

# RadioMax

BY

Data Delivery Devices LLC

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Data Delivery Devices LLC.

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## **Section 1.**

### **INTRODUCTION.**

RadioMax allows an IBM compatible computer to control various brands of radios and communication receivers. RadioMax has numerous features allowing the user to operate receivers (and a tape recorder, if available) to their fullest potential.

A quick summary of the features:

A scanning speed in excess of 1000 channels per minute, depending on the radio and interface.

Powerful scan delays, monitor time limit adjustments and scan speeds allow intelligent scanning. The user can set the maximum listen time per hit (from zero seconds to infinity), and the time to wait after loss of signal (again zero to infinite delay). The combination of these delays gives unbeatable control. These delays may be manually overridden any time by just hitting the up/down or pause buttons.

A tape recorder with remote control capability may be controlled by RadioMax, programmable by channel. The control algorithms are intelligent, i.e. a loss of signal for more than a second or so will stop the tape until the signal resumes, effectively removing dead tape time.

A mouse driven built in editor may be invoked any time to edit parameters for individual channels simply by clicking in the graph window, there is no need to invoke a separate editor. Global edit facilities allow the user to easily change parameters for all channels.

The P.C. can say the frequency and time of hits. Any combination of these may be programmed by the user for each channel. This feature is very useful when a tape recorder is also being controlled. The P.C. directly generates the speech. A radio specific speech board is not required. Features may be turned on or off without affecting the scan files.

The P.C. may directly record the radios audio by using the Soundcard in the PC - no external tape recorder is required!. RadioMax can play back recorded audio while scanning for new action; and with the newer soundcards (duplex capable) RadioMax can even play audio previously recorded while it records present audio activity.

High resolution graphics constantly display scan activity. The graph contains information such as scanning position, locked out channels, number of hits, current squelch status etc. The height of the graph may be fixed by the user or it may be automatically scaled by the P.C. A running display of frequency, mode, signal, tape recorder and speech status, comments etc. allows the user to easily monitor conditions. (For example, the radio and tape recorder may be in

another room). Large, easy to hit buttons allow the user to pause, single step, skip or reverse direction during scanning. Time and date stamp information may be automatically generated for hits. An 'Autolock' mode may automatically lock out channels after they are first hit, to enable intense searches.

RadioMax is fully multi-tasking. It generates ASCII frequency files which may be edited by most word processor programs, or by the built in editor. It supports up to 5000 channels per file and Multi File Scanning for large file arrays. RadioMax can convert files generated from the PerCon "Spectrum" database to ".FSS" type ASCII files.

These plus other features enable the system to offer unsurpassed monitoring capabilities. For example.....

A range of frequencies may be set up to be scanned. The tape is enabled for all hits, and speech for time and frequency is selected. RadioMax delays are set to prevent 'hangs' on constant carriers or lengthy hits. Scanning is started, and the system is left to run for a while.

When the user returns (possibly many days later) the scanning is stopped and the log saved to disk. The audio tape may be played back, there will be no long "gaps" due to intelligent tape control, the length of monitoring for each hit will be limited to prevent filling the tape with any constant carriers, and the frequency and time will be played back along with the hits. It becomes a simple task to locate and characterize infrequent hits. All of this data along with a record of the number of hits for each channel will also be recorded in the scan file, which may be saved in its entirety or just selected channels, for example just channels with hits, or channels not locked out, etc.

## **Section 2.**

### **HARDWARE REQUIREMENTS**

#### **COMPUTER:**

The RadioMax software requires a minimum P.C. configuration of at least a 386 class, four megabyte machine. RadioMax requires Microsoft Windows version 3.1, 95 or 98 to run. The P.C. must have available one serial (COM) port that is "16550" compatible, required for the high speed serial data transfer to the radio interface. Depending on the radio, RadioMax may require a custom interface which is installed between the P.C.'s serial port and the radio. To support the speech features of RadioMax the P.C. must have a "Sound Blaster" compatible sound card installed. If a Soundcard is installed RadioMax may record audio directly to the PC's hard drive.

The more processor power and memory available in the P.C. will allow the user to run more programs at the same time as RadioMax, which is of course fully multi-tasking under the Windows operating system. As an example, RadioMax running at the fastest scan speed on a 100 MHz Pentium machine uses about 10-20% of the machines resources; i.e. four RadioMax programs could run at full speed at the same time and the P.C. still has resources left to run other programs. Of course actual results will depend on individual installations, machine type, memory etc.

#### **INTERFACE:**

An interface may be required to connect certain radios to the PC. The interface may be supplied by Data Delivery Devices LLC or a third party vendor such as the OPTOELECTRONICS model CX12 OPTOLINX unit. Some Icom radios (such as the R71) require the Icom UX-14 option installed to supply a CI-V port (most R71's have it installed at the factory). Some radios have factory installed interfaces, or interfaces (such as the OptoElectronics OS456 / 535 units) which may be installed in certain RadioShack radios by the user. If you are unsure of your radios interface requirements contact Future Scanning for assistance.

## ***RADIO:***

RadioMax will control certain radios manufactured by AOR, Drake, Kenwood, Icom, Lowe, RadioShack (with OptoElectronics boards installed) and Uniden. For maximum performance the radio should be configured to operate at 9600 baud, (see appendices). Icom's optional speech board is not needed, all speech is directly generated by the P.C.

## ***TAPE RECORDER:***

A user supplied tape recorder may be controlled by the RadioMax providing that a suitable interface is available. Any recorder with a standard 'remote' control input will work. A stereo unit has the advantage of letting the user record the P.C.'s speech on one channel and the radios audio on the other, rather than mixing them as with a mono unit. The interface may be the FSS CI-V / tape recorder interface or certain versions of the OptoElectronics interface will also operate a tape recorder.

The PC itself may also be used as the tape recorder (and tape player) if a sound card is installed.

### **Section 3.**

## **HARDWARE INSTALLATION.**

### **WARNING!!!**

**NEVER PLUG OR UNPLUG ANY PERIPHERAL TO THE P.C. WHILE POWER IS APPLIED EITHER TO THE DEVICE OR TO THE P.C. THIS APPLIES TO ANY BRAND OF PERIPHERAL. THE P.C. CAN BE EASILY DAMAGED BY CONNECTION OR DISCONNECTION WITH POWER APPLIED.**

First of all, power down the P.C. and the radio.

Future Scanning Interface Installation:

Locate the COM port to used with RadioMax. The COM port may be a 9 or 25 pin "D" type connector with male pins on the back of the P.C. Install the extension cable supplied with the interface into the COM port. The RadioMax interface plugs onto the other end of this extension cable. Two thin cables with 3.5 mm male plugs come from the interface, one is marked with a sleeve, this plug is inserted in the socket on the back of the radio marked "REMOTE".

The other plug is inserted into the socket on the back of the radio marked "RECORDER REMOTE". (Note, insertion of these plugs into the wrong sockets on the radio will not damage the radio, computer or interface). One more cable comes from the interface, which is terminated with a very small (2.5 mm) jack plug. This is for computer control of a tape recorder, and may be left disconnected if a tape recorder is not used. If a tape recorder is to be used, first read and understand the following cautions before attempting to use a tape recorder.

Precautions for control of a tape recorder.

The RadioMax interface controls a relay (internal to the interface) the contacts of which are brought out to the smallest jack plug. These contacts are completely electrically isolated from the computer and radio. However the relay contacts are rated for LOGIC LEVEL VOLTAGES AND CURRENTS ONLY, and are intended to connect to the remote control input on tape recorders which support remote control. This relay has the same capacity as the recorder / remote relay in Icom radios.

## **WARNING!**

**CONNECTING EITHER OF THESE RELAYS DIRECTLY TO A DC POWER SUPPLY OR 117 VOLTS AC MAY DESTROY THE RELAY CONTACTS, THE INTERFACE, P.C. COMPUTER, TAPE RECORDER AND / OR THE ICOM RADIO, AS WELL AS GENERATING A POSSIBLY LETHAL SHOCK HAZARD.**

Assuming a tape recorder with a standard remote control input is available connect the cable from the RadioMax interface with the smallest male plug into the tape recorder remote control socket, (it is often located next to the microphone input).

Most ICOM radios support communication rates of 300, 1200 and 9600 baud, with some running up to 19,200 baud. RadioMax will operate at any of these speeds, the speed being selected from the configuration setting in the program. However to operate the RadioMax system at full speed the radio must be configured for its fastest communication speed. If two radios are to be operated at the same time with the RadioMax system the radios baud rates must be set to the same rate. See the appendices for details on how to change the baud rate. (It is usually set at 1200 baud at the factory).

The ICOM radios also have internal jumpers to set the radio 'address', used when multiple radios communicate on the same bus. RadioMax may communicate with radios at any legal Icom address, see the appendices for the default Icom radio addresses.

### Radio Settings.

Some of the switches on the Icom radio must be set to certain positions for the system to operate correctly, they are listed below.

1. If a radio has a VSC switch it needs to be turned off, i.e. the switch needs to be out.
2. On the R7000 the 1 GHz switch needs to be pressed in if the frequency range to be covered with the R7000 will be between 1.025 GHz and 1.9999999 GHz. If the frequency range to be monitored is between 25.0000 MHz and 999.9999 MHz the switch needs to be out.
3. If you have an internal speech board fitted in the radio it is suggested that you turn it off by using the switch on the back of the radio.

The hardware installation is now complete, the radio and P.C. may be turned on, the sequence does not matter.

When not in the use the interface may be left connected to either the radio, P.C. or both. Either one (or both) may be powered on and used without any damage occurring.

## **Section 4.**

### **SOFTWARE INSTALLATION.**

The RadioMax software is supplied on one 3.5 inch diskette. Insert the disk in the PC's drive and from the file manager (or start menu) run A:\SETUP.EXE (or B:\SETUP.EXE if using the B: drive). If you do not know how to do this consult the documentation supplied with the P.C. The setup program will prompt you for the directory to install RadioMax on, if the directory does not exist the install program will create one. Note that RadioMax will NOT change any of the Windows system files nor will RadioMax install files in directories other than the one chosen. If in the future RadioMax needs to be removed an "Uninstall" program in the directory chosen will remove all installed RadioMax files; or you may simply delete the whole directory.

Several files are supplied, details of the files are in the appendixes, but here is a brief summary.

Radio.EXE is the executable scan program.

Radio.INI is the default configuration file for RadioMax. This text file contains information required for the computer to communicate with the radio correctly, scanning and display settings etc., and will be changed if the radio or configuration settings are changed then the configuration file saved. Several configuration files may be saved, and configuration settings may be loaded from the saved configuration files. When the program starts it will always load the default configuration from the file Radio.INI.

README.TXT is a text file containing any last minute changes or notes which are not in the manual.

Several files with the extension ".FSS" are supplied, these are scan frequency files generated by RadioMax. The name of the scan frequency to be loaded when the program starts is stored in the configuration file.

**RadioMax** C:\RADMAX2\FREQS\AIRCRAFT.FSS

File Edit Sort Scan Settings Display Manual Config. About

Multi File  off Hist File  off Auto  lock off Autolog Last  off  Freq off  Time off

Thu Oct 02 15:26:10	122.72500	AM US AIR AIRCRAFT	UNICOM	Thu Oct 02 15:26:10
Thu Oct 02 15:23:51	343.70000	AM Refueling AR-318 West, Exit		Thu Oct 02 15:23:51
Thu Oct 02 15:23:08	343.70000	AM Refueling AR-318 East, Entry		Thu Oct 02 15:23:08
Thu Oct 02 15:21:31	158.22000	FM MARTIN OIL COMPANY		Thu Oct 02 15:21:31
Thu Oct 02 15:21:30	158.19000	FM VERDIGRIS VALLEY ELECTRIC COOP		Thu Oct 02 15:21:30
Thu Oct 02 15:21:29	157.59000	FM AMERICAN TAXI AMERICAN SHUTTLE		Thu Oct 02 15:21:29

VA AIR UNK UNK Thu Oct 02 15:27:16

122.82500 AM  PAUSE  lock Listening 8 Timers 3

## ***Section 5***

### **GETTING STARTED, BASIC OPERATION.**

RadioMax is a very powerful scanning system, with a lot of flexibility, and as such it may be a little intimidating the first few times it is used. This section briefly describes basic operation, each command and operation is explained in detail further on in the manual.

