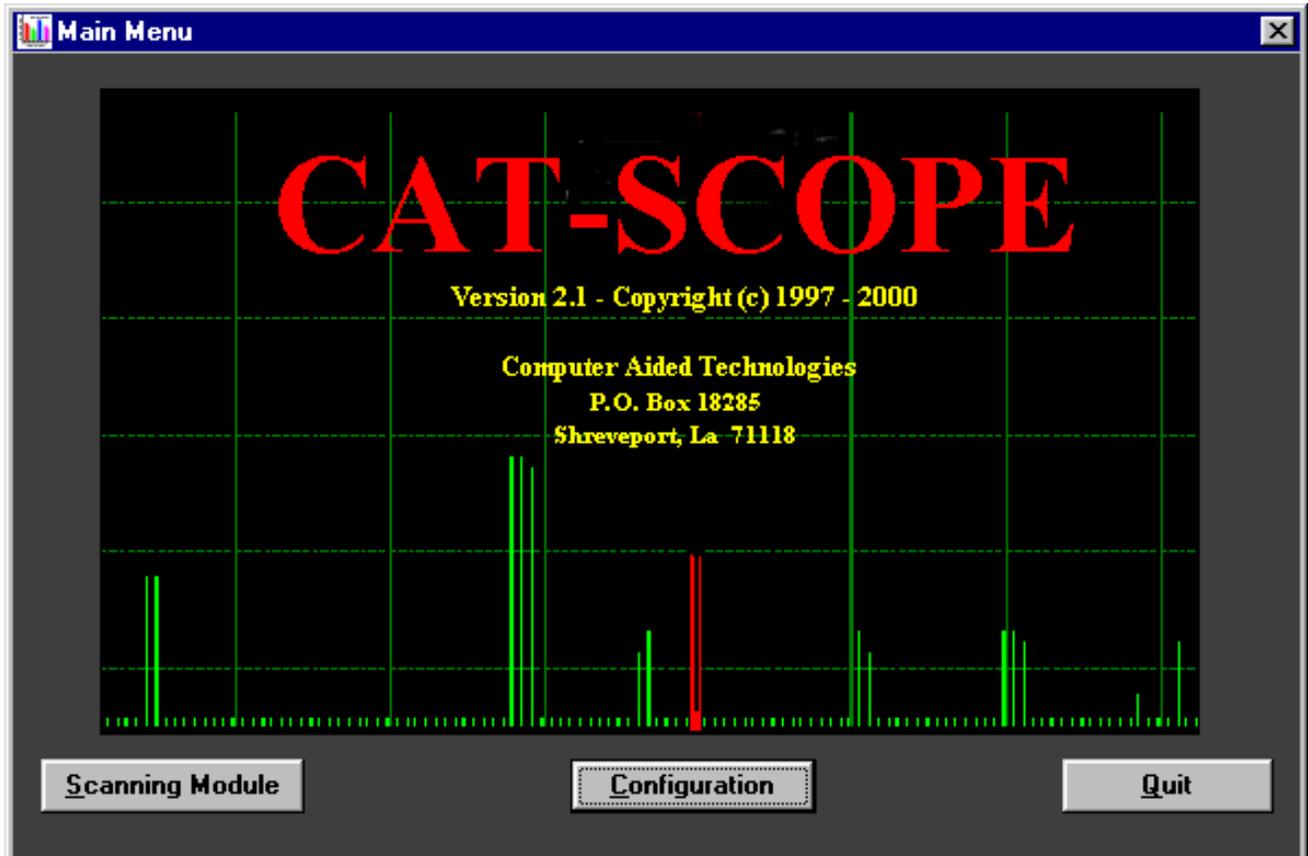


CAT-SCOPE



Spectrum Analysis for your PC

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Introduction

Introduction

Thanks for purchasing CATSCOPE. CATSCOPE is a software control program for AOR's SDU5000 and SDU5500. **(Because there are two units, we will from this point on refer to either unit as "SDU").** The SDU is a Spectrum Analyzer that can be attached to just about any radio that has a 10.7 IF output. With the SDU and this software program, you can have full computer control of your radio. You can visually see on your computer screen, full graphical representation of the IF's 'view' of the radio spectrum. As a stand alone unit, you must use all the buttons on the SDU. With, CATSCOPE, a simple mouse click can tune your radio, adjust the spectrum bandwidth, and even SCAN multiple frequencies, and record them to disk for later 'playback'. Multiple 'color filters' permit you to analyze the bandwidth in depth, from various 'perspectives'.

