the software onto a HARD DRIVE, it is still theoretically possible to install the software without a hard drive just so long as TWO 720k floppy drives are fitted.

AOR also carries COPY PROTECTION which transfers the necessary files to the destination disk... The MASTER disk contains TWO TOKENS... you cannot copy the disk.

Copy Protection

AOR Spectrum Coordinator is now copy protected. The protection does not use a dangle or other cumbersome devices, however, there are a few simple points that you may need to refer to. Please read this section carefully.

AORSC is now copy protected using a system which places a "token" on your hard disk (or floppy disk if selected) when you install the program. The program will only work on the disk you installed it to. There is no dongle or key-disk, so once installed the program runs completely normally and you will not be inconvenienced (unlike other schemes).

Please read the "READ.ME" file that is copied onto your system before using the software.

Specific points to remember:

1. The distribution disk contains two tokens. You cannot transfer the program to another machine without moving the token back onto the original distribution disk then reinstalling. The token can easily be moved with the CCMOVE program that is provided. Contact your distributor if you need additional copies of the software.

2. You should keep you original disk in a safe place away from strong magnetic fields, high humidity or other environmental conditions that could damage it. You will not be able to reinstall the software or move it to another machine without the original distribution disk.

 3. Two hidden files are copied to a hidden subdirectory of the AORSC directory (AORSC.ccc and CCONTROL.SYS) when you install the software. These contain configuration information for the copy protection scheme and are normal DOS format files. DO NOT DELETE THESE FILES UNDER ANY CIRCUMSTANCES. If these files are deleted, AORSC will not run.

4. If you are using a backup utility, make sure that the two hidden files are not backed up. When restored, the copy protection scheme may not be able to validate the installation and AORSC will not run. Most backup utilities do not touch these files because they have the hidden, system and read-only attributes set. The two copy protection files also do not have the archive bit set, so you should be able to exclude them from backups by setting up your backup software to ignore files without an archive bit. Remember, it is not the backup but the restore that can cause problems.

5. The /d+ option of the PC-Kwik disk cache software from Multisoft Corporation is not compatible with the copy protection scheme and should be temporarily disabled when installing AORSC or moving the token. HyperCache also affects the copy protection scheme in the same way because of nonstandard methods of accessing the floppy disk drive. Again, it should be temporarily disabled, but both caches may be used at other times.

6. The copy protection scheme is compatible with disk drives compressed with SuperStor, Stacker and DoubleSpace. However, you should temporarily remove the token from the hard disk when installing one of these compression utilities because the protection will appear invalid when the drives are compressed. The disk compression utilities warn you of this in their manuals.

7. The copy protection scheme is known to be compatible with the following disk defragmenters: Central Point's Compress, Digital Research's Diskept, Stac's Sdefrag and Microsoft's Defrag.

Moving Copy Protection

A simple utility has been provided so you can move the copy protection "token" that is installed by the software back onto the distribution floppy disk or between hard disks.

You may need to move the copy protection token back onto you original distribution disk in the following circumstances'.

> When installing disk compression software

> When upgrading AORSC

> When moving the program to a new computer

> When returning the original disk to your AOR distributor (for updates etc.)

To transfer the token back onto the distribution floppy disk, follow these instructions:

1 . Place the original distribution disk into drive A and log onto the drive by typing "A:" at the DOS prompt or "B:" for the B drive (without the quotes).

2. Run the CCMOVE utility program to move the copy protection token from your system back onto the distribution disk. The command for the default hard disk directories "CCMOVE C:\AOR A:" (or CCMOVE C:\AOR B:). You will need to substitute the directory name you used if it is different from the default.

You can use the CCMOVE utility to have copies of the program on several computers at once, however the program will only work on the machine that has the copy protection token on it. You will not be able to copy the distribution disk itself

This AOR software product comes with a single license. Contact your AOR dealer to obtain additional copies of the software.

AR2500 not supported

The AR2500 receiver has not been supported by AORSC for some time, this ensures the best stability and performance when used with the AR3000A & AR3000 receivers.

4.1. Installing the programs onto your computer - 3½ inch master disk

> **NOTE : IF YOU WANT TO INSTALL AORSC ONTO A FLOPPY DISK YOU WILL NEED A BLANK (BUT FORMATTED) FLOPPY DISK SUITABLE FOR USE IN DISK DRIVE B BEFORE YOU START.**

> **Step 1:**
> Put the disk marked AORSC INSTALLATION DISK into disk drive A of your computer.

> **Step 2:**
> Change the operating system default disk drive to drive A by typing the following:
>
> A:

> **Step 3:**
> Type the following command to run the installation program:
>
> INSTALL
>
> The installation program allows you to choose the disk and disk drive that will hold installed program.

> **Step 4:**

> **WARNING: THE INSTALL PROGRAM WILL CREATE A DIRECTORY ON YOUR HARD DISK (IF THIS IS BEING USED) CALLED "AOR". THIS NAME CAN BE CHANGED IF REQUIRED.**

If you will be installing AORSC onto a floppy disk place a blank (but formatted) 720k floppy disk into drive B and select this disk drive by pressing the <B> key when asked to do so.

If you want to install AORSC onto any other disk drive (including you hard disk) press the key next to the relevant disk drive name.

> **Step 5:**
> When installation is complete please the AORSC INSTALLATION DISK in a safe place.

Please note that the INSTALL.EXE program provides the following defaults:

For hard disk based machines:

Serial Port	COM1
Memory directory	\MEMORY (inside \AOR directory)
Memory filename	DEFAULT.MEM
Logbook directory	\LOGBOOK (inside \AOR directory)
Inter-character delay	6 ms
Scan dwell time	4 seconds
SFW report frequency	15 minutes
S-meter threshold	0 (minimum)
Type of printer	None
Morse announcements	Yes
High speed scanning	No (AR-3000A only)
Use colour	Yes
Type of graphics	(your choice)

For floppy disk based machines:

Serial Port	COM1
Memory directory	B:
Memory filename	DEFAULT.MEM
Logbook directory	A:
Inter-character delay	6 ms
Scan dwell time	4 seconds
SFW report frequency	15 minutes
S-meter threshold	0 (minimum)
Type of printer	None
Morse announcements	Yes
High speed scanning	No (AR-3000A only)
Use colour	Yes
Type of graphics	(your choice)

You can change the defaults for the serial port (COM1 or COM2), the memory directory, the logbook directory, Morse announcements, or high speed scanning using the CONFIG.EXE program.

You can change all the other defaults while running AORSC.EXE.

4.2. Installation using the 5¼ inch master disk

The AORSC package is now too large to fit onto a single 5¼ inch floppy disk so that two are supplied with the package 1 of 2 and 2 of 2. The copy protection token and move utility is located on disk 1 of 2.

The installation process for the 5¼ inch disks is slightly different to the 3½ inch disk. Installation from the 5¼ inch disk MUST BE TO A HARD DRIVE WITH AN IDENTIFYING LETTER "C" AND SUBDIRECTORY "C:\AOR". THIS WILL BE CREATED AUTOMATICALLY BY THE INSTALL BATCH FILE.

To install from the 5¼ floppy disks

From A drive: Place disk 1 of 2 into A drive, select A drive and type INSTALLA [ENTER]

From B drive: Place disk 1 of 2 into B drive, select B drive and type INSTALLB [ENTER]

4.3. Changing the installation at a later date

The procedure described above is intended to produce a working system quickly. To achieve this a number of defaults are used (eg serial port COM1 is used for communications). The default installation will work in most cases, however they may not be convenient in the long run.

The configuration of AORSC can be changed at a later date by using the CONFIG.EXE program.

To create a new installation information file, INSTALL.DAT, run the CONFIG.EXE program by typing:

> CONFIG   at the DOS prompt.

A series of windows will appear on the screen as the program runs which contain various configuration options. These can be selected, changed or left as they are.

The configuration feature of AORSC was written assuming that you have a basic knowledge of DOS. Please refer to a DOS manual if some of the terms used in the installation procedure are unclear. A brief discussion of some common terms is included later in this manual.

The following options may be altered when configuring the program:

> **(i)   Type of AOR receiver**

The AOR AR-3000A receiver may be used with the AORSC software. Select the receiver that is required by pressing the letter key next to the relevant model number inside the window. The software will then adjust tuning instructions to take into account the type of AOR radio in use.

> **(ii)   Choice of Serial Port**

Communications between the computer and the receiver take place using an RS-232C interface. AORSC automatically configures a serial port on the computer so that the correct word length and start and stops bits are selected.

It is possible to determine which of the serial ports of the computer will be used for communicating with the receiver. It is also possible to use COM3 and COM4 if they are operated using ports 03E8 (COM3) and 02E8 (COM4). The required serial port can be selected by pressing the keyboard character that appears next to the required serial port.

> **(iii)   Memory directory**

The memory file occupies about 216 kBytes of disk space. It may be convenient to use a separate floppy disk, or a special directory on the hard disk, to hold this file. Enter the DOS name of the disk drive, or directory, that will be used for the memory file.

Examples: "\MEMORY" or "A:" (don't enter the quotes)

Note that directory names must not end in a "\" character.

If the current directory, which is displayed inside the window, is correct it can be left unchanged by pressing <ENTER> before anything else is entered. When AORSC is run for the first time it will attempt to create a default memory file in the directory that is specified with this option.