The software may be started either by double clicking on the RadioMax icon or from the "START, RUN" Windows selection, then typing "RadioMax". After a second or so the main RadioMax screen will appear and RadioMax will attempt to read in a default configuration file (default name 'Radio.INI'). If it exists the configuration file will contain information such as baud rate, radio address, the name of a scan file to load on start up etc.

#### ***FIRST TIME CONFIGURATION.***

Since the settings in the configuration file probably do not match the connected receiver RadioMax may complain and will need to be configured correctly the first time it is run. Go to the config. menu, and select the correct "radio type". Remember to enter the correct radio "address" if you have changed the radio address from the default one. Note that the addresses are shown by RadioMax in decimal notation - some radio manufacturers may show the addresses in 'hexadecimal' format. For example, OptoElectronics gives the default ID for the OS535 board as 80 hex, which is 128 decimal. Once this has been set choose the "serial port" selection in the config. menu and make the appropriate selections. Note that unusual serial port addresses may be manually entered. Be sure to select the correct squelch detection method. Some radios, such as the OptoElectronics OS456 / 535 boards may be operated with "software" or "hardware" type squelch detection; the "hardware" method allows much faster scanning and is more reliable at signal detection. Ensure that the appropriate hardware signal from the interface is selected. If the signal polarity is incorrect it may be reversed by checking the "invert" box.

Some radios that do not support "hardware" squelch detection such as the Icom R-10 may be operated in the slower software "analog" or "digital" squelch detection mode. This mode is slower than 'hardware' detection since there is an additional overhead of command to the radio to request the signal level and time required for the radio to respond to the request. In this case the "digital" mode is faster and more reliable, although the "analog" method gives true signal strength readings on the VU meter.

The "interface type" selection mainly affects how the tape recorder relay operates, and will not normally affect operation unless a tape recorder is also used.

Once configuration has been completed communication is established with the radio, and a screen similar to the previous diagram should appear. A brief overview of the display and operation follows, with comprehensive descriptions of all features and program operation further on in the manual.

### ***BASIC DISPLAY AND CONTROLS.***

In the center of the display is a graph showing a number of vertical bars, each bar corresponds to a channel; they will vary in width depending on how many channels are currently loaded. The height of the bars indicates how many “hits” have been logged per channel. The left vertical axis indicates the scale which may be changed by the user or automatically by RadioMax. The numbers on the scale will disappear when the program is sized for a very small vertical height. To the right of the graph is a VU meter, indicating the current signal strength from the radio. The signal strength bar is colored green, until it is above the “trigger level” (the black box just to the left of the colored bar) at which point it turns red. The user may change the “trigger level” by clicking on it. Once the signal is above the “trigger level” it is determined to be strong enough to cause a ‘hit’, and RadioMax may pause scanning depending on user set timers. Note that depending on the brand and type of radio, interface, and serial settings the signal level may be a “true” analog signal level as reported by the radio or it may be an analog “level” corresponding to an “on” or “off” type squelch signal reported by the radio.

Above the graph is the history window, showing recent hit information such as frequency, mode, time, and comments etc. The hits may be scrolled up and down by using the scrollbar on the right hand side. Channels that have never been hit before are shown in red text.

At the very bottom of the screen is a status and control bar, which allows the user to view and change parameters as the program runs. A display in the left of the control bar displays the frequency and mode of the current channel. Next to this is a left arrow, then a large ‘Pause’ button, and a right arrow, these three controls are used for changing scanning mode, channels and directions. Next to the right arrow is a lockout button, allowing the user to change the lockout state for channels. Beside the lockout button is a status display which constantly indicates to the user the current state of operation. Beside the status display are two small timer indicators with a Timer button between them, these are used for indicating and changing scanning timer parameters. Finally on the right are two more buttons, one to save and one to open frequency files from disk.

Above the bottom control bar is a status line which displays any comments the user may have entered for individual channels. These comments may also have embedded hit date and times in them.

Just above the history window is another control bar, with a row of status displays and control buttons. By clicking on the buttons various commands may be selected, and the current state of each control may be seen in the status display

immediately to the right of each push button. Some of the push buttons allow selection of more than one control state, as will be seen later.

Starting at the left of the control bar is the “Multi File” button, which turns on or off the Multiple File Scanning feature. Next is the “History File” button, which controls automatic storing of extended history to disk. The “AutoLock” button follows, which turns on or off the automatic lockout feature. Next is the “AutoLog” button, which allows the user to select the control state of the automatic date and time logging. Next is the Tape control button, used for computer control of a tape recorder if one is connected to the interface and its corresponding status display. The next two buttons and status displays are similar, one for speech control of hit frequencies and the next for speech control of hit times.

Above the top control bar are the various menu selections for the program, these will be explained in detail later. At the top of the screen the filename of the current scan frequency file is displayed.

There are two basic modes of operation for RadioMax, “paused” and “scanning”. The current operation state is always displayed in the status indicator on the bottom control bar. All of the controls are fully functional whether paused or scanning, however some controls have slightly different effects depending on the current program state, such as the direction arrows. Most of the controls have high speed (i.e. they do not require simultaneous pressing of the ALT key) keyboard shortcuts, which are explained in the “Detailed Commands” section.

First an overview of operation in the “Paused” state.

When the program is paused it waits for the users input, with the radio set to the current channel indicated by a black line underneath the graph axis, just below the channel bars. To move to the next channel up click on the right arrow button, similarly clicking the left arrow goes down one channel. The frequency of the radio will be changed to the next channel up or down, and the radio mode will also be changed to that stored for this channel. It is easy to quickly go up and down through channels this way. If the desired channel is not close by, the user may simply click with the left mouse button anywhere in the graph, and the channel will be changed to the closest one to the mouse position. Large frequency files can quickly be “navigated” using this method. Switching to a different channel is instantly shown by the channel position indicator moving.

Any channels which are “locked out” are indicated by a red bar under the channel, just below the graph axis. When in the “paused” mode the radio may be set to any channel including locked ones, since although displayed all the time the lockouts are only effective during scanning. The lockouts may be set or cleared several ways, including automatically by RadioMax if the user desires. However to quickly change the lockout state of the current channel when “paused” is simply click on the “lockout” button, just to the right of the right arrow button. If the current channel was locked out it will be changed to unlocked and vice versa. The lockout indicator for this channel will be updated to reflect the change.

As well as having information about frequency, mode (AM, FM etc.) and lockout, each channel has several more parameters the user may change. To review and if required change these parameters clicking anywhere in the graph with the right mouse button will bring up an instant edit window for the current channel. Note that the channel to be edited will be the currently selected one, so the right click may be anywhere in the graph. All features of the channel edit window are explained in the “Detailed Commands” section.

Now for an overview of operation in the “Scanning” state.

After clicking on the “Pause” button RadioMax will change from paused to the scanning state. It will begin scanning from the current channel, changing the radios frequency and mode corresponding to the channels in memory, each of which holds information concerning the channel such as mode (AM, FM etc.), the number of hits that have occurred on this channel, whether to turn on the tape recorder during a hit, the users comment, information concerning lockouts, speech, etc. The channel indicator will move along the bottom of the graph and information on the screen will be updated to reflect the changing channels. Any channels locked out will be skipped over.

When RadioMax reaches either end scanning will continue from the other end. RadioMax constantly monitor’s the squelch signal from the radio and if any activity is detected it will store the hit information. Then, depending on user set options, it may turn on the tape recorder, speak the frequency and time, and listen for user set delay periods before resuming scanning.

During scanning all of the buttons (and keyboard shortcuts) are active and function the same as when paused, with the following exceptions. When scanning the direction arrow buttons will change scan direction rather than advancing to the next channel as when paused. By clicking anywhere in the graph scanning will jump and continue from the clicked location; making it easy to concentrate around one area if desired.

## **.Section 6**

### ***DETAILED GUIDE TO PROGRAM OPERATION - MENUS***

This section is divided into two sections, the first describes menu selections and the second explains detailed operation of the control buttons. Most users of the RadioMax system are probably already familiar with operation of the P.C., and will have little problem operating the menus, buttons etc., since most of these are self explanatory. However some users will be new to the P.C., so every operation is explained below. Along with the operations are general hints, tips and suggestions for getting the maximum benefit from the system.

#### **FILE MENUS:**

The file menu contains several selections to allow the user to load, save and combine scan frequency and history files.

General File Information:

When loading and saving files any drives or folders available will be shown, clicking on them will bring up the respective directories. Only directories and files with the correct extension for the particular file operation will be shown, although the user may use any extensions by typing them into the file box. All RadioMax frequency files end with the extension “.FSS”, history files end in “.HST” and configuration files end in “.INI”. During file operations RadioMax always adds the extensions to the end of the file for you, there is no need for you to type them in. All scan files are of an ASCII format, meaning that they may be read (and manually changed if required) by most text editors and database type programs. All of the file formats are shown in the appendices.


#### ***NEW (File Menu)***

When selected a window will appear allowing the user to build a new scan frequency database (or add to the current one). The user is prompted to enter starting and ending frequencies and a frequency step size. The values to be entered in the upper and lower requesters may be any legal values for the version of RadioMax that you are running. The upper frequency may be greater than the lower frequency, RadioMax will sort it them out. The smallest step size is 0.00001 MHz (10 Hz), and this resolution is stored in files even if the connected radio is not capable of resolving that accuracy since the files may be used with other radios. The mode for the new channels is selected using the mode buttons, and other options for the tape recorder, lockout and speech controls can also be selected.

If the user wants to add the new channels to channels currently in memory, make sure that the box “add to channels already in memory” is checked. The original channels will not be modified, but the new ones will be added at the end of

the original ones. Once this has been completed a new scan frequency file may be generated by clicking the OK button. If this operation results in more than 5000 channels total, the user will be warned and the channels above 5000 will not be created.

### **Open (File Menu)**

(Mouse Shortcut  on right of lower control bar)

When selected causes the file selector window to pop up, from this the next file to be loaded may be selected. Once a file has been chosen and the OK button clicked, the current scan information in memory will be erased and the selected file loaded in its place. (Note, see Open / Append if you want to add to information already in memory.)

### **Open a file, append to current channels (File Menu)**

When selected causes the file selector window to pop up, from this the next file to be loaded may be selected. Once a file has been chosen and the OK button clicked, the selected file will be loaded into memory at the end of the current frequency information in memory. This way two or more scan files may be easily combined then edited. RadioMax will only load up to a maximum of 5000 channels at a time, if the combined size exceeds this the extra channels will not be loaded.

### **Convert a UDBF File (File Menu)**

RadioMax usually loads and saves RadioMax type frequency files. However it may also convert a Universal Frequency Database Format (UDBF) type file to a RadioMax (\*.FSS) type file. The UDBF files are dBase III compatible files of a format defined by PerCon Corporation, the supplier of the "Spectrum" FCC database. These files are designed to be a universal format that may be exchanged between programs from different vendors; the files remain the same between different programs. RadioMax does not use the UDBF files as its native format, since UDBF files contains some information that RadioMax does not use, and the UDBF format does not hold information RadioMax needs, such as hit count, speech and tape settings etc.