Some of the most common radios that can be used with the SDU are:

AOR - AR5000 (requires IF output Modification from Factory Authorized Service Center)

AOR - AR5000

ICOM R7000

ICOM R7100

ICOM R8500

Once any of the above radios are connected to the SDU, our program will essentially control the radio, using the SDU as the 'interface' or 'go-between'. The commands you issue from the computer by pressing command buttons etc, are essentially the same commands that can be issue from the front keyboard of the SDU

Introduction

unit. Commands that are sent from our program to the SDU are translated, and then sent to the specified radio. Tuning, mode changes, the bandwidth of the spectrum analysis and more are all possible with just a mouse click.

In addition, if you have ANY radio with a 10.7 IF output, while the controllability may be limited to reading the IF frequency, many things can still be accomplished, such as data capture to a disk file, peak reading and peak alarms.

We will cover all the features in detail later in the manual. First read the chapter on "General Installation", covering the connection of the SDU Unit to the radio, and also the connection of the system to the computer.

Thanks again for your support!

Jim Springer
Computer Aided Technologies

SYSTEM REQUIREMENTS

System Requirements

The required hardware for CATSCOPE is an IBM/PC compatible computer, Windows 3.1/95/98 or greater. 16 meg of RAM (32 recommended), A Hard drive with 2 Meg free space. A VGA color graphics monitor. A minimum of 1 serial port. A Standard serial cable is required to be connected between the computer and the SDU and another standard cable between the SDU and the radio. DO NOT USE A " NULL MODEM" CABLE, as this type cable has the handshaking lines reversed and will not permit data flow between the radio, SDU and the computer.

General Installation - Hardware

General Installation

The SDU, the radio and the CATSCOPE software are a three piece system that work in unison. You must treat the SDU as the 'interface' between the software and the radio. Unless you realize that the radio is controlled BY the SDU, you may experience difficulty in operating or understanding the software.

First things first - Since CatScope supports both the SDU5000 and the SDU5500 we will go through the setups for each unit individually.

The Hardware

SDU5000

For this example we will use the AR-5000 and the SDU5000 as our example of the hardware installation.

1. Connect power to the 12 VDC input on the rear of the SDU5000
2. Connect the " IF Cable" between the SDU5000 port labeled " RF-in" and the AR5000's " IF output" . The cable is an RF coaxial cable, about 24 inches long, with a BNC RF Twist-type connector, on each end.
3. Connect a serial cable between the SDU's serial port labeled " RX-Control" and the serial port of the AR5000.
4. Connect an (optional) cable from the video output to a separate video monitor.
5. Turn ON the AR5000, and then once the radio is 'booted up', turn on the power to the SDU5000.
6. a. Press the " CONF" button on the button panel of the SDU5000.
b. Press the number " 1." on the SDU panel and press <enter>, to

General Installation - Hardware

select
the radio type.

c. Choose the number " 2" (AR5000) and press
<enter>

If you have everything connected properly, 'so far', the SDU5000 should 'sign on' to the AR5000 and the words, " Connecting AR5000" should appear on the LCD screen of the SDU5000. If you cannot get " connected" you must first resolve these problems and trouble shoot your connections between the SDU5000 and the AR5000.

- b. If your radio is a different model, other than the type of radio the above procedures and responses should be similar.
- c. HINT - If you have an Icom but the receiver is not listed, you can sometimes choose one off the menu and then change your radio's CI-V address to match.

6. NOW, turn both units off. Connect the serial cable between the Computer and the SDU5000s remaining serial port, labeled " PC/IF" , and restore power, first to the AR5000, and then the SDU5000.