(iv)   Band information directory

The file BANDPLAN.DAT is used to display information about the radio services using the part of the spectrum that the receiver is currently tuned to. It is possible to change the drive or directory containing the bandplan file in the same way as the memory directory can be changed.

Please use the DOS COPY and ERASE utilities to move the file BANDPLAN.DAT from its present location on the computer system to the new location.

(v)   Help information directory

Normally the help information file AORSC.HLP is located on the same disk drive and directory as the main program. This file can be relocated on another disk drive or directory, if this is more convenient.

Please use the DOS COPY and ERASE utilities to move the file AORSC.HLP from its current location on the computer to the new location.

(vi)   Logbook directory

The logbook file can be kept on a floppy disk or on a hard disk. If the default location of the logbook file is not suitable it can be changed using this option.

If a file called LOGBOOK.DAT is located in the old location on the computer system the DOS COPY and ERASE utilities should be used to move it to the new location. This will ensure that previous LOGBOOK data is moved to the new location.

(vii)   Printer

A printer may be attached to the parallel port (LPT1 or PRN) of the PC. The type of printer can be wide (132 column), narrow (80 column), or no printer output can be selected if no printer is available.

(viii)   Morse ID selection

An optional announcement in Morse of the receiver mode can be selected which is heard whenever the mode is changed. The announcements are as follows:

Mode	Morse Characters	ASCII
AM	di-dah dah-dah	"A", "M"
USB	di-di-dah di-di-dit dah-di-di-dit	"U", "S", "B"
LSB	di-dah-di-dit di-di-dit dah-di-di-dit	"L", "S", "B"
CW	dah-di-dah-dit di-dah-dah	"C", "W"
FMW	di-di-dah-dit dah-dah di-dah-dah	"F", "M", "W"
FM	di-di-dah-dit dah-dah	"F", "M"
FAX	di-di-dah-dit di-dah dah-di-di-dah	"F", "A", "X"

If no announcement in Morse of the receiver mode is required then this option can be switched off.

(ix)   Use of colour

A very small number of monochrome displays do not support the type of highlighting which is used by AORSC as the default. If you are having problems with highlighted text (eg it is blanked off) you can select an alternative method of highlighting using this option.

Select monochrome if you are having problems with highlighted text.

(x)   Type of graphics display

Normally you will not need to change the type of graphics display you selected when you originally installed AORSC, however, you can change it if you need to using this part of CONFIG.

Select from VGA, EGA, Hercules, or None (for no graphics). You should only need to do this if you have upgraded your graphics board.

4.4. Some additional notes

When all the options outlined above have been selected AORSC will create the file INSTALL.DAT in the default directory (this file contains the program configuration). It is loaded by AORSC each time the program runs so that the options that were previously selected can be used.

<div align="center">An example INSTALL.DAT file is shown below :</div>

```
AR-3000                          the receiver being used
1                                number of frequency bands available
100.0                            lowest frequency in band 1
2036000.0                        highest frequency in band 1
COM1                             the serial port in use
C:\AOR\MEMORY                    the directory containing memory files
```

C:\AOR\MEMORY\DEFAULT.MEM	default memory filename
C:\AOR	the directory containing REGION1.DAT
C:\AOR	the directory containing AORSC.HLP
C:\AOR\LOGBOOK	the logbook directory
6	default intercharacter delay
4.0	default scan dwell time (in sec.)
15	default SFW report period
0	default S-meter threshold for scanning
NARROW	Printer type "WIDE", "NARROW" or "NOPRINTER"
FALSE	Morse identification "TRUE" or "FALSE"
FALSE	Use joystick port "TRUE" or "FALSE"
TRUE	Use colour defaults for highlighting
VGA	Type of graphics in use

If problems with the installation of AORSC are experienced then please compare the file INSTALL.DAT with the example above (only the text on the left should be present, do not enter the comments on the right). Pay particular attention to the directory names and the use of back-slash characters (if needed). Also make sure that the files that are installed in special directories are moved to their correct locations before running the program.

RAM drives may be used to increase the speed of disk access if no hard disk is available, but be careful as data on a RAM disk will be lost when the computer is switched off. The band information file (REGION1.DAT) is suitable for copying to a RAM disk as it is never modified by AORSC. In this case use a RAM disk program to create a virtual disk, install REGION1.DAT on the drive generated and copy the file across onto the RAM disk before running AORSC.

5. CONNECTING THE PC TO THE RECEIVER

This section of the manual describes how to connect the serial port of the PC to the receiver. Please check your connections to the radio very carefully BEFORE starting to use the software.

5.1. The RS-232C Interface

The RS-232C interface on the receiver is a serial communications interface which means that data is transferred to it one bit at a time. The program automatically configures the PC serial port with the correct parameters needed.

5.2. Making the RS-232 connection between PC and receiver

A screened cable with a minimum of 5 conductors is recommended for connecting the PC to the receiver. If screened cable is not used then digital noise may radiate from the conductors of the cable and cause interference to reception.

It is important to follow these instructions for connecting the computer to the receiver very carefully. Pin 1 and pin 7 of the RS-232 connector that plugs into the back of the AR-3000 should be shorted together, if this radio is being used. All cable connections should be high quality for durability.

<u>Configure the serial cable according to the tables given below:</u>

For operation with the AR-3000A or AR-3000

PC 25w D-Type (female)	Radio 25w D-Type (male)
SHIELD 1	1
TXD 2	2
RXD 3	3
RTS 4	4
CTS 5	5
GND 7	7
6, 8-25 Not Connected	6, 8-25 Not Connected

**NOTE : PIN 1 AND PIN 7 SHOULD BE SHORTED TOGETHER AT THE
RADIO'S END OF THE CABLE IF AN AR-3000 IS BEING USED.
THEY SHOULD BE ONE-TO-ONE FOR THE AR-3000A.**

If you are using a 9 way D-type connector then please refer to your computer manual for details of the pin connections (this may vary according to manufacturer). One possible pinout is shown below (this is for the PTI-209 I/O card, which is quite common):

PC 9w D-type (female)	
RXD	2
TXD	3
GND/SHIELD	5
RTS	7
CTS	8

5.3. Enhancing the tuning speed of the AR-3000A

The AR-3000A differs from the AR-3000 in several ways; the most important being the method of S-meter sampling on the RS-232 interface. Unfortunately, the new technique (although more reliable) can be quite slow. It may take a while for the S-meter sample and prompt to return after each "Y" command.

However, this can be overcome quite easily using the tape control signal on the rear panel of the AR-3000A and the joystick port on the PC. Many PCs are supplied with a joystick (or games) port as standard: it is normally a 15 way D-type female connector.

To take advantage of the joystick port, you will need to make up an extra cable as follows:

AR-3000A "AUX" DIN connector	Joystick port
6 (REM+)	2 (Button A1)
7 (REM-)	4 (ground)

**WARNING: CHECK THE CABLE AND CONNECTORS FOR SHORTS
AS A MISTAKE COULD DAMAGE YOUR PC OR RADIO.**

When you have finished, use the CONFIG.EXE program to alter the INSTALL.DAT file.

When AORSC is run with the joystick port in operation the S-meter sampling over the RS-232 interface is switched off until the squelch opens. This greatly increases the speed of tuning.

6. KEY FEATURES OF THE PROGRAM

AORSC is a powerful program for the IBM PC, or a compatible computer, that allows you to control an AOR scanning receiver using a serial port (RS-232 interface) of the computer. Many facilities are offered to give you a high performance radio monitoring system.

Now that you have installed the software and prepared your RS-232 cable, let us briefly look at the capabilities of the program before going into detail. Here are the key features of the program:

* Comprehensive text display

A text display is used to present information to you about the operation of the software. The status of the receiver, and software on the PC, is shown above a list of the memory channel contents. The bottom line of the screen contains a menu giving a list of options representing the main facilities of the software.

* Extensive VFO control

The keyboard of the computer may be used to select the frequency and mode of the receiver using dual VFOs. It is possible to switch instantaneously between the two VFOs with a single key press. A fixed VFO offset may be entered into the system and the VFOs locked together using the "tracking" facility so that the offset is maintained while tuning across the spectrum.

* Massive memory capacity

Three thousand mode sensitive memory channels are provided in each memory file, each with dual VFOs and a 50 character comment. A selection of these memories is displayed on the screen so that you can review memory contents easily. The display of memories can be paged up or down so that it is possible to check on the contents of the entire bank of 3000 channels from the VDU.

You can expand your memories by creating new memory files, each with 3000 channel as above. There is no limit to the number of files you can create, unless you run out of disk space.

* Full range of scanning facilities

A comprehensive range of scanning facilities is provided with the software. It is possible to scan memories, free scan or perform band limited scans. Frequencies that are found when using the free scan or programmable band scan (PBS) can be transferred directly into the program's memories either manually or automatically. It is possible with the PBS to set up a scan so that the software will automatically find signals and place their frequencies in the top 500 memory channels of the software. In addition channel occupancy can be calculated optionally for preset PBSs so that the level of spectrum usage for a band of frequencies can be measured. Similar statistics can be calculated for a memory scan with output directed to a printer and/or disk file.

* Rejection of unwanted frequencies

A list of up to 100 frequencies can be built up that contains frequencies rejected during scanning operations. This list can include internal spurious frequencies associated with the receiver, constant carriers, or frequencies of no interest. Frequencies can be added to the list during a PBS or Free Scan, or by manually adding them to the list. Rejected frequencies are indicated inside the scan window if encountered while scanning.