By selecting this import option RadioMax will read in a UDBF file and convert it to the RadioMax format. This way the user may generate UDBF files from the PerCon database, then directly import these into RadioMax. Once imported the files may be changed as required, then saved as a native RadioMax frequency type file, with all the extra information that RadioMax supports. When this option is selected RadioMax will display a window allowing the user some options during the import.

UDBF files generated directly from the PerCon database often do not have the mode (AM, FM etc.) set. RadioMax allows the user to select the default mode for channels which do not have the mode set in the UDBF file. The UDBF files

have a field (called “Notes”) for the users comment which is often blank, so if the user chooses RadioMax may insert the UDBF fields “DBA\_NAME” and “XMIT\_CITY” into the comment. These may be changed by the user once the file has been imported.

The UDBF files can be huge. As an example the Spectrum database contains about 300,000 records between 25 and 1000 MHz for the state of California. However each frequency often has numerous license holders for the same frequency. RadioMax can eliminate duplicate frequencies as they are converted if the “Skip Duplicate Frequencies” checkbox is checked. For the State of California this reduces the number of records to about 8000. (Note that RadioMax also has the ability to “lock out” duplicates even if they are loaded into the scan file).

For large files RadioMax will save the records as multiple files of the same name with the last 3 letters of the filename automatically numbered for you. RadioMax will show a warning if this is to happen.

### ***Multi File Scanning (File Menu)***

RadioMax may be set up scan multiple disk files automatically. Once this menu item is selected a window will appear where the user may select files from the directory for Multi File Scanning. On the right a list displays the files selected. Click on any of the selected files to remove them from the Multi File Scanning list. (note that this does not delete the files, it just removes them from the scanning list). The scanning list is saved (and loaded during startup) in the program configuration file, Radio.INI. After viewing (and changing, if required) the Multi File Scanning list close the window. Clicking on the “Multi File” button in the control bar actually turns Multi File Scanning on and off. Mulit File Scanning has the same effect as “banks” in a traditional scanner

### ***Save (File Menu)***

(Mouse Shortcut  on right of lower control bar)

This causes the current scan frequency file in memory to be saved as the filename which appears in the screen title. The shortcut button which does the same thing is the menu selection “Save”, and it is located in the bottom right hand corner of the screen. If the user wishes to save the frequency file under a different name see “Save All channels as” below. If the user tries to exit the RadioMax program without saving a changed frequency file a prompt will appear to allow the current file to be saved before exiting.

### ***Save All channels as (File Menu)***

When selected this causes the file selector window to pop up and from here the file to be saved may be selected. If you want to save the file with a new name

enter it in the file box. Once a file has been chosen and the OK button clicked, the selected file will be saved. Every channel will be stored in the scan file with all associated information. If the file already exists the user will be prompted to confirm before the existing file on disk is overwritten.

### ***Save channels with Hits as (File Menu)***

When selected causes the file selector window to pop up, from this the file to be saved may be selected. If you want to save the file with a new name enter it in the file box. Once a file has been chosen and the OK button clicked, the selected file will be saved. Only channels that have one or more hits will be stored in the scan file. This is useful after scanning if there are a lot of unproductive channels without activity, as only channels of interest will be saved. If the file already exists the user will be prompted to confirm before the existing file on disk is overwritten.

### ***Save Unlocked channels as (File Menu)***

When selected causes the file selector window to pop up, from this the file to be saved may be selected. If you want to save the file with a new name enter it in the file box. Once a file has been chosen and the OK button clicked, the selected file will be saved. Only channels that are not locked out will stored in the scan file. This is a very useful method to just save channels of interest, since channels may be locked or unlocked from within RadioMax by several parameters, such as hits, words in comments, hit times etc. If the file already exists the user will be prompted to confirm before the existing file on disk is overwritten.

### ***Export a UDBF File (File Menu)***

RadioMax may save the current information in a Universal Frequency Database Format (UDBF) type file. For more information on the UDBF format see “Import a UDBF file” above and the appendices. The user will be prompted for a name to save the file as. Note that the UDBF file format does not hold all the information that RadioMax uses and can generate, so exporting files as UDBF will mainly be used to output data to other programs.

### ***History File (File Menu)***

(Mouse Shortcut  Button on right of upper control bar)

RadioMax accumulates information in the RadioMax frequency file (“.FSS”) as it runs, storing data such as hits, and it may also store hit times (for more information about storing hit times see the “AutoLog” button). The RadioMax frequency file and its information may then be saved to disk. However RadioMax may also be set up to store information for every single hit, including logging every

time of multiple hits on the same channels in a history file. The history files have the same format as frequency (".FSS") files but have the extension of ".HST". Since they have exactly the same format as frequency files they may be loaded back into RadioMax later just as a normal frequency file; but of course only channels with hits will exist in the history file. The files will consist of channel information stored in the order of hits, which may be sorted later by RadioMax if required. Since normal running may generate hundreds of thousands of hits these files may be very large, and the history file operation is mainly intended to be used for very specialized applications.

When "History File" is selected one of two things happen. If RadioMax is not currently logging onto a history file a selector window will pop up and the file name of the history file to be used may be selected. If you want the history file to have a new name enter it in the file box. If you use an existing filename it will be overwritten with the new history log. Once a filename has been chosen and the OK button clicked, the history logging will begin. If RadioMax is already logging hits to a history file when "History File" is selected the history file will be closed and history logging will be turned off. If the user exits the RadioMax program it will automatically save the current history file if history logging was on before exiting the program. The current state of history logging is always shown next to the "Hist File" button, which has the same effect as selecting "History File" from the File Menu.

### ***Exit (File Menu).***

When this is selected the RadioMax program will end. If the RadioMax file in memory has changed since it was last saved the user will be prompted to save it before exiting.

## ***EDIT MENUS:***

### ***Edit Channel (Edit Menu)***


*(Mouse Shortcut, Click anywhere in the graph using the right mouse button)*

Selecting the "Edit Chan" menu causes a window to appear with all of the information for the current channels characteristics. This includes the mode, frequency, comment, hit count, tape and speech control attributes. Any of these parameters may be changed by clicking or typing at the relevant place. There are also UP /DOWN, DELETE and NEW buttons as well as OK and CANCEL. The current channel parameters correspond to the one with a bar underneath on the graph, just below the graph X axis. If this is not the correct channel the next channel up or down may be viewed by clicking on the UP or DOWN buttons in the

channel edit window, note that all channels will be shown including “locked out” ones. All of the parameters in the window will change to reflect the next channels settings, however the bar below the graph will not move until the channel edit window is closed.

The DELETE button will remove the current channel from memory and then the channel edit window will change to reflect the next channels parameters. Clicking on the NEW button will cause a new channel to be created, it will be created as the last channel in memory and the user may select all the parameters for it from the channel edit window. When completed click on OK to exit, or CANCEL to abort the latest changes. Note that if channel parameters are changed then they will be stored as soon as the user clicks the UP or DOWN button’s; there’s no need to keep exiting and re-entering the channel editor if channels to be modified are close to each other, just move up or down to the next one to edit. To quickly move up or down while in the channel editor click on the UP or DOWN button (or use the cursor keys to highlight the UP or DOWN button), then holding the “Enter” key on the keyboard will cause RadioMax to quickly run through the channels.

### **Lock / Unlock Channel (Edit Menu)**

(Mouse Shortcut, the  Button on the lower control bar)  
(Keyboard Shortcut, the “L” key’)

By selecting this the lockout state of the current channel will be toggled, i.e. if it was locked it will become unlocked and vice-versa. The “Lock ./ Unlock Channel” menu selection has the same effect as clicking on the “Lockout” button in the lower control bar of the main screen. If the channel is locked a red bar is shown below the channel indicator on the graph.

### **Priority Channel (Edit Menu)**

RadioMax has the capability to automatically check one channel more frequently than the other channels during scans, this channel is called the “priority” channel. Any active channel may be used as the priority channel, including one that is locked out. By selecting “Priority Channel” from the menu a small window will appear with a box where the user may enter a number corresponding to how often the priority channel should be checked. This number may be from every 5 channels up to 999, or it will display “OFF” if the priority feature is not being used. Simply enter how often to check the priority then click OK, or the “OFF” button to turn priority checking off. When scanning resumes the channel indicator will jump to the priority channel as often as was entered. The priority channel data is not saved in the scan frequency file.

### **Delete Channel (Edit Menu)**

*(Keyboard Shortcut, the “Delete” key)*

By selecting this the selected channel is deleted from the channels currently in memory. This may also be done from the Chan Edit window.

### **Global Edit (Edit Menu)**

General ‘Global Edit Dialog’ Information.

Selecting this menu will bring up a global edit dialog box that may be used to affect EVERY channel in the scan file currently in memory. This is useful for quickly changing parameters for every channel. Individual channel parameters should be changed by using the ‘Edit Channel’ menu selection or by right clicking the mouse inside the graph. By combining these tools a file may be quickly customized, for example, a basic scan file may be created using the File New command, then all the other parameters for the scan file may be changed using the Global Edit menus. Any individual changes may then be made to each channel if required. The resulting file may be saved any time, with another file name if needed.

The tape and speech enable/disable menu selections should not be confused with the tape and speech buttons above the graph. The dialog selections will change the parameters in the scan file (changing them permanently if the file is then saved). The tape and speech buttons turn on or off the speech and tape functions temporarily, without affecting the scan file. This is very useful if you want to retain the speech / tape settings of the file, but do (or do not) wish to have speech or the tape active at any time. These buttons must be set to “Auto” if the functions are to operate according to the settings in the scan file, since when “Off” or “ON” the button controls take precedence over the characteristics of the scan file.

### **Erase Comments (Global Edit Dialog)**

This will do just that, erasing all channel comments in memory. Each channel may have a comment of up to 80 characters in length, which can contain any normal characters. RadioMax uses a special method to log the dates and times of hits when the “AutoLog” button is set to “First” or “Last”. Since most users comments are much shorter than 80 characters, RadioMax will automatically insert the date and time into the last 19 characters of a comment during “AutoLogging”. These embedded dates and times are then used during sorting and locking features. For further details on “AutoLogging” refer to the “AutoLog” button section. Since any stored dates and times are embedded in the comments erasing the comments will also erase the associated dates and times. The user will be warned before the “Erase Comments” action is completed.

### **Clear Autolog Space (Global Edit Dialog)**

This will erase the last 19 columns (columns 61 to 80) in every comment line. This allows space for the area in each comment that may (if the user wishes) be used for automatic time and date insertion of hits in each channel. (see Autolog Button section for further details). A scan file may be loaded that already has auto-logged dates and times, these dates and times may then be cleared without losing the users comment by selecting 'Clear Autolog Space'. The user will be warned before the "Clear Autolog Space" action is completed.

### ***Erase Hits (Global Edit Dialog)***

The RadioMax frequency files allow storing and displaying up to 32,767 hits per channel. The number of hits are saved for every channel in the scan frequency and history files. "Erase Hits" allows the user to clear every hit for the file currently in memory. This lets the user load a stored file with hits, clear the hits then start scanning to accumulate a new hit history. The user will be warned before the "Erase Hits" action is completed.

### ***Lockout All Channels (Global Edit Dialog)***

Selecting this will lockout every channel in the scan file. Scanning may still continue, however the system cannot jump from the present channel until at least one other channel is unlocked. Locking out all the channels is very useful for preparing a custom scan file, since there are numerous ways to unlock certain channels by various parameters. The user will be warned before the "Lockout All Channels" action is completed.

### ***Unlock All Channels (Global Edit Dialog)***

Selecting this will unlock every channel in the scan file. Unlocking all the channels is very useful for preparing a custom scan file, since there are numerous ways to lock out certain channels by various parameters. The user will be warned before the "Unlock All Channels" action is completed.