At this point you should again see on the screen of the SDU5000 the 'Connecting AR5000" sign on message, and you are ready to start running the system from the CATSCOPE Software.

Unless something changes in your system setups, you should not have to press anything on the radio or SDU unit other than to 'power up or down'.

SDU5500

For this example we will use the AR-5000 and the SDU5500 as our example of the hardware installation.

General Installation - Hardware

1. Connect power to the 12 VDC input on the rear of the SDU5500
2. Connect the " IF Cable" between the SDU5500 port labeled " RF-in" and the AR5000's " IF output" . The cable is an RF coaxial cable, about 24 inches long, with a BNC RF Twist-type connector, on each end.
3. Connect a serial cable between the SDU5500's serial port labeled " RX-Control" and the serial port of the AR5000.
4. Connect an (optional) cable from the video output to a separate video monitor.
5. Turn ON the AR5000, and then once the radio is 'booted up', turn on the power to the SDU5500.

The SDU5500 has 6 buttons at the bottom of the LCD screen. Depending on the LCD menu they have seven " layers" of functions. Cycle to function menu #1. There you'll see " RX" (Receiver) over the 2nd button.

6. a. Press the " RX" button on the button panel of the SDU5500.
 - d. Using the Tuning Knob select the radio type.
HINT - If you have an Icom but the receiver is not listed, you can sometimes choose one off the menu and then change your radio's CI-V address to match.
 - e.
 - c. Highlight the (AR5000) and press <enter>

If you have everything connected properly, 'so far', the SDU5500 should 'sign on' to the AR5000 and the words, " AR5000 Connected" should appear on the LCD screen of the SDU5500. If you cannot get " connected" you must first resolve any of these problems and trouble shoot your connections between the SDU5500 and the AR5000.

General Installation - Hardware

If your radio is a different model, other than the type of radio the above procedures and responses should be similar.

6. NOW, turn both units off. Connect the serial cable between the Computer and the SDU5000s remaining serial port, labeled " PC/IF" , and restore power, first to the AR5000, and then the SDU5000.

At this point you should again see on the screen of the SDU5000 the 'Connecting AR5000" sign on message, and you are ready to start running the system from the CATSCOPE Software.

Unless something changes in your system setups, you should not have to press anything on the radio or SDU unit other than to 'power up or down'.

General Installation - Software

Installation of CATSCOPE Software

The first thing to do is install your master diskette(s) onto your hard drive. CATSCOPE is not copy protected but the files are compressed on the disk into archives.

For Windows 3.1 simply click on the Files Menu bar at the top left of your Windows program Manager, and choose " RUN" . At the next Prompt, type A: SETUP.EXE (or B:SETUP.EXE if appropriate) and press <enter>. you must Include the entire file name AND extension or an error box will pop up, and tell you it cannot find the file.

For Windows '95 Click on START, and then point to SETTINGS. Double CLICK Add/Remove Programs, and follow the instructions on your screen to ADD a new program. You will see a prompt already filled in with the " A:SETUP.EXE" , so choose your source disk drive letter and press <enter>.

The installation will take a few minutes, and when complete you will have a new Program Group, named CATSCOPE, with two Icons installed in the program manager. Icon (CATSCOPE) and Icon CATSCOPE Help.

It would be advisable to make copies of your system disk(s) and store in a safe place.

***** warning messages during installation *****

1. If a warning message is displayed saying 'XYZ" .DL_ is already in use, just click OK to continue with the installation.

General Installation - Software

2. Unless you are running Windows NT or accessing CATSCOPE from a network, you can disregard any prompts to edit your Autoexec.bat file to include SHARE.EXE. While the setup program supplied by Microsoft looks to see if this file is in your Autoexec.bat system file, it is not necessary to use it unless you are running within a network..

Getting Started - Setting Up

Getting Started

It will be easier to use the software if you have a basic understanding of the connection of the hardware, and " what is controlling what" . The CATSCOPE Software communicates through the serial port to the SDU. Think of the SDU Spectrum Analyzer as an interface between the computer and the radio. The SDU accepts commands from the computer, processes them, and then takes the appropriate action. It may tune the radio, or change the 'view' or bandwidth of the analysis. Any communication between the radio and the computer must first go through the SDU Analyzer unit.