* Easy maintenance of memory data

Memory channels can be browsed manually from the keyboard using the arrow keys and optionally transferred to the receiver. Various facilities are provided for clearing memories, selecting blocks of memories for scanning, printing memory contents on an optional printer and moving blocks of memory channels. It is possible to individually "tag" memory channels so that a Morse "a" character is sent through the PC's speaker to alert you to the presence of activity on a memory channel while memory scanning.

* Comprehensive listener's logbook

A comprehensive listeners logbook, allowing the activity of stations to be manually recorded on disk, is also included with the program. Printouts of logbook information can be produced on an optional printer. It is possible to add logbook entries while scanning using a single keypress.

* Bandplan display

A text based diagram of the bandplan for your region of the world (either region 1, 2 or 3), which covers the entire frequency range of the receiver, can be displayed on the computer screen.

* Easy to use on-line help information

Pages of help information can be read from disk for display on the computer screen while the software is being used.

* Enhanced operation using a mouse

A Microsoft compatible mouse may be used to control the receiver instead of the keyboard. This greatly enhances operation of the software since it is not necessary to memorise key strokes in order to use the program's facilities. The mouse may be used to page the memory display, recall memory channels, select the receiver's mode, tune the receiver using tuning steps, select the required step size, change front panel parameters and select options from the menu at the bottom of the screen.

* Detailed monitoring of a single frequency

The Single Frequency Watch (SFW) facility allows statistics about signal activity on a single frequency to be calculated over a period of time. Regular reports on the density of traffic on the frequency can be output to a printer or disk file. This facility allows the number of overs per hour to be calculated together with the amount of activity expressed as a percentage of the total time per reporting period. The frequency of reports can be determined by you.

* Reconstruction of offset simplex transmissions

Offset Simplex Reconstruction (OSR) allows both sides of a simplex transmission that are on different frequencies to be recovered by switching intelligently between the two VFOs of the system.

* Extensive data transfer capabilities

Various conversion routines are provided that allow memories, Logbook information and the reject frequency list to be output to disk in text format. This allows data to be imported into an external data base (not supplied) where it can be modified to your requirement. The altered data can then be imported back into AORSC so that it can be used with the software.

* Transfer facilities for data to/from the radio

It is possible to upload and download AORSC memory data to the AR-3000 and AR-3000A.

* Spectrum analyser style graphics display

A Graphics Spectrum Display (GSD) is provided with AORSC so that you can display signals in the RF spectrum in the same way as a spectrum analyser can.

7. RUNNING AORSC

7.1. Getting Started

The program can only be run after the software package has been properly installed. You should only read this section of the manual if you have installed the software and prepared your cables according to previous sections of this manual.

To run the program, **change the default drive or directory** to the directory you defined in by the installation procedure (system default = CD\AOR) and type:
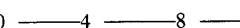
            AORSC   at the DOS prompt.

If all goes well, the main AORSC display will appear on the VDU after a couple of seconds. If nothing happens then you should check your RS-232 connection since this may well be at fault.

The main AORSC screen contains information about the receiver's frequency and mode. It is also used to display the contents of the memories and various other information.

An example of the main screen is shown in figure 1:

```
15:51:30                 AOR RADIO MONITORING SYSTEM            WED 08-JAN 1992

VFO A:     91.200,00 kHz  /  FMW    Step:  25.0 kHz        Mode:  MANUAL TUNE MODE
   VFO B:     1.215,00 kHz  /  AM      NO TRACK             STEP ADJ.        PAUSE SCAN
S-METER:  [//////////////////////////]                     MODE   <<<DN STEP UP>>>
   BUSY  └0 ─────4 ─────8 ─────12────15┘                          <<<<<    ....    >>>>>
──[HOME    ]                                                                 [PAGE UP ]─

Chan              VFO A              VFO B  AST  Comment
   0      99.500,00 FMW      1.089,00   AM        BBC Radio 1 (Wenvoe)
   1      89.000,00 FMW     88.600,00 FMW        BBC Radio 2 (Churchdown Hill)
   2      91.200,00 FMW      1.215,00   AM        BBC Radio 3 (Churchdown Hill)
   3      93.400,00 FMW      0.198,00   AM        BBC Radio 4 (Churchdown Hill)
   4       0.693,00   AM      0.909,00   AM        BBC Radio 5
   5      94.700,00 FMW      0.819,00   AM        BBC Radio Hereford and Worcester
   6      95.000,00 FMW     ---- .--- ,--    ---   Radio Gloucestershire (Stroud)
   7      96.000,00 FMW      0.756,00   AM        Radio Shropshire (The Wrekin)
   8      97.200,00 FMW     ---- .--- ,--    ---   Beacon West Midlands (Turners Hill)
   9      97.600,00 FMW      0.954,00   AM        Radio Wyvern (Ridge Hill)
  10     102.400,00 FMW      0.774,00   AM        Severn Sound (Churchtown Hill)
  11     104.000,00 FMW     ---- .--- ,--    ---   BBC Hereford and Worcester (Great Malvern)
  12     104.700,00 FMW      0.693,00   AM  ✓    Radio Gloucestershire (Churchtown Hill)
  13       0.252,00   AM     ---- .--- ,--    ---   Atlantic 252
  14      96.800,00 FMW      0.882,00   AM        Radio Cymru (Wenvoe)
──[END    ]                                                                  [PAGE DN]─

HELP          MANUAL    LOGBOOK    SCAN      MEMORY   SPECIAL  FILES  EXIT
```

The top line, of figure 1, shows the current date and time, and below that (between the two lines) is the receiver status, signal strength display and cluster of indicators used for mouse control.

The status display shows the settings of the dual VFOs of the software and also the mode of the program (in figure 1 the program is shown in "MANUAL TUNE MODE"). The keyboard tuning step size is also shown. The signal strength consists of a bar that varies its length according to the strength of signals received. Below the tuning step size is an indicator that shows if the VFOs are locked together or not ("TRACKING" indicates that the VFOs will follow each other). The settings of step adjust and pause/stop on scan are shown just above the cluster of indicators for mouse operation. If "ATT." is displayed under the "MODE" symbol this indicates that the attenuator is in use

Some of the 3000 memory channels are shown below the receiver status display. The frequencies and modes are stored together with a comment and a cluster of three indicators ( ) in the columns marked "AST". These columns indicate if the memory channel has the

attenuator active (A), is selected for memory scanning (S) or is tagged (T).

The type of information displayed on the screen changes as the various facilities of the program are used.

The program starts in Manual Tune Mode. This is the level of the program from which the main functions can be selected. The program mode is always shown in the status display.

7.2. Using the software

The facilities of the software can be obtained using single key stokes, using the mouse, or by selecting options from the menu shown at the bottom of the screen.

  (i) Using single key strokes

Single key strokes can be used to access frequently used facilities of the software while in Manual Tune Mode. The single keystrokes are listed below:

Keystroke	Function
<ALT-H>	Obtain help on AORSC
<ALT-S>	Store the active VFO in memory
<ALT-R>	Recall a VFO from memory
<ALT-W>	Browse through memory channels
<ALT-M>	Scan through a range of memory channels
<ALT-P>	Start a new Programmable Band Scan (PBS)
<ALT-B>	Obtain bandplan information
<ALT-F>	Start a Free Scan
<ALT-T>	Change the PC system time
<ALT-L>	Start the Logbook
<HOME>	Display memories starting at 0
<END>	Display memories starting at 2500
<PGDN>	Page up through 15 memory channels
<PGUP>	Page down through 15 memory channels
<LFT>	Decrement step size
<RGT>	Increment step size
<UP>	Tune active VFO up in frequency
<DN>	Tune active VFO down in frequency
<F1>/<F2>	Select AM mode on active VFO
<F3>	Select LSB mode
<F4>	Select USB mode
<F5>/<F6>	Select CW mode
<F7>	Select FM narrow mode
<F8>	Select FW wide mode
<F9>/<F10>	Select FAX mode

<#>	Toggle attenuator
<=>	Equate VFOs A and B
<S>	Toggle step adjust
<P>	Toggle pause/stop when signal found
<T>	Toggle VFO tracking
<A>	Select VFO A
<B>	Select VFO B
figures keys	Enter a frequency using keyboard
<U>	Increment active VFO by 1 MHz
<D>	Decrement active VFO by 1 MHz
<SPACE>	Blank the screen to reduce interference
<BACKSPACE>	Save memory information to disk
<TAB>	Move menu highlighting to right
<SHFT-TAB>	Move menu highlighting to left
<ENTER>	Select highlighted menu option
<ESC>	Exit from AORSC

(ii) Using the mouse

The mouse can be used to select options and control the software by positioning the mouse
cursor over the required part of the screen and "clicking" the left mouse button.

In general the right mouse button can be used to escape from function of the software instead
on the <ESC> key.

(iii) Selecting options from the menu

Menu options, shown at the bottom of the main screen, can be selected by positioning the
mouse over the required option and "clicking" the left mouse button.

Keyboard users may use the menu by pressing the <TAB> or <SHIFT><TAB> keys until the
highlight bar is over the required option and pressing <ENTER>.

Many of the menu options relate to several facilities, so a window containing a list of the
facilities that are provided for each option will appear after some of the options have been
selected. It is possible to select a sub-option from the list by typing the digit that appears
next to the required option in the window, or by moving the highlight bar over the required
sub-option using the mouse and "clicking" on the left mouse button.