### ***Unlock Adjacent Duplicates (Global Edit Dialog)***

If files have been built from frequency databases they often contain duplicate frequencies, for example base and mobile frequencies. RadioMax can lock out the duplicates frequencies if required. Note that the channels must be adjacent for RadioMax to do this; if the frequencies are not frequency order first perform a "sort" based on frequency, then lock out adjacent ones, then resort if required.

### ***Reverse Lockout State (Global Edit Dialog)***

This allows the user to quickly "invert" the lockout state of all channels; "locked out" channels will be unlocked and vice -versa. This is very useful if

multiple channels have been “autolocked”, the lock-out state may be easily reversed if required.

### ***Say Frequency (Global Edit Dialog)***

This turns on “Say Frequency” for every channel in the file currently in memory. For the program to respond to the file setting the “Say Frequency” button must be set to “Auto”. A warning is shown before this operation is completed.

### ***Don't Say Frequency (Global Edit Dialog)***

This turns off “Say Frequency” for every channel in the file currently in memory. For the program to respond to the file setting the “Say Frequency” button must be set to “Auto”. A warning appears before the “Don't Say Frequency” operation is completed.

### ***Say Time (Global Edit Dialog)***

This turns on “Say Time” for every channel in the file currently in memory. For the program to respond to the file setting the “Say Time” button must be set to “Auto”. A warning is shown before the “Say Time” operation is completed.

### ***Don't Say Time (Global Edit Dialog)***

This turns off “Say Time” for every channel in the file currently in memory. For the program to respond to the file setting the “Say Time” button must be set to “Auto”. The user is warned before the “Don't Say Time” operation is completed.

### ***Tape All Channels (Global Edit Dialog)***

By selecting this the user will enable the tape recorder during hits if the Tape Button is set to “Auto”. The user will be allowed to cancel the “Tape All Channels” operation before it completes.

### ***Don't Tape Channels (Global Edit Dialog)***

By selecting this the user will disable the tape recorder during hits if the Tape Button is set to “Auto”. The user will be allowed to cancel the “Don't Tape Channels” operation before it completes.

### ***Lockout by Comment (Edit Menu)***

Selecting this will cause a small window to appear. Here you may enter a text string that all the comments will be searched for. Once the string is entered selecting ‘Lockout’ will cause any channels that contain the string in the comment to be locked out, likewise selecting ‘Unlock’ will unlock any locked channels that contain the string.

For example, suppose you have a large scan file that you frequently use, and it contains many types of channels (police, aircraft, phones etc.). Suppose you

just want to listen to aircraft. First use the global 'Lockout All Channels' menu selection, which results in every channel being locked out. Now select 'Lockout by comment...' and when the requester appears enter "air" (note, do not enter the quotes), then select the 'Unlock' button. Every channel with the string "air" in its comment will now be unlocked, and scanning of these channels may commence. Like wise all channels may be unlocked using the 'Unlock all channels' selection, then any channels that are not to be monitored locked out by comment.

The search string entered is case sensitive, e.g. entering "pol" will cause "police", "interpol", and "pollyanna" to be found, but not "Police", "poL" or "POL". If you wish RadioMax may ignore the case, to do this check the "Ignore case" checkbox. Then RadioMax would also find "Police", "poL" and "POL" in the previous example. Spaces may be significant, so if more than one word is entered the whole string must match, i.e. entering "OJ Simpson" would cause a match in any channel that contained "OJ Simpson", but would not find "OJ the Juice" or "Mr Simpson". This allows very flexible scanning potential, and of course scan files may be saved at any time, allowing the user to easily create custom scan files. If the 'Autolog' function has been operating (see the "AutoLog" button section for a detailed 'Autolog' explanation) selected channels may be searched for by date, e.g. enter "Mon" to find channels that were hit on Monday, etc. The user will have chance to cancel the "Lockout by Comment" before it is completed.

### ***Upload / Download (Edit Menu)***

Some radios have the ability to allow reading and writing channel memories via the serial port. This selection allows up and downloading to and from the radio. Note that the channels will always start at channel 1 on the radio and go as far as the user requests. Be careful!!! It is possible to erase channels in the radio that have been manually programmed. It is recommended to start by "reading" all of the radios channels into RadioMax, and storing these channels into a file. A warning appears before uploads and downloads commence. Note that if the radio channels can be written but not read there may be a cable and/or interface problem.

### ***SORT MENU:***

First some general sorting information. RadioMax has the capability to sort all channel information according to a wide range of parameters. When RadioMax frequency files are first created they are usually in ascending order, starting with the lowest frequency on the left of the screen and the highest on the right. Any frequencies that are manually entered later are added to the end of the file currently in memory, so scan files may not end up in ascending frequency order. RadioMax has absolutely no restrictions on frequency or any other parameter for ordering the channels.

However some radios have internal relays that switch as they pass certain frequencies, for example the Icom R7000 will click as it changes above and below

512 MHz. If there are several sequential channels above and below these points the clicking of the relay in the radio during high speed scanning may become annoying. This may be minimized by sorting the file into frequency order. Some radios take much longer to “settle” when changing from one mode to another, e.g. from FM to AM, so in some cases it may make sense to sort the channels by modes. RadioMax makes it easy to sort files by these and many more parameters.

### ***Sort Channels (Sort Menu)***

Once “Sort Channels” is selected a window appears allowing the user several parameters to sort by, such as hit count, mode, comments etc. The user also has the option to choose ascending or descending sorts. Once the user clicks on “OK” RadioMax performs the sort in memory, and will rearrange the display to reflect the changes. Naturally all channel information will move with each channel during sorting. It may take a second or so to perform the sort if there are thousands of channels in memory and the user has a slower P.C. RadioMax uses the fastest sort routine possible, and all sorts are performed in memory without using any disk access. Experiment with the sort capabilities to see how versatile and fast they are.

## **SCAN SETTINGS MENU:**

### ***Miscellaneous (Scan Settings Menu)***

When selected a dialog appears allowing the user to modify miscellaneous settings. The first is the “autolock trigger level”, which may be set between 1 and 3000 hits. Note that “autolock” has to be enabled (see the Upper Control Bar settings for further details) for the trigger level to be used.

### ***Timers (Scan Settings Menu)***

(Mouse Shortcut, the  Button in the lower control bar)

Great effort has been spent to come up with a flexible and powerful scan delay method for the RadioMax system. It offers settings for just about every conceivable situation, and may easily be adjusted to ensure important signals are not lost, ‘dead time’ is minimized and tape control is optimized. It is important to understand the way it works, and it is helpful to understand the reason behind its techniques.

First here is a brief revue of how the standard Icom squelch circuit works with most radios and an explanation of its limitations. (note that other brands of radio have similar restrictions.) Assume the radio is being used by itself without a computer, either for range or channel type scanning. The radio scans until it finds

a signal stronger than the squelch setting, then one of three things may occur, depending on the setting of the scan delay knob:

- a. If the scan delay is set at off the radio will stop scanning until the received signal disappears, then it will continue scanning. There are two big problems with this method. First any continuous carriers will 'lock' the radio, and scanning is over unless the user manually intervenes. The second problem occurs with signals that may have varying signal strength, or where there is a gap in the carrier due to two communicating transmitters. As soon as the signal drops scanning resumes, and the reply to a message may be missed.
- b. If the scan delay is set at 5 or 15 seconds the radio will stop scanning at a hit and wait for the preset length of time, whether a signal is present or not. Then scanning will resume, regardless of whether the signal is still there. The result is that the radio will always stop for the set period of time, even if the signal has disappeared. Even worse, it will start scanning again after the preset time delay even if a signal is present. This can be most frustrating when a rare signal is being monitored and scanning resumes.
- c. If the scan delay is set at infinity scanning stops, and the radio remains at that frequency. This can be useful for some applications, but is of little use for general scanning/logging, as only one frequency may ever be found.

RadioMax uses a combination of two independently user programmable timers, to give much greater flexibility during scanning. After "Timers" is selected a window will appear with two timers visible and some control buttons. The first timer is 'After Signal Loss', the second 'Maximum Delay Time'. Lets run through a typical signal 'hit' to explain these timers.

When RadioMax first detects a signal it will wait for a very short period of time and verify that it indeed has found a signal and not just a burst of noise. If it cannot find the signal there it will 'hunt' the previous channel to ensure the signal was not from the previous channel. This is required because of the extremely high scan speed RadioMax operates at, by the time the radio supplies the squelch signal the system may already be a channel ahead. This 'hunting' is transparent to the user as it occurs so quickly. Once a strong signal has been verified the delay timers will begin. Real time signal activity is indicated by the graph bar on the right hand side of the screen. When the signal rises above the (adjustable) black trigger level the bar turns red, indicating a signal large enough to stop scanning. (Note that depending on the type of radio and the squelch interface type setting, the bar height may indicate the actual signal strength or it may indicate an on/off squelch status signal changing. See the main section for further details).

Lets ignore the 'Max Signal Time' timer for a moment. RadioMax will wait while there is an active signal to be monitored. After the signal has disappeared a timer will begin (called 'After Signal Loss') and RadioMax will wait on this channel for the selected 'After Signal Loss' time. However if a signal returns during this time the timer will be reset to its initial value, and the sequence will restart. But if the time 'expires' without a signal appearing scanning will resume. Using this method signals with 'gaps' (for example a base station and mobile communicating)

may be monitored without the system restarting scanning. The system will never restart scanning until the signal has disappeared continuously for the preset time delay. The time delay for 'After Signal Loss' may be selected between zero (scanning will restart as soon as the signal disappears) to 3600 seconds (1 hour) for very intermittent signals. If the "Stop Scanning" button is clicked the timer will display "Stop", and scanning will be terminated at the first hit. This gives us the basic scan delay, where the system will ALWAYS wait while there is a signal, and wait for the 'After Signal Loss' time AFTER the signal has gone. The display just to the left of the "Timers" button in the lower control bar displays the "after signal loss" delay, you may notice it counting down during listening.

However there are some drawbacks in using the "After Signal Loss" delay by itself. If a continuous signal is present the system effectively 'hangs' at that frequency. A slowly pulsing signal (for example some radio beacons) may also cause the system to hang if they transmit more frequently than the "After Signal Loss" time. What is needed is another programmable delay which will limit the absolute maximum time a channel is monitored, whatever the signal conditions are. Hence the "Max Delay Time" timer. When this is selected (i.e. not set at unlimited) the time spent on each channel will be limited to this delay, then scanning will be forcibly restarted.

The "Maximum Delay Time" delay is adjustable from zero (don't listen to the signal, just store logging information then continue scanning) to 3600 seconds, (1 hour). The system may be left running, and samples taken from all sorts of signals without any danger of the system getting stuck at certain frequencies for longer than the preset time. If the 'No maximum' box is checked the "Maximum Time Delay" is effectively disabled, all delays will be dependent on the "After Signal Loss" menu. The "Maximum Delay Time" is shown just to the right of the "Timers" button in the lower control bar and will be seen counting down as RadioMax listens to hits.

Using these two delays allows some interesting combinations, for example:

If the "After Signal Loss" time is set to greater than the "Maximum Delay Time" the system will ALWAYS remain on a hit for the "Maximum Delay Time" duration, irrespective of the signal. This effectively duplicates the Icom's capabilities for the 5 and 15 second delay settings, but of course with far more time delays available.

By setting the 'After Signal Loss' time to zero scanning will resume as soon as the signal disappears, effectively the same as Icom's scan delay "off" setting.

Setting 'After Signal Loss' time to say 2 seconds and the 'Maximum Signal Time' to 15 seconds the system will stop on any active signals, allowing the user time to listen, catch intermittent signals but not hang up on non stop signals.

If 'Stop Scanning' is selected from the 'After Signal Loss' menu the system will stop on the first hit. It will act as though the user had hit the pause button, and remain there until the user intervenes. This effectively duplicates the Icom's 'infinite' scan delay setting.