To run CATSCOPE, click on the CATSCOPE icon.

The opening 'main menu' contains three selections, which will be referred to throughout this manual as " command buttons" .

Quit

Exits Program immediately. Closes all files and saves the last used configuration for future sessions.

Scanning Module

This module is where you will spend all your time. All control functions are available from this module

Configuration

This module contains the settings or options that enable communication with the SDU.

Setting configurations

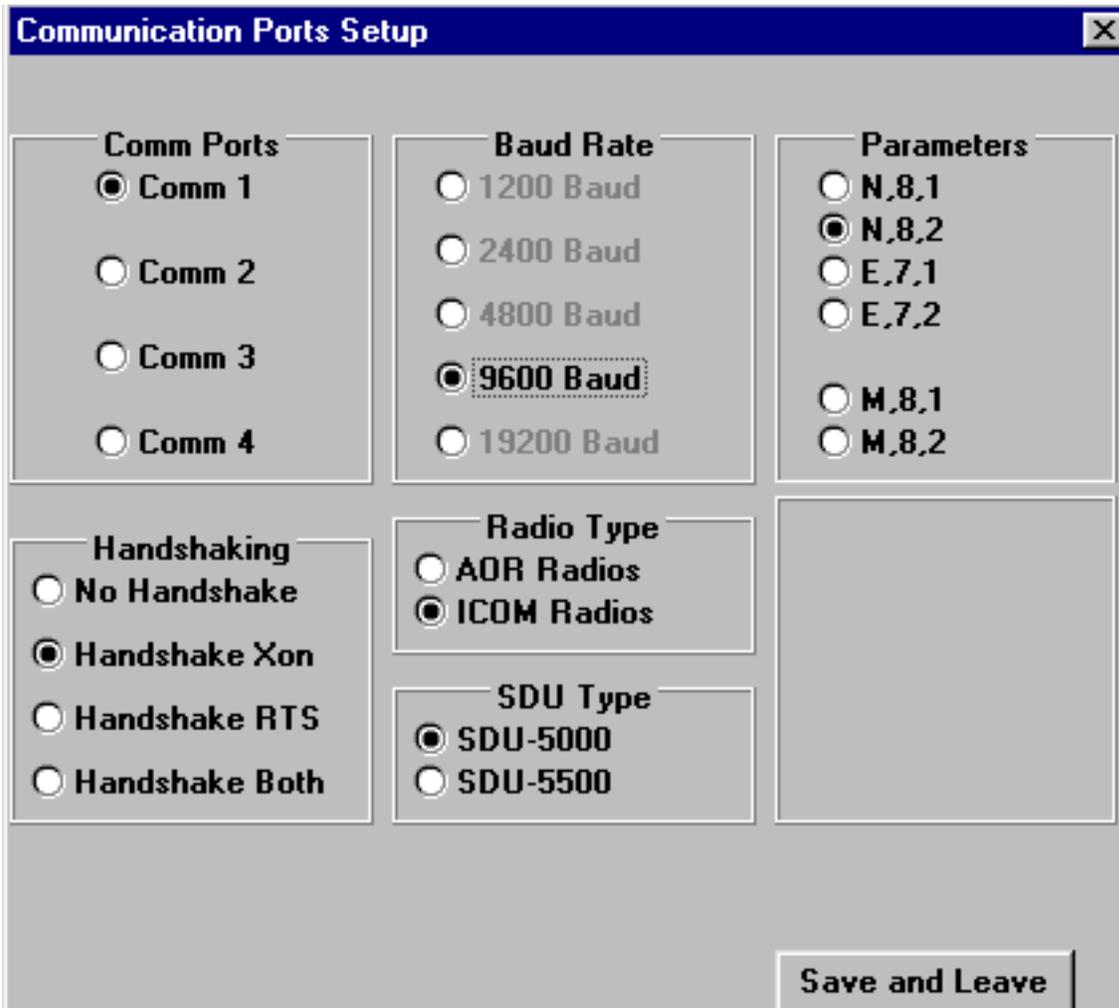
In order to communicate with the SDU, you must first select the basic settings such as COMM PORTS, and their parameters.