8. BASIC OPERATION OF THE SOFTWARE

8.1. Tuning the receiver using the keyboard

(i) Using the arrow keys

The arrow keys, in Manual Tune Mode, can be used for two purposes. The <UP> and <DN>
arrow keys can be used to tune the receiver up or down in frequency steps. The <LFT> and

<RGT> arrow keys control the size of these tuning steps. The step sizes that can be selected are listed here: **12.5kHz, 25kHz, 100kHz, 1MHz, 10MHz, USER**

The largest step size may be replaced by a step size defined by you. The user step size may be entered from the "MANUAL" menu option when operating the software in Manual Tune Mode.

(ii) Direct frequency entry

Frequencies can be entered directly using the PC keyboard. To enter a frequency simple type in the required value using the number keys in units of MHz (eg to enter 145.5 MHz type in "145.5<ENTER>").

As soon as a number key has been pressed a window will be displayed on the screen so that the required frequency can be entered into it.
It is possible to escape back to Manual Tune Mode without entering the frequency by pressing <ESC>.

(iii) Selecting the mode

The mode of the receiver can be selected using the function keys. The table below shows how each function key can be used:

Key	AR-3000/A mode
<F1>/<F2>	**AM**
<F3>	**LSB**
<F4>	**USB**
<F5>/<F6>	**CW**
<F7>	**FM**
<F8>	**FMW**
<F9>/<F10>	**FAX**

FAX mode can be used to de-tune the receiver by 1.7 kHz so that modern multimode modems (such as the AEA PK-232), which can decode FAX signals, can be used without having to manually subtract 1.7 kHz from the received frequency.

(iv) Using the attenuator

The radio's attenuator can be switched by pressing the <#> key or selecting the attenuator sub-option in the "MANUAL" menu.

8.2. Tuning the receiver using the mouse

(i) Frequency stepping

The receiver can be stepped up or down through the spectrum by moving the mouse cursor over the right or left indicators in the status area of the screen and "clicking" the left mouse button. The size of tuning step can be altered by "clicking" on the "STEP" indicator that is between the two tuning indicators.

(ii) Changing mode

The mode can be selected by "clicking" the mouse on the "MODE" indicator. The receiver will cycle through each of the modes that are available each time the mouse is "clicked".

(iii) Recalling a memory

If the mouse cursor is moved into the memory display area a highlight bar moves up or down the list of channels depending on the position of the mouse cursor. If this bar is positioned over a memory channel that is not empty and the left mouse button "clicked" the contents of that memory channel will be transferred to the main VFOs. This is a very fast way of recalling a memory channel without having to enter channel numbers.

(iv) Using the attenuator (again)

The mouse can be used to switch the attenuator (if available) by "clicking" on the space under the "MODE" symbol so that the "ATT." symbol is displayed. Alternatively the mouse can be used to select the attenuator sub-option in the "MANUAL" menu.

8.3. Inspecting memory contents

The display of memory contents can be paged up or down by pressing the <PGUP> or <PGDN> keys. Alternatively the mouse can be "clicked" on the "[PAGE UP]" or "[PAGE DN]" indicators so that the contents of all the memories can be inspected without having to tune the receiver.

The last 500 memory channels are normally used for storing frequencies found while scanning (they are marked with a * to indicate that they are special). These channels may be viewed by pressing the <END> key or by "clicking" the mouse on the "[END]" symbol.

The first few memory channels can be displayed using the <HOME> key or by "clicking" on the "[HOME]" symbol.

9. USING THE MENU

There is a list of eight menu options displayed on the bottom line of the main screen. Each option can be highlighted using the <TAB> or <SHIFT><TAB> keys so that the highlight bar is over the required option. The item can then be selected by pressing the <ENTER> key. Alternatively the mouse cursor can be placed over the required option and the left button "clicked" to select the option.

When a menu option has been selected a window is usually displayed on-screen containing a list of sub-options. Each sub-option can be selected using the <UP> and <DN> arrow keys to move the highlight bar up or down the list. The <ENTER> key then activates the highlighted option. Alternatively the optional mouse may be used to move the highlight bar and the left mouse button "clicked" to make the selection.

9.1. Selecting the HELP option

Help information on a variety of topics can be selected using this menu option.

When help is selected the main screen is replaced with a split-screen display of topics (in the top half) and information on each topic (in the bottom half). Use the <UP> and <DN> arrows to move the highlight bar from topic to topic so that the information in the bottom half of the screen changes.

If there is more information to be display than can be shown in one go the "[more]" symbol will appear in the bottom right hand corner of the screen. Press <PGUP> or <PGDN> to scroll the text up or down so that the rest of the information that is available can be seen.

Return to the program by pressing <ESC>.

9.2. Selecting the MANUAL range of options

When the MANUAL option of the menu has been selected the Manual Parameters Form will be displayed on the screen. This contains the current status of commonly used parameters of the program.

Move the highlight bar to the required parameter and press <ENTER> to select a parameter, or "click" on it using the mouse. Modify the required parameters in this way and press <F10> to set up the radio or <ESC> to abort.

(i) Toggle step adjust <S>

The step adjust facility can be used to ensure that the frequency that the receiver is tuned to is always exactly divisible by a whole number of frequency steps. This is useful for changing step sizes while scanning.
Each time this option is selected the step adjust status will change between the two possible conditions (ie "STEP ADJ." or "NO STEP").

(ii) Toggle pause/stop scan when signal detected <P>

This indicator effects operation of the scanning facilities provided with AORSC.

It is possible to force the receiver to stop scanning when a signal is found or to just pause for 5 seconds and resume scanning automatically. If scanning stops when a signal is found you can use the <UP> or <DN> keys to manually restart scanning.

Each time this option is selected the pause or stop scan status will switch between the two possible conditions (ie "PAUSE SCAN" and "STOP SCAN").

(iii) Toggle VFO tracking <T>

Any offset that you have setup between the two VFOs can be maintained by turning on VFO tracking.

Each time this option is selected the status of VFO tracking will switch between the two possible conditions (ie "TRACKING" or "NO TRACK").

(iv) Enter VFO offset

The two VFOs may be offset so that split frequency operation can be monitored. The offset is always entered with respect to the active VFO and may be positive or negative in value. This facility can be used to quickly set up a fixed offset between the VFOs without having to calculate the frequency difference manually.

Enter the required VFO offset in kHz and indicate if it is a positive or negative offset from the current active VFO.

The offset can be maintained using the VFO tracking facility.

(v) Enter user defined tuning step size

A number of preset tuning step sizes are provided with the AORSC package. It is possible for you to replace the largest step size with a custom step size using this option.

Enter the required tuning step size in kHz and press <ENTER>.

(vi) Toggle Attenuator <#>

The setting of the attenuator can be toggled using this sub-option. When the attenuator is active the "ATT." indicator appears in the status area of the screen under the "MODE" symbol.

9.3. Selecting the LOGBOOK option

The LOGBOOK can be selected directly using this option - there is no list of sub-options displayed.

Further details of the range of facilities provided by the LOGBOOK option are given in a later section of this manual.

9.4. Selecting the SCAN range of options

(i) New Programmable Band Scan (PBS) <ALT-P>

When a Programmable Band Scan is being setup A PBS form is used to enter all the parameters of the scan. Use the <UP> and <DN> keys to move a highlighting bar round the list of parameters that are available. Press <ENTER> to select a parameter.

Enter a title so that the PBS can be recognised later and the lower and upper frequency limits of the scan. Both frequencies should be entered in units of MHz (eg "145.5<ENTER>" for 145.5 MHz).

The mode can be selected from the list that is displayed by pressing the number key next to the required mode.

It is possible to use step adjustment (so that frequencies scanned are aligned on channels), to toggle stop/pause scan and to toggle VFO tracking.

The threshold is the S-meter level required to stop/pause scanning and can be set so that only strong signals register with the scan, or it may be set for maximum sensitivity so that anything will stop/pause the scan. The range is 0 (maximum sensitivity) to 15 (minimum sensitivity).

If the PBS will be used later, or with other PBSs in a multiple scan then this can be arranged using the "Selected for multiple PBS" options. It is also possible to select the PBS for a multiple scan later if required.

The final parameter in the PBS form is the time (in seconds) that scanning is paused for if pause scan is selected. A simple time out display is used to show how much time is left when scanning is paused.

When the PBS has been set up correctly press <F10> to begin scanning or <ESC> to abort.

(ii) Start a preset PBS

When a preset PBS is to be started the title and frequency limits of each PBS that is available are displayed in a window. The required set of parameters can be selected by moving the highlight bar to the required option and pressing <ENTER>. Alternatively the mouse can be "clicked" on the required PBS.

The PBS parameters will then loaded into the program and scanning will start. The following keys can be used to control the scan.

PROGRAMMABLE BAND SCAN KEYSTROKES	
Keystroke	**Function**
<UP>/<DN>	**Direction**
<LFT>/<RGT>	**Select step size**
<P>	**Pause scan**
<F6>	**Reject current frequency**
<F7>	**Add to logbook**
<F8>	**Toggle auto memory add**
<F9>	**Add to memory**
<F10>	**Transfer to VFO**
<ESC>	**Exit from Free Scan**

When it is started the PBS tunes the radio in steps determined by the currently selected step size. It is possible to change the step size while scanning is taking place using the <LFT> and <RGT> arrow keys. The direction of the scan can be changed using the <UP> and <DN> arrow keys.

It is also possible to switch between VFOs, while scanning using offset VFOs, by pressing <A> or <B>.