Any time that the system is in the Listen mode and is waiting on a delay timer the user may force a move from that channel by clicking on the UP or DOWN button. This will cause the system to cancel all running delays and move onto the next channel, then restart scanning. This is very useful to quickly restart scanning if a signal is not of interest.

If the user wants to stay on the channel simply click on the PAUSE button, the system will wait on the channel after the timers have expired.

Note that due to the limitations of Windows if speech is turned on it will be completed before the timers start.

In the "Timers" window the user may also select different scan speed settings, which will also depend on the serial baud rate that the radio and RadioMax is set to.

## ***DISPLAY MENU:***

RadioMax constantly displays a graph showing all channel information on the screen. The channel width is automatically adjusted to show all channels in memory. When there are more channels in memory than there are pixels in width for the graph more than one channel may share a visible pixel, although of course each channel has its own distinct information. In this case the graph bars will show the highest hits. The graph may be scaled by the user in width or height and the graph will be redrawn to reflect this.

When the RadioMax program window is made too small in height to display the Y axis numbers they will be removed from the graph, so RadioMax will still show an informative display; these Y axis numbers will reappear when the program window is sized larger. If the RadioMax window is sized even smaller the graph will disappear, and just the buttons and status windows will be visible. This way the user may size the program window to give a fully functional "status" type display and run other programs which may require more screen area at the same time. RadioMax still operates when the program is minimized to just a status bar.

### ***Auto format display (Display Menu)***

When selected the vertical scale of the graph will automatically be adjusted by RadioMax so that the graph will always show the highest hit count. When hits accumulate and exceed the present height of the graph the graph will be re-scaled and redrawn automatically. A check mark next to "Auto Format Display" will indicate whether this feature is enabled.

### ***Zoom In (Display Menu)***

This lets the user "zoom in" on the display height to see close up detail of channels with few hits which may not be easily visible if other channels have many

hits. Any channels which exceed the graph height will be shown slightly larger than the maximum graph height.

### **Zoom In (Display Menu)**

This has the opposite effect of “Zoom In”, which is described above.

## **MANUAL MENU:**

Here the user may access manual radio controls.

### **Manual control (Manual Menu)**

When selected a small window will appear that lets the user manually control the radio frequency, mode and tape recorder. Any scanning will be suspended while this screen is active.

### **Up (Manual Menu)**

(Mouse Shortcut, the  Button in the lower control bar.)  
(Keyboard Shortcut, the right cursor key)

This causes RadioMax to advance to the next channel up (including locked out channels) if currently paused, or changes scan direction to up if scanning.

### **Pause (Manual Menu)**

(Mouse Shortcut, the  Button in the lower control bar)  
(Keyboard Shortcut, the space bar)

If currently scanning RadioMax will become paused, and vice versa. The current state is always displayed just to the right of the lockout button.

### **Down (Manual Menu)**

(Mouse Shortcut, the  Button in the lower control bar)  
(Keyboard Shortcut, the left cursor key)

This causes RadioMax to change to the next channel down (including locked out channels) if currently paused, or changes scan direction to down if scanning.

## **CONFIG MENU:**

Using these menu selections the user may adjust several RadioMax settings.

### ***Serial Port (Config Menu)***

This allows the user to configure RadioMax for different serial ports and baud rates. RadioMax has been designed and tested to operate reliably with standard P.C. hardware which Windows operates correctly with, and will function using any of the comm ports 1 to 8, provided the comm ports have been installed and operate correctly under windows. Note that comm ports 5 to 8 may have unusual address settings, and if your comm port board has a different address from that shown you may enter the correct address in the “address“ box shown on the screen. RadioMax uses this address for the squelch detect capability; data transmitted to the radio uses Windows serial communication and interrupt functions.

RadioMax will remember any settings that have been changed when exiting the program, in the file called RADIO.INI.

### ***Sound Card Options (Config Menu)***

RadioMax allows the PC's soundcard to be used to generate speech or to use the soundcard for direct audio recording and playback. Selecting the 'Sound Card for Speech Generation' option causes the standard toolbar to be shown, complete with the 'Say Freq' and 'Say Time' buttons. If the 'Sound Card for Audio Recording' is selected then the toolbar will change to show the 'Auto' and 'Manual' direct audio control buttons.

RadioMax will remember any settings that have been changed when exiting the program, in the file called RADIO.INI.

### ***Speech Configuration (Config Menu)***

RadioMax may automatically generate speech to inform the user of the frequency and / or the time of hits. For this capability to be enabled the 'Sound Card Option' must first be set to 'Speech Generation', (see 'Sound Card Options, explained above). Once enabled, it is here that the user may specify whether RadioMax will announce in a male, female or custom voice. Select "Male" or "Female" for the standard voices. If "Custom" is selected audible numbers recorded by the user may be used.

When RadioMax speaks numbers it will assemble sounds from audio ".WAV" type files with the first one or two letters of the speech filename corresponding to the digit to be spoken. So in the same directory as RadioMax

there are files named "0MALE.WAV", "1MALE.WAV", "2MALE.WAV" etc. and "0FEMALE.WAV", "1FEMALE.WAV", "2FEMALE.WAV" etc. To use custom voices you may enter the part of the filename's that RadioMax will look for. For example, if you enter "FRED" (don't enter quotes or an extension) when RadioMax starts to speak 123.7 it will need the files "1FRED.WAV", "2FRED.WAV", "3FRED.WAV", "PTFRED.WAV" and "7FRED.WAV". (The PTFRED will be the decimal point).

Using software supplied with the sound card in your P.C. record ".WAV" files for all the digits and the point sound, storing them with the corresponding filenames. You may want to edit the ".WAV" files to eliminate any gaps at the start and end of each digit. Save these files in the RadioMax directory, then once you have selected the custom option with you filename RadioMax will announce in your voice. Here is a list of the filenames needed for "frequency" and "time" speech generation, your filename (which must not be longer than 6 characters) would replace NAME in the following:

0NAME.WAV, 1NAME.WAV, 2NAME.WAV, 3NAME.WAV, 4NAME.WAV, 5NAME.WAV, 6NAME.WAV, 7NAME.WAV, 8NAME.WAV, 9NAME.WAV, PTNAME.WAV, 10NAME.WAV, 11NAME.WAV, 12NAME.WAV, 13NAME.WAV, 14NAME.WAV, 15NAME.WAV, 16NAME.WAV, 17NAME.WAV, 18NAME.WAV, 19NAME.WAV, 20NAME.WAV, 30NAME.WAV, 40NAME.WAV, 50NAME.WAV

### ***Radio Configuration (Config Menu)***

Here the user may configure RadioMax for different radios. Icom and some OptoElectronics products each have a unique "address" which needs to be set to access the device. Shortcut buttons automatically select the default address for some of the more popular Icom and OptoElectronics radios, although any legal address may be manually entered. (addresses are shown in decimal). See the appendix for more details of Icom radio addressing, or the radio manual.

### ***Hints (Config Menu)***

As menus are selected RadioMax often displays a simple line of help text in the users comment display area. By selecting "Hints" RadioMax will also invoke "fly over" type hints, where the user has hints displayed as the mouse moves over certain buttons as well as menu selections. You may want to use the "Hint" mode until you are familiar with all of the many features.

### ***Save Configuration (Config Menu)***

Once the user has made changes to the configuration it may be saved by using this menu selection. When RadioMax starts it will look in the same directory as Radio.EXE for the file named "Radio.INI", which contains all of the users settings for RadioMax. (See the appendices for details about the configuration file format). If "Radio.INI" cannot be found default settings will be used. Therefore the user should save the configuration file with the name "Radio.INI" if these are the

settings to be automatically used next time. Configurations can also be saved and loaded with any other name if required.

### ***Load Configuration (Config Menu)***

Here the user may load configuration settings that have been previously saved, perhaps for a special radio. Note that RadioMax will automatically load the configuration file "Radio.INI" when the program starts so the "Load Configuration" does not need to be used under normal circumstances. Configurations of any name may be loaded, provided they conform to the ".INI" format, see the appendices for details about the configuration file format).

### ***ABOUT MENU:***

#### ***About (About Menu)***

This brings up a window that lets the user view the running version and serial number of RadioMax.

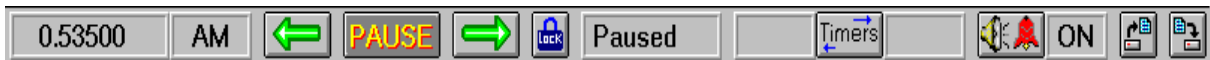
## Section 7

### DETAILED GUIDE TO BUTTONS.

RadioMax uses a wide variety of buttons and status displays to quickly change and view many of the features of RadioMax, here's a description of each one.

There are two "control bars" containing both buttons and status displays, one at the bottom of the screen and the other at the top, just below the menu selections. First the lower control bar will be described.

#### Lower Control Bar



At the extreme left hand side of the control bar the current channel frequency is displayed, in MHz. This will always reflect the current frequency. The next status display to the right is the current mode, such as AM, FM etc. Note that RadioMax has the capability to set the following modes, AM, FM, FMN, SSB, LSB, USB and CW. Some radios are not capable of all of these modes, and the connected radio will ignore modes that it cannot set.



Just to the right of the mode status is the "DOWN" arrow. This arrow has the effect of causing RadioMax to change to the next channel down (including locked out channels) when in the "Paused" state, and to change direction to down when scanning. It has the same function as the "Manual - Down" menu selection. Its function is also duplicated by the left cursor key.



To the right of the left pointing arrow is the "Pause" button. If currently scanning RadioMax will become paused, and vice versa. The current state is always displayed just to the right of the lockout button. The "Pause" button action can also be implemented by pressing the space bar.



The next button to the right of "Pause" is the "UP" arrow. This arrow has the effect of causing RadioMax to change to the next channel up (including locked out channels) when in the "Paused" state, and to change direction to up when scanning. It has the same function as the "Manual - Up" menu selection. Its function is also duplicated by the right cursor key.



The “Lockout” button allows the user to quickly toggle the current channels lockout state. Any “locked out” channels are always shown by a red bar underneath the X graph axis, no bar is displayed if the channel is unlocked. The “L” key has the same effect as the lockout button.



The “Alarm Button” allows the user to turn on and off the audible alarms controlled by RadioMax. As hits occur, RadioMax will check to see if the hit channel is programmed to sound one of the alarms (they are numbered from 0 to 9). If the alarms are enabled (by the alarm button) and an alarm has been selected for this channel it will sound. The alarms are “.wav” type sound files, 10 sample ones are supplied with RadioMax but you can easily record some to replace these using the software supplied with the PC sound card. The alarm files are named alarm0.wav, alarm1.wav etc. up to alarm9.wav. The alarms may be chosen for each individual channel or globally using the standard channel editors in RadioMax. If “off” is selected by the alarm button all alarm sounds will be suppressed; however the alarm settings will not be affected in the frequency file



The “Timers” button is a fast way to invoke the “Timers” window; it is the same as selecting “Timers” from the Config menu. For further details see the full explanation of all the timer features under the Timers (Config. Menu) section.



This brings up a window allowing the user to select a new scan file to load. Its a shortcut to the File Menu Open command.



This will save the current file information under the RadioMax file name displayed in the program title. To save the information under a different name use one of the File Menu “Save” commands, which also allows files to be saved under different parameters.

### Upper Control Bar.



or



Now the upper control bar will be described. Note that there are two possible versions of the upper control bar, depending on how the program is configured to use the soundcard. See the soundcard options for further details.



This will turn on or off Multi File Scanning. When Multi File Scanning is on RadioMax will operate as normal and respond to all the normal program features. However when it reaches the last (or first, if the scan direction is down) channel, RadioMax will save the current file, then load in the next file specified in the Multi File Scanning list. This way the user may automatically scan multiple files, saving any new information. The screen will always display all the information about the current file; its title is displayed in the screen title.