1. Click on the Configuration Button
2. Default Parameters for communicating to the SDU are

Getting Started - Setting Up

Comm Ports	Comm 1
Baud Rate	9600 - (Fixed)
Parameters	N,8,2
Handshaking	No Handshake

We have already setup the basic configuration for you, so you should not have to change anything but the comport assignment to get 'up and running"



3. Click on the proper Comm port. Only one can be chosen. CATSCOPE recognizes ONLY standard Comm port Addresses and IRQ's. If you cannot access the SDU, use the Control Panel in Windows to be sure some non-normal address or IRQ is not the problem. Windows NT

Getting Started - Setting Up

does not access comm ports in the same manner. If you are in a network and have access through a "RAS" (Remote Access Server), you may not be able to access the comports. NT may not let set a serial port to a 'Standard IRQ'.

Standard Port	Address	IRQ
Comm 1	" 03F8" hex	4
Comm 2	" 02F8" hex	3
Comm 3	" 03E8" hex	4
Comm 4	" 02E8" hex	3

5. Once all options are picked, Click on the command button 'Accept Saves' and then Click on the command button " Accept and Leave" to return to the Main Menu.

Getting Started - Scanning

Getting Started Scanning Overview

Scanning using the SDU is not exactly like using a radio scanner to scan between a preset range of frequencies. The SDU views the entire 10.7 Mhz bandwidth of the radio's IF. A radio can only 'see' or receive one frequency at a time, not the entire bandwidth. The frequency the radio is tuned to will be referred to as the "Center Frequency". The SDU then breaks this range of spectrum up into 160/320 distinct points of reference, with the Center Frequency being in the middle of the sweep. After each scan, it then sends this information back to the computer as a stream of data. This is commonly called 'sweeping', and is much the same as you are used to seeing on an oscilloscope. A single Sweep of the bandwidth of the IF takes place about 1-2 times per second. Each sweep's points are then 'downloaded' to the computer, plotted and placed on the computer screen, by the software, in the same pattern as you see displayed on the SDU's LCD screen. Since at 10 MHz each 'point of reference represents .065/032 Mhz, signals that are present "in between' these reference points, even though 'active', may not appear to be 'visible'. If you want to see a 'finer detail view', simply narrow the sweep range. A suggested sweep range would be 160/320 times the normal increment for that band.

Example: Lower range 450 Mhz
 Upper range 454 Mhz
 Increment .025 Mhz
 160 segments = exactly 4 Mhz 'bandwidth' or
span.
 320 segments = exactly 2 Mhz 'bandwidth' or
span.

This way you will probably be able to view every occurrence of activity within the designated range. A much narrower detail can be achieved by lowering the

Getting Started - Scanning

bandwidth to below 1 Mhz. At this level of resolution, you can probably even see the stereo modulation envelope of most FM broadcast stations or a TV station's Video and audio carriers for a TV channel..

While the SDU unit has these abilities as a stand alone system, this is where the similarity ends. Basically, the SDU unit cannot maintain any information in it's memory. Once the sweep is completed, it is discarded, and another takes it's place. With the CATSCOPE software program, this information can be saved to diskfiles, manipulated, averaged, and even 'smoothed' for several samplings to accommodate erratic signals and fluctuations in signal strength. Diskfiles can be replayed at will, even without the SDU being hooked up to the computer. You can even send the files to some other facility for further analysis, using the software without even having the SDU unit connected!.

Basic "How to start"

We will start with a simple 'tutorial' of how to get started and then go into each of the CATSCOPE features, by command button.

1. From the Main Menu, click on the Command Button " Scanning Module" .
2. A 'blank' grid representing the screen of an oscilloscope will be displayed, The most apparent 'first thing' you will notice is a small 'window' in the lower 'control button' area. It is placed in the middle and just below a command button labeled " Center Freq" , and it will be showing a scrolling message " Reading Reading Reading" . This indicates the computer actively reading data flowing from the SDU unit to the computer. Once communications are established, the first of a

Getting Started - Scanning

series of graphical screens of the spectrum will be displayed. The center frequency of the spectrum will begin to be displayed in this window, alternating with the " Reading Reading" message. This window will always display the center frequency, or the frequency the radio is tuned to.