The PBS will respond to the presence of a signal in one of two ways. If "SCAN STOP" was selected in the PBS setup the scan will stop until a key is pressed. If "PAUSE SCAN" was selected the PBS will stop scanning when a signal is found for the dwell time then resume scanning.

If automatic addition of frequencies into memory is being used the scan will not stop at all but will enter all active frequencies into the next available memories in the top 500 memory

channels. The automatic memory add facility can be toggled using the <F8> key.

In all cases, when a signal is found the frequency is listed in a window inside the programmable band scan window. If the frequency is already in one of the last 500 memories in the array of memory channels a message will appear inside the window warning of this.

If not automatically adding frequencies into memory the frequency can be entered manually into a memory channel using the <F9> key. The next available memory channel in the last 500 channels is used to store the required frequency.

The details of a signal can be entered into the logbook by pressing the <F7> key. The date, time, frequency, mode and signal level (range 0 - 16) of the active VFO are all automatically entered into a LOGBOOK entry form. When the form is completed it can be added into the logbook by pressing <F10>.

The PBS can be paused while scanning is in progress by pressing <P>. it is possible to change the step size using the <LFT> and <RGT> arrow keys and to step up or down in frequency using the <UP> and <DN> keys while paused. Scanning can be resumed by pressing <P> again.
A frequency can be added to the list of rejected frequencies using the <F6> key. This prevents the scan from stopping on unwanted frequencies.

The frequency that is currently tuned can be transferred to the radio's VFO and scanning can be stopped by pressing <F10>. The PBS can be aborted by pressing the <ESC> key at any time.

When a new PBS has finished it is possible to store all the parameters of the scan in a file so that the PBS can be restarted at a later date. The frequency limits, step size, step adjust setting, pause setting, mode, dwell and S-meter threshold are all stored in the file.

The parameter files are stored on disk in files named "PRGM???.PBS" where "???" is a one up count from "000". This allows an almost limitless number of different PBS scans to be stored on disk. If the PBS has been run for the first time you will be given the option to store all the parameters which you have used in one of these files. There is no limit to the number of PBS configurations which can be used with AORSC.

(iii) Multiple PBSs

It is possible to scan through more than one Programmable Band Scan by selecting several preset scans from those available. The parameters of each PBS can be viewed inside a text window and the PBS can be selected using the <S> key. The <UP> and <DN> arrow keys can be used to view all the PBS parameter files that are available. Press <F10> to begin scanning.

At the end of each PBS the next in the series will be loaded into the system and scanning will continue until stopped by you.

(iv) Memory Scan <ALT-M>

Enter the range of memory channels that are to be included in the memory scan by selecting the lowest memory channel then the highest. This can be done using the Memory Scan form. Move the highlight bar up and down the list of parameters that are available in the usual way using the <UP> and <DN> keys. Press <ENTER> to select the required parameter.

The direction of the scan determines if memory channels are scanned in ascending or descending order.

When the memory channel limits are being set a memory form is used to display memory channel parameters. Press <UP>, <DN>, <PGUP> or <PGDN> to view memory channel contents and <F10> to use the displayed memory channel as a limit of the scan. This procedure should be used to select both the upper and lower limit of the scan.

Only memory channels that are "selected" within the range specified will be included in the scan. The browse facility or the mouse can be used to select or deselect individual memory channels. When using the memory browse facility the <S> key can be used to toggle the memory channel select indicator. The mouse can also be used to toggle the memory select indicator by positioning the mouse cursor on the memory display area of the screen, so that the highlight bar is over the required memory channel, and "clicking" the right mouse button.

The pause/stop scan, threshold and dwell time facilities can be selected in a similar way to PBS operation.

Press <F10> when all the parameters are correct or <ESC> to abort.
When memory scanning a window will appear in the middle of the display so that the contents of both VFOs and any associated comment can be quickly seen.

The following keys can be used to control the memory scan:

MEMORY SCAN KEYSTROKES	
Keystroke	**Function**
<UP>/<DN>	**Direction**
<LFT>/<RGT>	**Select step size**
<A>/<B>	**Select VFO**
<P>	**Pause scan**
<F10>	**Transfer to VFO**
<ESC>	**Exit from Free Scan**

The direction of scanning can be controlled using the <UP> and <DN> arrow keys. Scanning can be paused by pressing <P> and resumed again by pressing <P> again. While paused it is possible to step up or down through selected memories using the <UP> and <DN> arrow keys. It is possible to switch between the two VFOs by pressing <A> or <B> whether scanning or paused.

Scanning will continue until a memory channel that contains an active frequency is found by the system. The memory scan will pause for a period of time determined by the dwell time then resume scanning if "PAUSE SCAN" is selected. If "STOP SCAN" is in use the scan will remain stopped until a key is pressed.

If a memory channel has been tagged a Morse "a" character will be sent by the PC using the internal speaker of the computer to alert you to the presence of a signal on memory channel.

To transfer a memory channel to Manual Tune Mode press the <F10> key, or to exit without transferring a frequency from memory use the <ESC> key. These functions work even if not paused on a channel.

(v) Free Scan <ALT-F>

A free scan is a mode of scanning that is not band limited. The settings of the "STEP ADJUST", "PAUSE SCAN" and "TRACKING" indicators are active during a Free Scan and affect the operation of the scan. It is also possible to use the auto. memory add facility in a Free Scan.

The following keys can be used to control the free scan:

FREE SCAN KEYSTROKES	
Keystroke	**Function**
<UP>/<DN>	**Direction**
<LFT>/<RGT>	**Select step size**
<F6>	**Reject current frequency**
<F7>	**Add to logbook**
<F8>	**Toggle auto memory add**
<F9>	**Add to memory**
<F10>	**Transfer to VFO**
<P>	**Pause scan**
<ESC>	**Exit from Free Scan**

The receiver will start scanning immediately that the option has been selected. The direction of scanning can be changed using the <UP> or <DN> arrow keys. The step size can also be changed using the <LFT> and <RGT> keys.

Scanning can be paused at any time by pressing <P>. It is possible to step the receiver up or down in frequency or to change the tuning step size using the arrow keys while paused. Press <P>again to continue scanning.

When a signal is found the frequency is listed in a window inside the programmable band scan window. If the frequency is already in one of the last 500 memories of the software a message will appear inside the window warning of this.

If the signal is not wanted then scanning can be resumed by pressing the <UP> or <DN> arrow key.

If the frequency is to be manually entered into memory press <F9>. AORSC will then add the frequency to the next available channel in the last 500 memories. The auto memory add facility can be used by pressing <F8>.

Frequencies can be added to the reject list by pressing <F6>. The Free Scan could be used (together with a high S-meter threshold) to locate all the internal spurious signals of a radio and prevent scanning operations from being triggered by them.

The details of a radio signal can be entered into the LOGBOOK in a similar way to when performing a PBS.

The frequency that is currently tuned can be transferred to the radio's VFO and scanning can be stopped by pressing <F10>. The PBS can be aborted by pressing the <ESC> key at any time.

(vi) Memory Hit Histogram (MHH)

The Memory Hit Histogram (MHH) is a special memory scan that determines the level of occupancy on selected memory channels. A MHH is started just like a conventional memory scan by entering the range of memory channels to be scanned through. Additionally the number of times the scan will loop round must also be entered.

As scanning progresses the MHH will determine if a signal is present on a memory channel by measuring the S-meter level and checking 0.5 seconds later to see if something is still there. This prevents the scan spuriously recognising signals. If signals disappear while AORSC is checking the signal level the software assumes that impulse interference was received instead.

Each time something is found a record of the number of "hits" is updated so that a table of percentages can be calculated.

If scanning is in progress it can be stopped by pressing the <ESC> key. Alternatively scanning will stop automatically once the specified number of loops have been executed.

The results of the MHH comprise a list of each memory channel in the scan together with the number of "hits" and the percentage occupancy. A histogram is also included using the percentages so that the results can be examined at a glance. This data can be directed to a printer and/or a disk file.

(vii) PBS Hit Histogram

This is quite similar to the MHH mentioned above but uses a preset PBS to determine the scan limits. This is probably the most powerful feature of AORSC since it allows a band scan to be used to determine the level of spectrum occupancy without prior knowledge of frequency usage. Just set up a scan, leave it running for a while and look at the results to determine the nature of spectrum usage for a particular band of frequencies.

All active frequencies in the specified range will be identified by the PBS Hit Histogram and records of the number of "hits" for each frequency maintained. All active frequencies are automatically added into the top 500 memories together with a comment giving the time and date that the signal was first heard.

At the end of the scan the results of the PBS Hit Histogram scan can be output to a printer or disk file as with the MHH.

(viii) Graphics Spectrum Display (GSD)

If you have a graphics board fitted to your PC (either colour or monochrome) you can use the Graphics Spectrum Display (GSD) facility of AORSC to produce a spectrum analyser style display of the RF spectrum.

After you have selected GSD from the scan menu, you should enter the centre frequency, mode, step size and attenuator setting into the Graphics Spectrum Display entry form. The GSD will then work out the limits of the spectrum scan according to the step size you require and the resolution of your graphics display. The table below shows how many steps are available in each graphics mode:

Graphics Mode	No. Steps
VGA	638
EGA	638
Hercules	718

When you have completed the GSD entry form, press <F10> to begin displaying the spectrum on your VDU. You can abort by pressing <ESC>.