The "AutoLock" button controls the automatic scanning lockout feature of RadioMax. When the Button is clicked the current state will toggle, and be displayed in the "AutoLock" status just to the right of this button. When AutoLock is turned "ON" the system functions as normal, however when there is a hit the following occurs. RadioMax will compare the current number of hits on this channel to the "autolock trigger level" (see Scan Settings, Miscellaneous). If the channel hit count exceeds the "autolock trigger level" the system will automatically 'lock out' the channel for further hits (after any logging, taping, speech etc. has completed). Since the system will not stop at this channel again, (unless its manually unlocked) the system will spend more time hunting the remaining channels, and as more hits occur so the hunt becomes more 'intensive'. An added benefit is that every recorded hit on the tape may be from a different channel, assisting the user in quickly identifying activities of interest.

It is also very useful to quickly find and lock out continuous carriers or signals. Of course any channels may still be manually locked or unlocked if required. When extended logging to a history file is enabled the AutoLock feature may also be useful, since it can limit channels to be just hit one if required. The current AutoLock setting is saved in the configuration file.



RadioMax has the capability to automatically store the date and time of hits. This data is embedded as the last 19 characters of the comment in a RadioMax frequency file. When the "AutoLog" Button is clicked the display just to the right of the button will alternate between off, First and Last.

When "First" is selected scanning continues as normal until a hit occurs. RadioMax will then look at the last 19 characters in the current channels comment line. If these characters are all spaces, i.e. the end of the comment line is blank RadioMax will insert the day, date and time of the hit into the end of the comment line. If another hit occurs on the same channel the end of the comment line will already have information in it, so the time and date will not be saved again. The

result is that as scanning continues the date and time will be automatically inserted at the first hit of every channel. A users comment that extends past the 61<sup>st</sup> character in the line will not have the date and time written to it if “First” is selected.

If “Last” is selected RadioMax will write over the last 19 characters of the comment with the time and time of every hit, hence the time and date stamp will correspond to the last hit on that channel.

If AutoLog is set to “off” no information will be written in the comment lines, and existing hit times (if any) will remain untouched.

RadioMax has the capability to clear AutoLog times without affecting the rest of the comments in any way, see the Global Menu selections for further details on how to do this. RadioMax can also sort frequency files according to hit times, see the “Sort” menu for more details.



The “Tape” button is used to control the relay inside of the RadioMax interface, which via the small plug on the interface will control a tape recorder, (see the appendices for more details). When the button is clicked the tape status display just to the right of the button will change and show the current status, either off, On or Auto. This status is always displayed, and the button may be clicked at any time during program operation. Note that clicking on the button will have no effect on the frequency file settings.

When the status displays “off” the relay will always be turned off, completely ignoring any squelch state and frequency file settings, which will not be affected in any way. This is useful if you do not wish the tape recorder to run, and do not want to change individual channel information that may control the tape recorder in a scan file.

When the Tape status shows “On” the relay will always be turned on, again completely ignoring any squelch state and frequency file settings that may be present. This allows you turn on the tape recorder at any time to either record or simply just to rewind the tape without unplugging the tape recorder remote control connector.

If the Tape control is set to “Auto” the tape recorder is activated whenever a channel has a hit and the respective channel calls for the tape to be turned on. Whether or not the channel controls the tape recorder may be set by using the channel edit window or global edit menus. When the tape is automatically recording the user may also stop and start the tape manually by clicking on the Tape control button without changing the scan file characteristic’s. When in the “Auto” recording mode the tape will run until listening ends and scanning resumes. Naturally the user may extend the listen time by going to the pause state with the “Pause” button or pressing the spacebar, the tape will still run if in “Auto” mode.

RadioMax has intelligent routines to prevent ‘dead time’ (quiet periods) being recorded on the tape. During all “Auto” tape activity the system constantly monitors the squelch signal, if it disappears (i.e. no signal) for more than a couple

of seconds the tape is shut off, but will restart immediately the signal returns. This is very effective in eliminating dead time, and prevents constant tape stop and starts due to fluctuating signals or two way conversations. This special tape timer is independent of all the other timers in RadioMax. Note that the tape recorder control will operate even if the PC soundcard is being used for audio recording; the tape button will not be visible however. To change tape modes while using the soundcard for audio recording it is necessary to temporarily change to 'Soundcard for speech' mode, (the tape button will then re-appear) make the tape button changes, then revert to 'Soundcard for audio recording' mode. The 'T' key on the keyboard may also be pressed which will have the same effect as clicking the button - however by pressing the 'T' key there is no need to change back to 'Soundcard for speech' mode to make the change.



The "Say Freq." Button allows the user to control whether or not the P.C. will announce frequencies with an audible voice. For speech capability the P.C. must be equipped with a "SoundBlaster" compatible speech board, note that Icom's speech option available for some radios is not required nor is it used. RadioMax has the capability to announce the frequency in a male, female or custom (users) voice which may even be in another language, see the "Config Radio/Speech" menu description for details on how to create custom voices.

When the "Say Freq." Button is clicked the status just to the right of the button will change and display the current setting, which will "off", "On", or "Auto". Note that clicking on the button will have no effect on the frequency file settings. RadioMax will not announce trailing zeros in frequencies to eliminate redundancy; i.e. 123.0001 will be announced as "123.0001" and "321.0000" will be announced as 321.0

If the state is set to "On" the P.C. will announce the frequency for every single hit. Note that the listen delays and timers will start after speech has finished, to ensure that the speech (which of course will vary in length depending on the frequency) will always be recorded if the tape recorder is being used.

If the state is set to "Auto" the P.C. will announce the frequency if "Say Frequency" is turned on for that particular channel. This characteristic may be changed by using the channel edit window or global channel edit menu features described earlier. Again the listen delays and timers will start after speech has finished.

When in the "off" state frequency speech will not be generated during hits.



The "Say Time." Button allows the user to control whether or not the P.C. will announce hit times with an audible voice. For speech capability the P.C. must be equipped with a "SoundBlaster" compatible speech board, note that Icom's speech option available for some radios is not required nor is it used. RadioMax has the capability to announce the frequency in both a male, female or

custom (users) voice which may even be in another language, see the “Config. Radio/Speech” menu for details on how to set up RadioMax to use custom voices. When the “Say Time” Button is clicked the status just to the right of the button will change and display the current setting, which will “off”, “On”, or “Auto”. Note that clicking on the button will have no effect on the frequency file settings.

If the state is set to “On” the P.C. will announce the time for every single hit. Note that the listen delays and timers will start after speech has finished, to ensure that the speech will always be recorded if the tape recorder is being used.

If the state is set to “Auto” the P.C. will announce the time if “Say Time” is turned on for that particular channel. This characteristic may be changed by using the channel edit window or global channel edit menu features described earlier. Again the listen delays and timers will start after speech has finished.

When in the “off” state time speech will not be generated during hits.

### **Soundcard Recording and Playback Options.**

RadioMax allows the PC’s soundcard to be used for direct audio recording and playback. To do this first the ‘Sound Card for Audio Recording’ must be selected from the ‘Sound Configuration’ menu. Once this has been done the toolbar will then show the ‘Auto Wave’ and ‘Manual Wave’ direct audio control buttons. The Sound card may be any brand that is compatible with the SoundBlaster type cards. The audio input from the radio may be connected to either the line or microphone input, use the mixer program supplied with the soundcard to adjust the input signal level. As audio is recorded ‘RECORDING’ flashes on the lower graph screen as a reminder to the user. Each audio recording is saved in the current program directory as a file such as MAX12345.WAV, where 12345 (in this example) is a number that RadioMax automatically assigns to the filename. This number will increase automatically, so files may easily be sorted by order of recording. The audio wave filename will be shown on the right hand side of the hit in the history window, and hits in the history window with audio recorded will be shown in a different color from hits that have no audio recorded, so they may be easily found. Note that if a recording was started manually or was automatically resumed by RadioMax after a gap in recording the associated ‘audio wave’ in the history window will reflect that, with an explanation such as ‘Manual Wave Recording Started’ being shown.

To hear recently recorded audio simply left click in the history window on the hit you wish to hear. RadioMax will immediately start to play the recorded audio. If the audio for that hit is still recording, or a hit without any audio recorded is selected no sound will be played. RadioMax can play recorded audio while the program is running at full speed, so there is no need to stop the program from scanning to listen to past recorded audio. Most newer PC’s have ‘duplex’ sound cards installed, and in this case RadioMax can play the previously recorded audio at the same time that it is presently recording audio from a new hit. Recording audio to the hard drive takes about 650 Kbytes per minute of disk space. Once the

audio is no longer needed it can of course be deleted. To delete an audio ('wav') file from inside RadioMax simply point at then 'double click' with the right mouse button the audio file or hit in the history window to delete. The history hit will change color and the 'wav' filename will disappear from the end of the hit information, indicating there is no longer an associated 'wav' file. If it was not an automatically recorded 'wav' file then the associated reference to the 'wav' file will vanish; since it has been deleted. Note that an audio file may be associated with several 'hits', if this is the case and the audio file is deleted RadioMax will remove the audio reference automatically. Microsoft Explorer and other similar programs may also be used to quickly view, play and delete files such as these '.wav' audio files.



The "Auto Wave" Button allows the user to control whether or not the P.C. will record audio from the soundcard during a 'hit'.

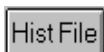
When the "Auto Wave" Button is clicked the status just to the right of the button will change and display the current setting, which will be "off" or "Auto". Note that clicking on the button will have no effect on the frequency file settings. RadioMax will evaluate the auto wave button state, the squelch signal and the current channels tape recorder state before deciding whether to record the audio.

If the button state is set to "Auto" the P.C. will record the audio if "Run Tape Recorder" is also turned on for that particular channel. This characteristic may be changed by using the channel edit window or global channel edit menu features described earlier.

When the button is in the "off" state the audio will not be automatically be recorded during hits. This method allows the user to selectively record audio just on certain channels, although the program may scan and stop on other channels too.



The "Manual Wave" Button allows the user to instantly record audio directly to the PC's hard drive using the PC's soundcard. When this button is clicked RadioMax will immediately start to record audio to the hard drive irregardless of any other settings. The filename used will be shown in the history screen and to the right of the button. This button allows the user to record anything of interest at any time. Note that the button must be clicked again to stop recording.



This is a shortcut to the "History File" selection from the file menu. See the file menu selection for further details. Just to the right of this button is the current history file status, which is shown as "off" or "ON".



## **APPENDICES**

### **APPENDIX A. RadioMax FILE FORMAT.**

Since all information in the scan files may be edited from within RadioMax it is doubtful that the average user will ever need this information, however other applications may require it or other files may be converted for RadioMax to use.

RadioMax uses a plain ASCII file format with no special control characters. All scan files normally end with the extension ".FSS" (without the quotes), these are the files that RadioMax will look for during load and save operations. The user may use any file extension however, and by typing it into the file requesters others may be used. The .FSS extension will be automatically added by RadioMax during saves unless the user chooses otherwise.

The file format is of fixed width, allowing vertical columns to line up for easy viewing of listings and possible inclusion into third party software products (databases etc.). Each field is separated by a comma. The first field, using 10 characters, contains the channel frequency in MHz. Frequencies less than 100.0000 MHz are preceded by spaces as required. The lowest legal frequency is 0.00001 MHz and the highest 9999.99999 MHz, even though this range may exceed the current radios capabilities. If a frequency outside of the radios range is attempted the radio simply ignores it. Using this method RadioMax files may be easily exchanged for different radios, without having to delete certain frequencies.