3. Now move your mouse cursor " Cross Hairs" around on the spectrum chart. Look at the top of the chart area, and you will see a small window that contains a changing frequency. This frequency is the frequency UNDER the cross hair pointer of the mouse.
4. Stop the cursor on some point and click the LEFT Mouse button and release it. After you release the mouse button, move the mouse cursor to some other point. A RED cross hair is 'left' where you clicked the left mouse button. This point sets
 1. The 'peak threshold' and
 2. The level and position for the 'peak alarm'.

The Red Cross Hair will remain stationary until you reposition it by clicking again on the left mouse button. The Peak Threshold determines the level to be **exceeded** before automatically showing the frequency for each 'peak' at the top of the graphical area. The resolution of the peaks can be so fine as to actually show several vertical lines representing the 'peal'. The software will attempt to find the 'highest peak' and only show a frequency for THAT position, or 'center of the activity, instead of ALL of the points. Move the red cross hair by clicking the left mouse button to a lower level on the graph.

The Peak Alarm is a 'one place' position. At this exact spot, if a peak 'hits' the exact center AND vertically exceeds the cross hair, the " beep'

Getting Started - Scanning

will sound. (If this option is chosen from the configurations menu).

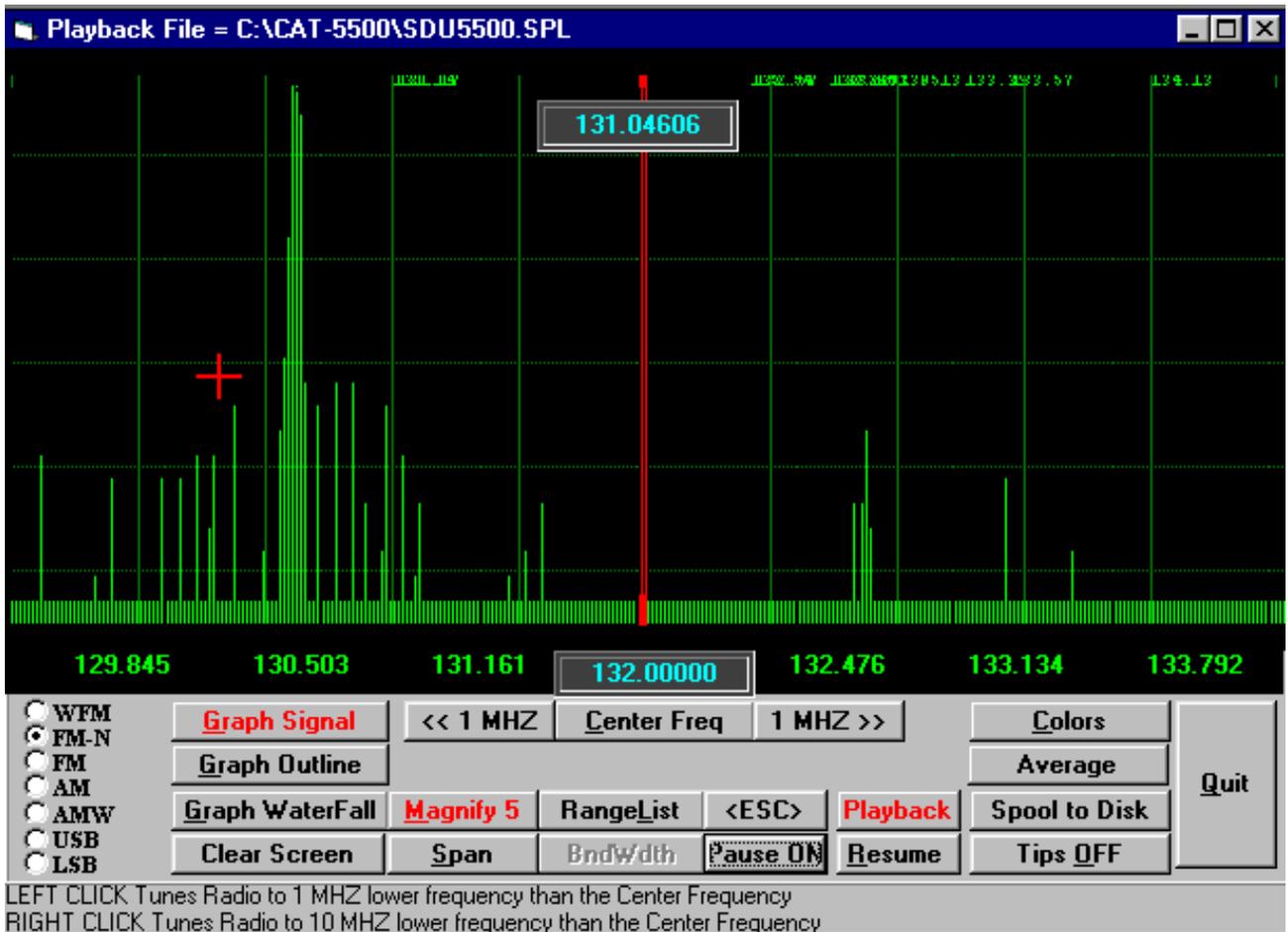
5. Now, move the Mouse Cursor to a 'peak' or high point on the one of the signals, and click the RIGHT mouse button.
 - a. The radio will be immediately tuned to this new frequency, and if there is a signal present you can hear it on the radio.
 - b. The SDU will now have a new center frequency based upon the new tuning of the radio. After a period of 3-4 sweeps, the new spectrum chart and center frequency will be updated.
6. Now click the command button in the center of the lower 'control panel' area and input a new center frequency into the prompt box that pops up. Your radio should immediately tune to that frequency, and in a few sweeps, the graph will show the new spectrum analysis.