The GSD will cycle between the two limits of the scan and display the level of any signals that are encountered on your VDU. Press <ESC> to return to the SCAN menu.

9.5. Selecting the MEMORY range of options

(i) Store <ALT-S>

When the program is in Manual Tune Mode, the current frequency and mode of the receiver can be stored in one of the 3000 memory channels that are available. Note that the last 500 memory channels are used to store frequencies found while scanning and should not normally be used.

A memory form is used to display current memory contents when storing the VFO. Select the required memory channel (normally a blank channel) using the <UP>, <DN>, <PGUP> or <PGDN> keys and press <F10>.

If data is already associated with the memory channel it can be overwritten.

It is possible to store both VFOs in a memory channel or just one. If only one VFO is to be stored then the current active VFO is automatically selected by the software.

It is possible to abort by pressing <ESC> at any time.

(ii) Recall <ALT-R>

Use a memory form to select a memory channel to be recalled, this can be done in the same way as for memory store.

The contents of the memory channel selected will then be transferred to the receiver. It is possible to abort using the <ESC> key.

The mouse can be used to recall memory channels by moving the mouse cursor into the part of the screen that contains the memory display and "clicking" the left mouse button on a memory channel.

(iii) Browse <ALT-W>

The browse facility can be used to quickly check on signal activity that is on frequencies stored on memory.

The following keys can be used to control a memory browse:

BROWSE KEYSTROKES	
Keystroke	**Function**
<UP>/<DN>	**Select next/previous memory channel**
<PGUP>/<PGDN>	**Step through memory channels**
<HOME>/<END>	**Select memory channel 0 /2500**
<A>/<B>	**Select VFO A/B**
<S>	**Toggle selection for memory scan**
<T>	**Toggle alarm tag**
<F10>	**Transfer to VFO**
<ESC>	**Exit from memory Browse**

The memory channels can be scrolled through using the <UP> and <DN> arrow keys. The <PGUP> and <PGDN> keys may be used to scroll up or down through the memories in steps of ten.

The <HOME> and <END> keys select channel 0 and 2500. This allows you to locate the start of the memory data or the start of memory information obtained during scanning operations.

When a memory channel is selected, using the keys described as above, the receiver will be tuned using the data stored in that memory channel.

The information displayed in the window will change as the memories are scrolled so that the contents of both VFOs and any associated comment can be quickly reviewed.

The browse facility can be used to toggle the setting of the "select" indicator that is associated with each memory channel. This indicator is used during memory scanning so that only certain memory channels in the desired range are included in the scan. The condition of the "select" indicator can be toggled by pressing the <S> key.

Browse also allows memory channels to be tagged so that an alarm (Morse "a" character) is output when a signal is found during memory scans. Press <T> to select this facility.

A memory channel can be transferred to the receiver by pressing the <F10> key. To escape from memory Browse without transferring a memory channel simply press the <ESC> key.

(iv) Print

**WARNING: MAKE SURE THAT A SUITABLE PRINTER IS CONNECTED
TO LPT1, AND THAT IT IS ON-LINE AND READY TO PRINT
BEFORE PROCEEDING.**

A range of memory channels may be copied to the printer using this option. Select the range of memory channels to be printed using the memory select forms in the normal way.

(v) Clear block of memories

A block of memory channels can be cleared using this option.

<p align="center">**WARNING: MEMORY CHANNELS CANNOT BE RECOVERED
ONCE THEY HAVE BEEN CLEARED.**</p>

Select the lowest memory channel to be cleared then the highest using the select memory forms. You can then determine if only one VFO is to be cleared or if the entire memory channel is to be cleared.

(vi) Select/deselect a block of memories

A block of memories can be selected, or deselected for memory scan operation using this option. Select the lowest and highest memory channel number to be affected.

(vii) Move a block of memories

A block of memory channels can be moved from one part of the array of memory channels to another using this option.

<p align="center">**WARNING: MEMORY CHANNELS CANNOT BE RECOVERED
ONCE THEY HAVE BEEN CLEARED.**</p>

Select the lowest and highest channel number of the block to be moved. The channel number where the block is to relocated at should then be selected.

(viii) Edit a memory channel

You can edit the contents of a single memory channel using this option. Select the memory channel you want using the memory select form; press <F10> when the correct channel has been found.

You can edit any of the fields of the memory channel in the normal way. Press <F10> again to update the channel, or <ESC> to abort.

(ix) Find a frequency in memory

It is possible to check and see if the current frequency of the radio is in memory. Select this option to see individual memory channels containing the current active VFO frequency.

(x) Upload from scanner memories

Memory information from the scanner can be uploaded into PC memory. Select the first PC memory channel to upload into using the memory select form in the usual way.

When the data is read from the scanner it is entered into VFO A of each PC memory channel. The following important points apply when uploading memory information into PC memory:

(a) There MUST be at least one frequency in each memory bank of the AR-3000 before uploading can take place. The program will "hang" if a bank is empty.

(b) Step sizes of 50 Hz only are downloaded into the AR-3000

(c) All memories in the scanner are read

(xi) Download to scanner memories

Frequencies stored in PC memory can be downloaded into the memories of the scanner. Select the first channel in PC memory for the download in the normal way using the memory select form. A block of memory information (VFO A only) will be downloaded into the local memories of the scanner.

The following important points apply when downloading memories:

(a) All memories in the scanner will be overwritten

(b) 400 memories are downloaded into the AR-3000

(c) ALL EXISTING INFORMATION IN THE SCANNERS WILL BE LOST

(d) Downloading may take quite a few seconds

9.6. Selecting the SPECIAL range of options

(i) Set time <ALT-T>

The system time can be set using this option. Enter the time in the format "HH:MM" and press <ENTER> to change the time. This operation can be aborted by pressing <ESC>. The existing time is used if <ENTER> is pressed without entering anything else.

(ii) Bandplan <ALT-B>

AORSC allows you to display information about the frequencies covered by the receiver. This information is not intended to be detailed but simply shows where the limits of the various bands.

```
┌─ Band Information <ALT-B> ──────────────────────────────────────┐
│                                                                 │
│  Region 1 Bandplan :                                            │
│    ┌──────────────────────────────────────────────────────┐    │
│    │                              │                         │    │
│    │                          145500.0                      │    │
│    │                              │                         │    │
│    └──────────────────────────────────────────────────────┘    │
│                                                                 │
│  144000.0 kHz                                   146000.0 kHz    │
│                         144MHz  Amateur  Band                   │
│  Notes:                                                         │
│                                                                 │
│   144000.0 kHz     144150.0 kHz     CW only                     │
│   144000.0 kHz     144025.0 kHz     Moonbounce                  │
│   144050.0 kHz                      CW calling Frequency        │
│   144100.0 kHz                      Meteor scatter CW reference frequency │
│   144150.0 kHz     144500.0 kHz     SSB and CW                  │
│   144250.0 kHz     144000.0 kHz     GB2RS (in SSB) and slow Morse transmissions │
│   144260.0 kHz     144000.0 kHz     RAYNET                      │
│   144300.0 kHz     144050.0 kHz     SSB calling frequency       │
│                                                                 │
└──────────────── Press any key to continue... ──────────────────┘
```

Figure 2

Figure 2 shows an example bandplan display for a frequency in the 144 MHz amateur band.

**NOTE: AORSC ONLY SUPPORTS ONE BANDPLAN FILE OF
INFORMATION - THE DEFAULT IS REGION 1, FOR REGIONS 2 & 3
COPY REGION2.DAT or REGION3.DAT to BANDPLAN.DAT**

(iii) Single Frequency Watch (SFW)

The Single Frequency Watch facility may be used by professional users to record information about signal activity on a single frequency. Regular reports on the density of signal activity can be produced automatically for review after the event.

The SFW can be setup using a form that allows the disk filename, printer and report period to be specified. If the filename is "NONE" then no disk output will be generated. The report period determines the frequency of reports.

When a SFW begins the system monitors the squelch status and S-meter of the receiver and uses them to determine if a signal is present or not.

Data can be optionally printed out so you should ensure that the printer is connected to LPT1 (PRN) and that it is on-line with some paper in it before using this facility if hard copy is required.

Each SFW report contains information on the average duration of overs detected, the degree of channel occupancy and gives an estimate of the number of overs per hour. Reports are produced with a frequency determined by the SFW report period determined by you. Each report is synchronised to the PC system clock, for example if reports are produced every 15 minutes they will be output at 0 minutes, 15 minutes, 30 minutes and 45 minutes past the hour. The first report output covers the period up to time the reports are synchronised and the

last report output covers the period of time following the last synchronised report.

     A SFW can be stopped by pressing the <ESC> key.

(iv) Reject frequency list

Up to 100 frequencies can be rejected from a scan (no conventional memory channels are used to store these frequencies). When the reject list is selected a complete list of rejected frequencies is displayed on the screen.

The following keys can be used to control operation of the reject list:

REJECT LIST KEYSTROKES	
Keystroke	**Function**
<UP>/<DN>	**Move highlighting**
<F1>	**Add VFO to list**
<F2>	**Delete VFO from list**
<F3>	**Add user defined frequency to list**
<F4>	**Delete highlighted frequency from list**
<ESC>	**Exit from Reject List**

One of the frequencies in the list is highlighted, this may be deleted if required by pressing <F4>. Alternatively the <UP> or <DN> arrow keys may be used to move the highlighting so that other frequencies in the list can be deleted.

Press <F1> to add the current active VFO frequency to the end of the list or <F2> to delete it directly from the list. Press <F3> to add a frequency manually to the list.