The second field has space for three characters, and contains the mode information 'AM ', 'FM ', 'FMN', 'SSB', 'LSB', 'USB', and 'CW'. The lockout field is next, a blank space for an unlocked channel, the letter 'L' if the channel is locked out. The record field follows, if hits on the channel are to be recorded the letter 'R' is in the field, a space if the hit is not to be recorded. The next two fields are similar to the record field, but contain information about speech for the channel. The first is for speech of the frequency, 'F' to enable it, a space to disable it. Next a 'T' if the time is to be spoken, a space if it is not. After this there is a field for the alarms, a blank space for no alarm or a number between 0 and 9 for the alarm number. The count of hits for the channel follows, five spaces allowing a number up to 32767 to be stored. Finally comes the comment for the channel, which may be up to 80 characters long. RadioMax does not store blank comments to preserve disk space and speed file operations. The information for each channel ends with a carriage return.

#### **WARNING!**

Be careful if you ever change scan files manually.

They need to be saved as an ASCII type file, not from a word processor which may embed control characters in the file. It is recommended that you save any modifications to a file under a different scan file name, so you will still have the

original file in case of any errors. RadioMax may not be able to load files that contain errors.

Part of a typical scan file is shown below.

34.8300,FM , ,R, , , , 0,Fish and Wildlife Service  
35.0200,FM , , , , , 11,McDonalds order window  
35.2200,AM ,L, , , , , 0,Paging  
35.6400,FM , , , , , 25,Medical paging  
40.0700,AM , , , , , 0,National Park buses  
40.2100,AM , , , , , 0,National Park buses  
40.5000,FM , , , ,T,3, 2,Army search/rescue  
40.6800,FM , , , , , 0,Industrial devices  
41.5000,FM , ,R, , , , 0,Army aircraft  
43.2200,FM ,L, , , , , 0,Paging  
43.5800,FM ,L, , , , , 0,Paging  
44.7000,FM , ,R, , , , 2,Oklahoma Highway patrol  
46.6100,FM , , , , , 0,46MHz Cordless phone channel 1  
46.6300,FM , , , , , 6,46MHz Cordless phone channel 2  
46.6700,FM , , , , , 0,46MHz Cordless phone channel 3  
46.7100,FM , , , , , 0,46MHz Cordless phone channel 4  
46.7300,FM , , , , , 2,46MHz Cordless phone channel 5  
46.7700,FM , , , , , 0,46MHz Cordless phone channel 6  
46.8300,FM , , , , , 4,46MHz Cordless phone channel 7  
46.8700,FM , ,R,F, , , 3,46MHz Cordless phone channel 8  
46.9300,FM , ,R, , , , 2,46MHz Cordless phone channel 9  
46.9700,FM , , , , , 0,46MHz Cordless phone channel 10  
46.7500,FM , ,R, ,T,6, 11,Presidential helicopter  
122.9250,AM , , , , , 0,Natural resources aircraft  
123.0500,AM , ,R, , , , 0,Helicopter  
123.1000,AM , ,R,F, ,8, 0,Air search and rescue  
123.4500,AM , ,R, , , , 1,Pilots air to air  
126.2000,AM , , , , , 0,Military air towers  
132.0000,AM , ,R,F, ,1, 0,Goodyear blimp  
135.5750,FM , , , , , 55,ATS satellite  
135.6250,FM ,L,R, , , , 1,ATS satellite  
143.4600,FM , ,R, , , , 0,Air Force MARS  
143.6250,FM , ,R, ,T, , 10,Russian Mir cosmonauts  
143.9900,FM , , , , , 0,Army MARS  
146.5200,SSB, , , , , 0,Ham walkie talkie  
148.1500,FM , , , ,T, , 2,Civil Air Patrol  
150.0000,FM , , , , , 0,Russian satellite  
151.6250,FM , ,R, , , , 0,Itinerant walkie talkie  
152.0075,FM ,L, , , , ,103,Medical paging  
152.0300,FM ,L, , , , , 3,Paging  
152.2100,FM ,L, , , , ,145,Paging  
152.5100,FM , ,R, , , , 93,Mobile phone

## **APPENDIX B.**

### **CONFIGURATION FILE FORMAT.**

The configuration files (with the file extension “.INI”) store several RadioMax program parameters. When RadioMax is first started it will look in the current directory for a file named Radio.INI, the default configuration file name. The user may then load another configuration file if required by using the “Config, Load Configuration” menu selection. This way several default settings may be quickly invoked, e.g. you may have configuration files for different radios. Amongst other parameters configuration files store a default RadioMax frequency file to load on startup. The format of the configuration file is given below. Note that not all of the parameters are always used, they may vary depending on the version of RadioMax and the radio being controlled. The parameters may be in any order. If a configuration file does not exist on startup RadioMax will generate and save one in the same directory for use the next time the program starts.

BAUD	9600
SERTYP	N81
RADIO	8
BRAND	2
TYPE	8
COMM	3
UART	3E8
SQUELCH	INT
SQUPIN	DCD
SQUINV	FALSE
SQUANA	FALSE
INTER	RS232
TAPENC	1
SIGLOSS	8
SIGMAX	15
VUSIG	141
SPEED	50
XPOS	133
YPOS	348
XSIZE	877
YSIZE	359
PCRVOL	19
PCRFIL	4
AUTOLOCK	OFF
LOCKNUM	1
AUTOLOG	LAST
TAPE	OFF
5KHZ	FALSE

SAYFREQ	OFF
SAYTIME	OFF
SPEECH	MALE
ALARM	ON
HEIGHT	AUTO
MULTI	OFF
FILE	C:\RADMAX\FREQS\PLANES.FSS
FILE0	C:\RADMAX\FREQS\AIRCRAFT.FSS
FILE1	C:\RADMAX\FREQS\GOVERNME.FSS
FILE2	C:\RADMAX\FREQS\LOCAL.FSS
FILE3	C:\RADMAX\FREQS\TRAFFIC.FSS
FILE4	C:\RADMAX\FREQS\SAC.FSS
FILE5	C:\RADMAX\FREQS\BARTLESV.FSS
FILE6	C:\RADMAX\FREQS\CELLPHON.FSS
FILE7	C:\RADMAX\FREQS\EXAMPLE.FSS
FILE8	C:\RADMAX\FREQS\MILITARY.FSS
FILE9	C:\RADMAX\FREQS\NORTHEAS.FSS
FILE10	C:\RADMAX\FREQS\PLANES.FSS
FILE11	C:\RADMAX\FREQS\RADIOMIC.FSS
FILE12	C:\RADMAX\FREQS\ALLOCAT.FSS

Explanation of configuration parameters:

**BAUD**

This is the baud rate that RadioMax will try to communicate with the radio at, and it may be any legal baud rate. It must match the radios baud rate (which for Icom radios is usually set to 1200 at the factory). The radio should be set to the fastest baud rate that the radio is capable of for the fastest scanning speed, and of course the BAUD entry should match the radios.

**SERTYP**

This is the type of data sent out of the serial port, number of bytes, parity and stop bits.

**RADIO**

This is the 'address' of the radio RadioMax will control, and may be any legal Icom address (1 to 255), but needs to match the radio. See the appendices for standard Icom radio addresses, preset at the factory.

**BRAND**

This is the brand of receiver RadioMax is currently set to control.

## ***TYPE***

This is the type of receiver RadioMax is currently controlling.

## ***COMM***

This is the P.C. "Comm." port address, which on most P.C.'s will usually be 1 or 2. RadioMax will operate with any functional high speed comm port that Windows recognizes as valid (usually from 1 to 8 if they are installed), and more than one copy of RadioMax may run at the same time on the same P.C. as long as each program has an individual serial port.

## ***UART***

This is the comm port physical address, in hexadecimal. RadioMax will generate this address from the "Configure Serial" window. Unfortunately comm ports do not always have the same address, especially when using comm ports 5 to 8 with boards from different vendors and with different PC configurations. If the port address you are using does not match that generated by RadioMax you may enter the correct address in the "Configure Serial" window. It will be saved when the configuration is saved, and will be used in the future unless the "Configure Serial" window is used to change it again.

## ***SQUELCH, SQPIN, SQINV and SQANA***

These are settings for the interface squelch detection logic. They are all set in the "serial configuration" screen.

## ***TAPENC***

This is the state of the relay polarity on the interface hardware. When it is set to '1' the relay contacts are closed when the "Tape Recorder" status is ON. If the relay polarity is set to 0 the relay contacts are opened when the "Tape Recorder" status is ON. This allows the relay to be used to control other non standard devices.

## ***SIGLOSS***

This is the after signal loss delay time in seconds, as selected by the "Timers" window.

## ***SIGMAX***

This is the maximum signal time in seconds, again as set in the "Timers" window.

## **VUSIG**

This is the squelch trigger level RadioMax was last set to, on a scale of 0 to 255. It is scaled according to the radio type and interface. To change it click on the black section of the VU meter.

## **SPEED**

This is the time in milliseconds that RadioMax will wait between channels. A smaller number will result in faster scanning, however some radios are not capable of scanning at the fastest speeds. It is essential to have the radio baud rate set as high as possible!. Note that time delays in the P.C. (for all programs) are ultimately driven by a timer in the P.C. which only has a resolution of about 55.5 milliseconds, so unless this speed value change does not cross this resolution there will be no effect. i.e. a scanning speed of 75 will be the same as 100, until the speed is changed to greater than 111 there will be no speed change. The speed is set from the "Timers" window.

## **XPOS, YPOS, XSIZE and YSIZE.**

These are the co-ordinates and sizes of the startup window.

## **PCRVOL and PCRFIL.**

These are the volume and filter width settings for Icom PCR-1000 radio.

## **AUTOLOCK**

This will be the state of the "AutoLock" button after startup and is either ON or OFF. Of course it may be changed by clicking on the "AutoLock" button after RadioMax has started.

## **LOCKNUM**

This is the number of hits required to trigger autolock, when it is turned on.

## **AUTOLOG**

Here is the state of the "Autolog" button on program startup, either OFF, FIRST or LAST. Again the user may be change it during program operation by clicking on the "Autolog" button.

## **TAPE**

This will be the state of the "Tape" button on startup, either ON, OFF or AUTO. Of course it may be changed during program operation by clicking on the "Tape" button.

## **5KHZ**

This is a width setting only used on the OptoElectronics boards.

### **SAYFREQ**

This will be the state of the “Say Frequency” button on startup, either ON, OFF or AUTO. Of course it may be changed during program operation by clicking on the “Say Frequency” button.

### **SAYTIME**

This will be the state of the “Say Time” button on startup, either ON, OFF or AUTO. Again it may be changed during program operation by clicking on the “Say Frequency” button.

### **SPEECH**

This is the default gender of the voice used for RadioMax, and is the selection the user may make in the “Config. Radio/Gender” window. It will be MALE or FEMALE unless the user is using a custom voice. See the “Config. Speech / Gender” menu selection for further details on custom voices.

### **ALARM**

This is determines if the audible alarms are turned on or off when the program starts.

### **HEIGHT**

Is the default graph height and may be a number (for manual height setting) or may be AUTO if RadioMax automatically scales the display. Its set from the display height menu.

### **MULTI**

This indicates if Multi File Scanning was active.

### **FILE**

This is the name and directory path of the RadioMax file to load on program startup.

### **FILE0, FILE1, FILE2, FILE3 etc.**

These are the filenames and directory paths of the RadioMax files as specified in the Multiple File RadioMax list.



## **APPENDIX C.**

### **UDBF (PerCon Corporation) FILE FORMAT.**

UFDBF is the Universal Frequency Data Base Format file for frequency data. It is a dBase III file with the following format.