This is the basic concept of the CATSCOPE Software. Once you become familiar with these features. Proceed to our complete details on all features, and some hints on using CATSCOPE.

Range List Scanning

Command Buttons

The Command Buttons are all essentially located on the lower area of the screen. We will explain these buttons in alphabetical order, so you will not have as much trouble locating the explanation for one at a later date.



<< 1 MHZ

This button will immediately tune the radio 1 mhz lower in frequency. Since the SDU has complete control of the radio during a session, you cannot tune the radio manually. If you could, the actual receive frequency would then be different than the

Range List Scanning

SDU's information and all the spectrum would be misaligned. If you are recording a spectrum analysis, you might want to periodically move the frequency lower, a mhz at a time, and get a more complete picture of the 'sweep', especially if the 'sweep' is of a small size.

Center Freq

The center Frequency is the frequency the RADIO is tuned (to). While you can visually see either side up to 5 MHZ, or a sweep of 10.7 MHZ at a time, the Center frequency IS this radio's receive frequency. Clicking this command button will pop up a small input form. Enter the new Center frequency, either press ENTER or click on ACCEPT to set the new frequency. It would be preferable that the Center Frequency be one that is normally active, such as a broadcast station or Police frequency.

1 MHZ >>

This button will immediately tune the radio 1 mhz higher in frequency. Since the SDU has complete control of the radio during a session, you cannot tune the radio manually. If you are recording a spectrum analysis, you might want to periodically move the frequency higher, a mhz at a time, and get a more complete picture of the 'sweep', especially if the 'sweep' is of a small size.



Colors

While the program is designed for the most 'average' and pleasing color combination, it is also understandable that some monitors, or LCD screens cannot reproduce the colors accurately. In fact some combinations could literally be 'invisible' on some screens. Clicking on this button will pop up a menu of all the possible 'visible' combinations of **foreground** colors. Click on the foreground and background radio buttons to choose a new color. One will certainly be more pleasing or 'visible' to the eye. This color setting is automatically saved as the new default upon exiting the program. You only have to set it once.

Range List Scanning

Average On/Off

This button will cycle through several different 'color phases'. Each has it's own unique properties when visually displayed on the screen. Some of the other graph selections can be combined with these color options for some rather unique analysis displays.