Press <ESC> to return to the main program.

(v) Offset Simplex Reconstruction (OSR)

Offset Simplex Reconstruction is intended to be used with offset VFO operation. When two or more stations are working each other in simplex mode on two different frequencies (a common situation on VHF) it is necessary to switch between the VFOs if transmissions from both stations are to be heard.

The OSR facility switches intelligently between the two VFOs on the basis of signal energy on the two frequencies.

The system assumes that the current active VFO is the primary frequency (that most communications are initiated on). The inactive VFO contains the secondary frequency. The primary frequency is normally that used by a base station and the secondary frequency is normally used by mobiles communicating with the base station.

It is possible to reverse primary and secondary frequencies using the <A> or <B> keys.

When an over is finished on the primary frequency the system automatically switches to the secondary frequency so that the reply can be heard. If nothing is heard on the secondary frequency after a brief period of time then the system returns to the primary frequency automatically.

(vi) Inter-character delay

If the AOR radio that is used with the PC does not tune correctly when used in a scan this indicates that the delay between control characters is incorrect. When characters are sent to the AOR radio too quickly there is not enough time for the radio to process the tuning command.

The intercharacter delay can be entered in milliseconds and should be chosen so that it is the minimum value for correct operation of the software.

9.7. Selecting the FILES range of options

(i) File conversions

A number of file conversion utilities are provided which allow data to be exported to an external data base (not included). Most data base programs allow data to be imported in ASCII format.

The memories, LOGBOOK and reject frequency list can be converted to text format then converted back, if required, once they have been modified externally. The location and names of the files that can be converted are given below:

Type of data	Normal Directory	Normal filename	Text filename
Memory channels	Memory	MEMORIES.ALL	MEMORIES.TXT
Reject list	Memory	REJECT.DAT	REJECT.TXT
LOGBOOK data	Logbook	LOGBOOK.DAT	LOGBOOK.TXT

A data base program can then be used to read the files that are produced. Each line of data in each file are terminated with the <CR><LF> character sequence, there are commas (',') between each data field.

Format of MEMORIES.TXT data

The file MEMORIES.TXT is in ASCII format. The fields of each memory channel are separated by commas and are:

Chan	Name	VFO A	VFO B	Mode A	Mode B	Att	Select	Tag
(4)	(50)	(11)	(11)	(3)	(3)	(1)	(1)	(1)

The numbers in brackets are the number of characters in each field. Each line ends in the <CR><LF> character sequence and is of fixed length.

Please note that only used channels are output.

Format of REJECT.TXT data

The reject frequency list file is also in ASCII format. The fields are separated with commas, as with the memory data, The fields are:

Chan	Freq
(3)	(11)

Once again the numbers in brackets represent the number of characters in each field. Each line ends with the <CR><LF> character sequence.

Format of the LOGBOOK.DAT file

LOGBOOK data is output in ASCII format with commas separating the fields (as above).

The fields are:

Date	Time Up	Time Dn	Station	Freq	Mode	Rpt	Comment
(8)	(5)	(5)	(40)	(11)	(3)	(6)	(50)

As usual, the numbers in brackets are the number of ASCII characters in each field. Each line of text ends in <CR><LF>.

(ii) Memory save

It is a good idea to record any changes to the memory contents on disk regularly in case of interruptions to the power supply, or other spurious disasters, disrupt the memories. Normally any changes in memory information are recorded automatically by the software but this facility may be used to save memory information manually as well.

(iii) Selecting an creating new memory files

You are not limited to a single memory file: you can have several. If you want to expand your memories over several files, first create a new (blank) memory file, then select it using the two sub-menu options which are provided.
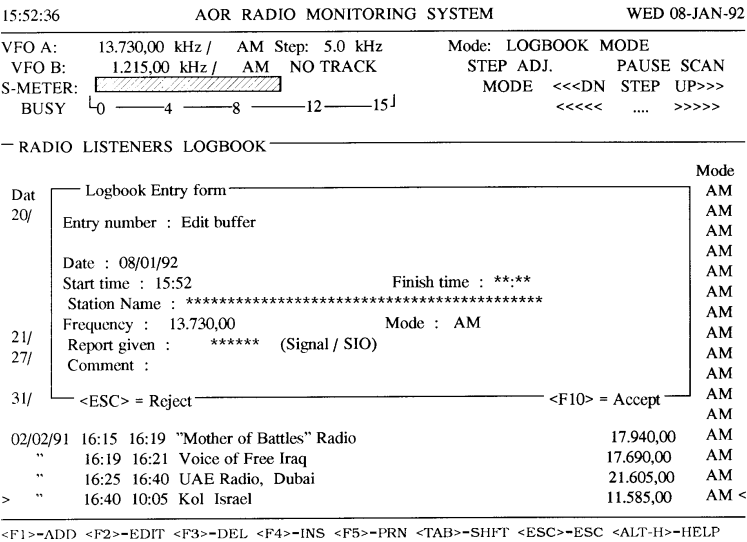
9.8. Exiting from the software

Select the EXIT menu option and type <Y> to exit from the software and return to DOS.

It is also possible to exit from the AORSC program and return to DOS by pressing <ESC> while in Manual Tune Mode. If the program is in another mode then keep pressing <ESC> until Manual Tune Mode is reached and then press <ESC> again.

10. THE LOGBOOK

AORSC allows entries to be made, for the stations that the receiver is tuned, in a disk based logbook. To select the logbook from Manual Tune Mode press <ALT-L>. An example logbook screen is shown below in figure 3.

```
15:52:36              AOR RADIO MONITORING SYSTEM              WED 08-JAN-92

VFO A:    13.730,00 kHz /    AM  Step:  5.0 kHz      Mode:  LOGBOOK  MODE
  VFO B:     1.215,00 kHz /    AM  NO TRACK          STEP ADJ.        PAUSE SCAN
S-METER: [//////////////////////////]               MODE   <<<DN STEP  UP>>>
   BUSY   └0 ———— 4 ———— 8 ———— 12 ———— 15┘               <<<<<    ....    >>>>>

 ┌ RADIO LISTENERS  LOGBOOK ──────────────────────────────────────────────
                                                                      Mode
  Dat  ┌ Logbook Entry form ────────────────────────────────────┐     AM
  20/  │                                                         │     AM
       │ Entry number : Edit buffer                              │     AM
       │                                                         │     AM
       │ Date : 08/01/92                                         │     AM
       │ Start time : 15:52               Finish time : **:**    │     AM
       │ Station Name : *************************************     │     AM
       │ Frequency : 13.730,00            Mode : AM              │     AM
  21/  │ Report given :     ******  (Signal / SIO)               │     AM
  27/  │ Comment :                                               │     AM
       │                                                         │     AM
  31/  └ <ESC> = Reject ──────────────────── <F10> = Accept ─────┘     AM
                                                                       AM
  02/02/91  16:15  16:19  "Mother of Battles" Radio        17.940,00   AM
        "     16:19  16:21  Voice of Free Iraq              17.690,00   AM
        "     16:25  16:40  UAE Radio, Dubai                21.605,00   AM
  >     "     16:40  10:05  Kol  Israel                     11.585,00   AM <

 <F1>=ADD <F2>=EDIT <F3>=DEL <F4>=INS <F5>=PRN <TAB>=SHFT <ESC>=ESC <ALT-H>=HELP
```

AORSC checks the amount of room on the drive or directory containing the logbook files whenever a new entry is added. If the amount of free disk space gets below 4 kBytes a message appears warning of this fact. You should exit from the program immediately by pressing <ESC> twice and start a new logbook disk. Do not attempt to change disks without exiting from AORSC first.

There are six basic logging functions available. These are selected using the function keys and certain other keys, and are described below. Figure 3 shows how a prompt summarising the main logbook operations is displayed on the bottom line of the screen.

The table below summarises the keys which can be used to control operation of the LOGBOOK:

LOGBOOK KEYSTROKES	
Keystroke	**Function**
<ALT-H>	**Obtain help on AORSC**
<UP>/<DN>	**Move marker up/down**
<PGUP>/<PGDN>	**Page up/down through entries**
<F1>	**Add an entry**
<F2>	**Edit an Entry**
<F3>	**Delete an Entry**
<F4>	**Insert an entry**
<F5>	**Print logbook**
<TAB>	**Shift logbook display**
<ESC>	**Exit from logbook**

10.1. Making a logbook entry <F1>

When details of a station are to be entered into the logbook press <F1>. A logbook entry form will appear on the screen (this is the central window shown in figure 3). An individual logbook item can be selected using the <TAB> and <SHIFT-TAB> keys and <ENTER>.

The date can be entered if the highlight bar is placed over the date field on the log entry form. Press <ENTER> and type in a date in the format indicated on the form. Press <ENTER> twice to enter today's date automatically.

The start and finish time of the logging can also be entered in a similar way.

The station name can be entered by moving the highlighting to the station name field on the logbook entry form and pressing <ENTER>.

The frequency and mode can both either be entered manually, or the current frequency and mode can be used by pressing <ENTER> twice when these fields are selected.

The signal report can be in either SIO format (for broadcast stations) or RST (for amateur stations).

A 50 character comment can also be entered if this is required. The comment is not normally displayed on the screen, but can be edited and printed.

When all items are correct press <F10>, it is possible to abort by pressing <ESC>.