Field Name	Type	Length	Description
SCANNER	C	008	Scanner Name
BANK	C	002	Bank Name or Designator
CHANNEL	C	003	Channel Number
FREQUENCY	C	009	Frequency
CALLSIGN	C	010	Callsign
PLTONE	C	005	Private Line (PL ) Tone
MODE	C	001	Operating Mode (Am,Fm,Wfm)
DBA_NAME	C	040	Name of Transmitter Company/Organisation
XMIT_ADDR	C	040	Transmitter Address
XMIT_CITY	C	020	Transmitter City
XMIT_COUNT	C	030	Transmitter County
XMIT_STATE	C	002	Transmitter State
XMIT_LAT	C	006	Latitude
XMIT_LONG	C	007	Longitude
RADIO_SERV	C	002	Radio Service Code
CLASS_STAT	C	004	Class of Station
DATE_FIRST	D	008	Date of First Contact
TIME_FIRST	C	008	Time of First Contact
NOTES	C	040	Notes

## **APPENDIX D.**

### **DEFAULT ICOM RADIO ADDRESSES.**

The default radio addresses for Icom radios are shown below. The radios are preset at the factory to these values, but may be changed if required, usually by moving jumper blocks or small switches inside the radio or the UX-14 interface. Consult the manual that came with the radio for information on changing the radio's address. Note that the default addresses should never conflict unless two identical radios are to be controlled at once, so normally these addresses will not need to be changed. RadioMax may communicate with radios at any address which may be manually entered in the "Config - Radio" window, not just the more common ones which have a selection button.

RADIO	ADDRESS
IC-735	4
IC-R7000	8
IC-275	16
IC-375	18
IC-475	20
IC-575	22
IC-1275	24
IC-R71	26
IC-751	28
IC-761	30
IC-271	32
IC-471	34
IC-127	36
IC-781	38
IC-725	40
IC-R9000	42
IC-765	44
IC-970	46
IC-726	48
IC-R72	50
IC-R7100	52
IC-R8500	74
IC-R10	82
PCR-1000	None

## **APPENDIX E.**

### **INTERFACE HARDWARE.**

#### **WARNING!**

**UNDER NO CIRCUMSTANCES SHOULD ANY OF THE CONNECTORS FROM THE RadioMax INTERFACE BE CONNECTED TO ANY VOLTAGE HIGHER THAN 12 VOLTS. THE CABLES, CONNECTORS AND INTERFACE ARE NOT RATED FOR VOLTAGES HIGHER THAN THAT, DAMAGE TO THE COMPUTER, RADIO AND INTERFACE MAY RESULT AS WELL AS PERSONAL INJURY OR DEATH.**

#### Tape Recorder Control.

The 2.5 mm plug that comes out of the RadioMax interface is used for remote tape recorder control. (It is the smallest of the three plugs.) Inside the RadioMax interface is a small relay with normally open contacts, which are connected to the tape recorder plug.

Just like the squelch signal relay in Icom radios these contacts are rated for LOGIC LEVEL VOLTAGES AND CURRENTS ONLY. The normal "remote control" input of a tape recorder does not require any additional hardware. These relay contacts are completely isolated from the interface, P.C. computer and the Icom radio, so they may be also be used to control LOW voltage circuits, e.g. a transistor to perhaps control the coil of a larger relay which in turn can be used to control the low voltage power to another device.

Note that even small cassette recorders will draw large surge currents when first connected to power, due to charging up of any internal capacitors, so do not directly run tape recorder power through these contacts!. The surge current will be enough to weld the relay contacts permanently closed.

#### Squelch Detect Signal

RadioMax monitors the radios squelch status, which is brought into the interface via the 3.5 mm plug without an identifying sleeve. The radio shorts together the tip and ring of the plug when a signal is present; the tip and ring are open circuit when no signal is detected.

#### CI-V Interface Signal.

The Future Scanning Interface converts the PC's RS-232 levels on the serial port to the Icom CI-V interface standard.

## **APPENDIX F.**

### ***BC895XLT PC Interface Cable Diagram and Operation Notes***

Note that there are five pins in line on the back of the radio. Only three are used; the connector may be plugged in either way round, since the two outside pins are shorted together and the two pins on either side of the middle pin are also shorted together. Here's the connections for a suitable cable. If you do not already have a suitable cable and do not wish to make one Future Scanning may supply a suitable cable.

RS-232 Signal	PC Port (9 Pin)	PC Port (25 Pin)	BC895XLT
Transmitted Data	3	2	1 or 5 (shorted inside radio)
Received Data	2	3	2 or 4 (shorted inside radio)
Ground	5	7	3

The radio must be in "remote control" mode for RadioMax to control it. This is indicated on the radio display by the letters RMT just to the right of the frequency readout. To place the radio in remote control mode press and hold down the ALRT/RMT button on the BC895 radio until it beeps twice; do this before starting RadioMax. If RadioMax is already running there is no need to exit; you can just re-select the radio or serial port selection in RadioMax once the radio is in remote mode, this will re-initialize the serial port and establish communications with the radio.

When finished you can restore local keyboard control of the radio by touching the ALRT/RMT button again. The state of RMT is maintained by the radio when power is cycled on and off.

## **APPENDIX G.**

### **TROUBLESHOOTING.**

The RadioMax system has been designed to provide years of trouble free service, using reliable low power electronic components in a miniature package. If problems occur first ensure that there are no loose connections and both the P.C. and radio are turned on. The system software will give some error messages which may help to pinpoint any problems. Some possible errors are listed below with remedies.

1. The software fails to scan, and remains on one channel. This can be caused by several reasons. Ensure that a scan file is in memory, either loaded from disk or generated by the 'Range Scan' function. Make sure at least two channels are unlocked. Check that the 'Paused' button is not selected. See if the delays have been set up for long time periods and a channel hit occurred. Ensure that the RadioMax interface is connected to the correct comm port on the PC. Ensure baud rate settings are correct. Use a "RS-232 Mini Tester" to visually verify activity on the RS-232 lines as the program operates. Make sure that the squelch and CI-V connectors are not plugged into the wrong radio sockets.
2. After first loading RadioMax reports 'No configuration file found' error. When RadioMax first loads it will look in the same directory as RadioMax for the configuration file, and report this error if it cannot find it. Configure RadioMax the save the configuration as "Radio.INI".
3. Serial interface errors. Although most users will probably operate RadioMax with comm ports 1 or 2, RadioMax will operate with comm ports 1 to 8. If comm ports higher than 2 have been installed the PC needs to be configured correctly for the system to work. Unfortunately installing extra comm ports in the PC is not as simple as plugging in a board, the following steps are required. First a memory address that is not already being used by another device needs to be found. The board being installed then needs to be set to this address. Then an interrupt that is not already being used needs to be found. The board being installed then needs to be set to use this interrupt. Windows then needs to be configured to recognize the new comm port. Finally RadioMax needs to be set to the correct comm port. Windows may provide some assistance in locating available memory and interrupt locations. It is straight forward process; however it is essential that non conflicting memory addresses and interrupts are used. "Standard" comm ports 1 and 2 on the PC generally use interrupts 3 and 4, and additional serial ports require other interrupts. If a board is purchased to provide additional comm ports it is highly recommended that the board have "high interrupt" capability, so it can use an interrupt not being used by another comm port or device. Interrupts 11 and 12 are often available on most PC's for extended comm ports. Note that the comm ports also need to be at least the "16550" type. (All recent PC's have this capability).
4. Serial Interface "Open Comm error -1". This indicates that an invalid comm port was requested and Windows does not recognize the hardware. Check the

Windows setting for the comm port specified, or configure RadioMax for a functional, installed comm port..

5. Serial Interface "Open Comm error -12". An illegal baud rate for this port was requested. Ensure your PC has fast enough serial ports installed.
6. Serial Interface "Open Comm error -10". The serial port is already being used by another device; perhaps the mouse is already using the serial port RadioMax was configured for.
7. Serial Interface "Open Comm error -4". The PC does not have enough memory to open the serial port.
8. Serial Interface "Open Comm error -2". The serial port is already being used and RadioMax is unable to use it. Perhaps you have started two versions of RadioMax at the same time and they are both trying to access the same comm port. This error may also occur if the PC has been configured at some time to communicate with a "Palm-Pilot" or similar device on the serial port. Even though the device is not in use (and may not have been used in months!) the driver software for it may have allocated the serial port, preventing RadioMax from using the port. It will be necessary to de-activate the relevant software; then restart or reselect the serial port in RadioMax.
9. Serial Interface "Serial Data Overrun Occurred". RadioMax is scanning faster than the radio is capable of running at, at the current baud rate. Either slow down the scanning rate (see "Timers"), or a much better solution is to reconfigure the radio to operate at its highest baud rate, then configure RadioMax to match the radios highest baud rate.
10. The radio scans but does not stop when a signal is detected. Verify that the "Max Listen Time" is not set to zero. Ensure that the correct squelch setting is selected for the radio and interface being used. Ensure that the squelch cable is plugged into the radio. Ensure that the comm port address matches the PC hardware. For the Icom high performance radios verify that the radios "VSC" switch is turned off (i.e. it is out). Use an "RS-232 Mini Tester" to visually verify that whichever input line is selected for the squelch operation changes state when a signal is detected on the radio. Note that if a 'null' modem cable is being used the signal name being used for the squelch may not match the indicated setting. With the squelch cable (not the CI-V cable with the indicator sleeve) unplugged from the radio and RadioMax running short together the tip and ring on the interface plug, RadioMax should detect this as a signal.
11. The tape recorder does not function correctly. Use an "RS-232 Mini Tester" to visually verify that the DTR and RTS lines changes state when the tape button is changed between "ON" and "off". If the tape starts when it should be off, and stops when it should be on, change the "Relay Normally Open" setting in the Configure Serial Port window. If the recorder runs continuously, proceed as follows. Disconnect the interface from the computer, tape and radio. Using an ohm meter measure the resistance between the shield and tip of the smallest jack plug (tape remote control plug), it should be an infinite resistance (open

circuit). If it is not the internal relay in the interface has been damaged, contact Data Delivery Devices LLC for assistance. When the interface is installed and the system is operating correctly the infinite resistance should go to zero ohms whenever the tape status next to the tape button shows "ON".

12. Radio picks interference from the PC. Some PC's (especially the higher speed ones) may generate interference with Icom radios at certain frequencies if the radio is very close to the computer. RadioMax is supplied with a long interface cable allowing the radio and computer to be separated by a reasonable distance. Move the radio away from the PC if interference is picked up. If a longer cable is used between the PC and the RadioMax interface ensure that it is wired "straight through", i.e. pin 1 on the male connector goes to pin 1 on the female connector, pin 2 to pin 2 etc. A serial "null modem" type cable swaps connections and will not work. The RadioMax interface just uses pins 2, 3, 4, 7, 8 and 20.
13. OptoElectronics Interface Problems. RadioMax will operate with the OPTOLINX CX-12 interface from OptoElectronics. Set the switches on the rear of the interface as follows:

Switch 1 - ON

Switch 2 - ON

Switch 3 - OFF

Switch 4 - OFF

Connect the CI-V cable from the radio to the full duplex or half duplex connector on the interface (it will work in either one). When running with RadioMax the "full duplex" and "half duplex" LEDs on the interface will change to reflect the tape recorder relay in the CX-12 interface status. Note that the CX-12 interface brings in two signals (called audio and squelch detect) to the "AUX" connector, which is a "stereo" (three connector) type. The tip (very end) of the connector is for "audio". The connection in the center (ring) actually carries the squelch detect signal. The connection closest to the cable is shield or ground. If a normal 3.5 mm mono plug to 3.5 mm mono plug cable assembly is used between the CX-12 interface and the radio the squelch signal is not passed through the interface, since the center conductor is grounded out by the mono plug. A cable needs to be used which connects the tip on a mono 3.5 mm plug (for the radio end) to the "ring" (center conductor) on the CX-12 interface end.