10.2. Editing an entry <F2>

This allows changes to be made to logbook entries already entered. When <F2> is pressed the logbook entry form will be displayed. In figure 3 one logbook entry that is shown behind the entry form has two arrows (">" and "<") enclosing it. Scroll the logbook display so that the required logbook entry appears on this line using the <Up> and <Dn> arrow keys. This is the logbook entry which will be copied into the entry form. Any of the fields can be changed in the same way.

10.3. Deleting an entry <F3>

Scroll the logbook display so that the entry that is to be deleted is enclosed by the ">" and "<" symbols. Press <F3> and the logbook entry form will be used to display the full contents of the entry.

An entry can be deleted or left it intact by answering the prompt that is then displayed.

10.4. Inserting an entry <F4>

This works on the same principle as the other options. The logbook entry form is used to enter logging details as before.

Please note that a logbook entry can not be inserted into an empty logbook. The normal add facility (<F1> key) should be used for this.

10.5. Printing out a logbook <F5>

Press <F5> to output on the LOGBOOK file on the optional printer. If no printer was specified when configuring the program this option will not work.

**WARNING: MAKE SURE THAT A SUITABLE PRINTER IS
CONNECTED TO LPT1, AND THAT IT IS ON-LINE AND
READY TO PRINT BEFORE PROCEEDING.**

Make sure that a printer is selected using the installation procedure and connect it to the PC using the LPT1 (PRN) connector. If no printer is attached to LPT1, or it is not selected, an error message will appear. If this happens try to correct the problem and press the space bar to continue.

If an 80 column printer was selected the comment part of each log entry will not be printed as there is not enough room on one line of the paper. If a 132 column printer is being used then the comment will be printed, but will be truncated at the end of the line. It is possible to print 132 column data on an 80 column printer by selecting "compressed" text on the printer. If "compressed" text can be selected manually on the printer then it will be possible to print comments by first selecting 132 column width using the installation procedure, and switching the printer before starting the printout.

10.6. Shifting the display <TAB>

It is impossible to display all the information about a station on one line of the computer screen because there are not enough text columns. To overcome this a display shifting facility has been provided with AORSC.

Press the <TAB> key to shift the display to the left revealing the signal report and comment. The original display can be restored by pressing <TAB> again.

11. ABOUT DOS

This section of the manual contains some information on DOS, the Disk Operating System, that is used by the computer to run AORSC. This information may be useful if you are unfamiliar with DOS and will help with using the AORSC software if some of the terms used in this manual are not known. Users who are familiar with DOS, and how it works, may prefer to move onto the next section of the manual.

The computer has a number of disk drives and a number of other facilities for communicating with external equipment. The next two sub-sections of this manual describe how information is stored on disks and how communications can take place between the computer and the receiver using these facilities.

11.1. Files, Disks and Directories

Computer based information, of all kinds, is usually stored on disks if it is to be re-used after the computer is switched off. Data is always stored on disks in files. A disk file is like a paper file in that it can contain any sort of information (not just text) and can be of almost any size.

Paper files are normally kept in the drawers of a filing cabinet. Organisation like this is done so that more that one paper file can be kept together in one place, but the information in each file is always easy to reach.

The files on computer disks can be organised in a structured way similar to this. The data on very large disks are normally organised into directories. A directory is just like a drawer of a filing cabinet. It is possible to list, and use, the computer files that are stored in just one directory. This makes it much easier to use disks with lots of files on them.

When a disk is formatted (prepared for use) only one directory (called the root directory) is created. If files are copied onto a disk, like this, they will appear in the root directory of the disk. When a hard disk, which has a much larger capacity than floppy disks, is used it is more convenient to have a number of directories available so that sets of files can be kept together on the disk. For example, the operating system files can all be kept in a single directory so that the disk does not appear cluttered when files are listed on the screen.

All directories (except the root directory) can be referred to by name. For instance, all the AORSC software files could be kept on a hard disk in a directory called "AOR".

It is possible to place a directory inside another one, and to place more directories inside that. This process can be repeated so that a tree like structure is created on the disk.

The files in the AORSC software package can be organised so that they are located in the root directory of a disk, or in any other directory. The installation procedure of the software allows you to define what disk drives (and/or directories) will be used to store the files that are used by AORSC. In this case it is not necessary to enter file names since the software either automatically creates any files it needs or uses files that are provided on the distribution disk.

Directories can be changed by typing "CD name" at the DOS prompt. To change to the root directory type "CD \", the back-slash here means "root directory". You can change to a directory that is located inside another by typing "CD name1\name2". In this example the operating system will change to the directory called "name1" then (because of this back-slash) change again to the directory "name2", inside "name1".

Disk drives also have DOS names. Floppy disk drives are called "A", or "B", whereas a hard disk is usually called "C". The AORSC software needs the location of files to be specified using both the disk and directory names (the directory name is only required if the files are not in the root directory). For example, "A:\" means that a file is located in the root directory of the floppy disk in drive "A", and "C:\AOR" means a file will be located in the directory called "AOR" which is in the root directory of drive "C".

When entering directory names it is a good idea to use the full directory specification. For example, the bandplan file REGION1.DAT could be located in a directory called "BANDPLAN" inside the main AORSC directory. If this directory is called "AOR" and is located in the root directory of disk drive "C" (the hard disk) then the directory name for the location of REGION1.DAT should be entered as "C:\AOR\BANDPLAN".

11.2. Serial Ports

Many IBM PC compatible computers are supplied with serial and parallel ports.

A port is an input/output channel on the computer. Information can be transferred to, or from, the computer along many connections at once (parallel) or along a few connections sequentially (serial).

The serial port on an IBM PC compatible has a 25-way D-Type male connector (protruding pins). The signals that appear on this connector conform to the EIA RS-232C standard. There are normally up to two serial ports available on the IBM PC. These are called COM1 or COM2 (COM1 is also sometimes called AUX). AORSC uses COM1 or COM2 to send

control data to the receiver. If four ports are available on a PC and the extra two operate at ports 03E8 (COM3) and 02E8 (COM4) these may also be used with AORSC.

12. TROUBLE SHOOTING

12.1. Timing adjustments

<u>AR-3000</u>

The RS-232 port on some AR-3000 scanners seem to behave differently to others. The version of the internal software of the AR-3000 and the MAX232CWE interface IC seem to affect the performance of the RS-232 input to the AR-3000. Problems seem to occur if tuning commands are sent to the radio too quickly. When this happens the receiver cannot respond correctly and leading digits of the frequency may dropped. This only occurs if the delay between characters in each RS-232 command are too short for a particular receiver.

Another problem with inter-character delays that are too short is that there is insufficient time available for S-meter readings to be generated. This becomes apparent when the AR-3000 does not stop on active frequencies.

If you are experiencing problems of either kind then the delay between characters in each tuning command sent by AORSC can be adjusted. This prevents loss, or corruption, of characters when the delay is correct for an individual receiver.

To adjust the inter-character delay in tuning commands enter the "SPECIAL" menu item by pressing the <TAB> key until it is highlighted and press <ENTER>. Select the option for timing adjustments, and enter a new value for the inter-character delay.

Normally a 1 - 8ms delay will cure the problem, but try entering small delays in increments of 1ms until the tuning works. An adjustment of 1ms can make all the difference.

<u>AR-3000A</u>

The AR-3000A does not suffer from timing problems to the same degree as the AR-3000. Some adjustment of the inter-character delay may be necessary if data appears to be lost when uploading memories. Normally a 2 - 6 ms delay is suitable with AT speed machines.

12.2. Conflicting programs (eg mouse drivers)

Sometimes other programs conflict with AORSC. This is especially true of certain mouse driver software. If you are getting strange behaviour from the program, particularly with operation of the RS-232 ports, please try the following:

First

*Vary the inter-character delay according to the instructions above

Second (if you still have a problem)

* Look to see if any terminate-but-stay-resident programs may be conflicting with AORSC. This particularly applies to communications which use the serial ports. Try removing any suspect TSRs from your AUTOEXEC.BAT file one by one until the problem disappears.

* Check that your mouse is properly configured for operation on a DIFFERENT serial port to that used with your radio.

* Make sure your mouse is in Microsoft compatible mode. A mouse configured as a PC Mouse Systems mouse will not work and MUST be de-installed.

* A DOS bases MOUSE DRIVER MUST BE USED... if the mouse works okay in WINDOWS then check that a mouse driver is actually loaded in the DOS environment.

Try removing your mouse driver altogether (either in CONFIG.SYS or AUTOEXEC.BAT)

12.3. Reducing RFI

When a sensitive radio is used in close proximity to a computer a certain amount of interference from the computer may result. Most interference of this type is caused by the display monitor. Often it is not the VDU itself that is the source, but radiation of video signals from the cable connecting the monitor to the system unit.

A large reduction in the level of interference can be obtained by blanking the VDU screen. A routine to do this has been included with AORSC and can be used by pressing the space bar, <SPACE>.

When the space bar is pressed the screen is temporarily blanked and the program put into a dormant state. Normal operation of the program can be resumed by pressing any key on the keyboard.

Using the clear screen function is much more effective at suppressing interference from the computer than switching off the VDU.

13. FINAL

The author would like to thank AOR (UK) LTD. for their help and support during the development of this software.

AORSC is intended to provide you with all the facilities you will need to monitor signals in radio spectrum. For further information on what can be heard, you should refer to one of the many listening guides which are available.

This program will continue to be enhanced and upgraded in due course so keep an eye open for new developments.

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Rev: 3.0