Average OFF

This selection will return you to your 'default' setting, All previous sweeps are erased as the new one is painted.

Average Colored

This selection will automatically cycle through all the available color palettes that can be seen with the normal screen's background color. Each preceding sweep is left on the screen, but the overlapping color, being different, will give you the ability to see the previous sweeps, each with different characteristics, peaks and valleys..

Average Smoothed

This selection will average the previous 4-5 sweeps with the present one, and present the 'average' of all sweeps in a bright green color. If signals are 'erratic' or fluctuating a lot, this will smooth them out and make a more 'normal' display...

Modes (Option Buttons)

Each time the frequency is changed, an auto bandplan 'module' is invoked. This eliminates the constant "extra" work of choosing not only a frequency, but the mode. The band plan has been 'fine tuned' to meet the international conventions for mode, per frequency allocation. However nothing is 'perfect' or meets all requirements. If the mode picked by the auto band plan is not correct, you can manually change it by clicking one of the modes in the Options box to the left bottom of the screen. This mode

Range List Scanning

will stay in effect until a new center frequency is picked.

Graph Signal

This selection, which is the default, shows the 'normal' vertical lined display, of signal amplitude.

Graph Outline

This selection displays the vertical component of the each signal's amplitude, with each succeeding point of reference 'connected' or traced to the other. There are no distinct points of reference discernible, only the 'tops" . This will show basically a 'boxed in' style of graph, .

Graph Waterfall

This selection displays the vertical component of the each signal's amplitude, with each succeeding point of reference 'connected' or traced to the other. There are no distinct points of reference discernible, only the 'tops" This will show basically a 'boxed in' style of graph, .BUT, the difference is that each succeeding trace will accumulate and offset by a small amount. This will give the appearance of a 'waterfall' or landscape display. If you also choose to use the Average " MultiColored" command, you should be able to distinguish several separate traces on one display.

hint use these selections in conjunction with the **Average** button

Magnify

Cycles through 1-12 magnification. As you sweep different frequency ranges you will discover that not all frequency areas have the same average amplitude. For instance the shortwave spectrum may almost 'peak out' your graph, while the UHF band will barely show up at all. You can cycle quickly between normal and a 'times 12'

Range List Scanning

magnification by repeatedly clicking this button. Cycling past 12 starts over at 1 or normal.

Range List

This is a powerful addition to the basic concept of spectrum analysis, and as such will be treated as a separate section of manual in another chapter. The range list is actually an entire functional 'scanning' module. The SDU unit, by itself cannot automatically change frequencies. This module permits unattended multiple range changes.

ESC

Many functions are going on at the same time. The SDU unit is sending data at 160/320 graphical points per second, and at the same time commands can be sent to the SDU unit to change frequency, bandwidth, etc. Choosing several options too fast can sometimes cause the SDU to get 'confused' and hang up at midpoint of executing a command. When this occurs, usually the data flow from the SDU unit is interrupted, and the graphical data will not be updated on the computer screen. If you notice the SDU's screen is 'waiting' for a command, pressing this command button will function the same as if you pressed "ESC" on the SDU unit directly.

Playback

Clicking on this Command Button toggles on/off the ability to 'playback' a previously recorded spectrum session. When you first click, a 'dialog' box will appear, permitting you to choose a file for review. All "playback" files have an extension of "*SPL" (short for 'spool'). Pick a file. If the file is a valid playback file, the command button will be changed to read "Playback ON", and the "Title Bar" at the top of the screen will change to reflect the name of

Range List Scanning

the file being played. The file chosen will continue to 'play' as long as you wish. The file chosen will 'cycle'. As it reaches the end of the file, it will start over again, and continue to do so until you tell it to stop.. Click the Command button again to 'turn off' the playback function.

Spool On/Off

Clicking this command button enables you to choose the filename for creating 'Playback' files. The common term, derived from the days of BBS's, is called spooling. If you wish to use a file already in existence, the new data will be appended to the end of the existing file. Choosing a name that does not exist in the directory, will create a 'new' file.

The data flow from the SDU unit is considerable. Each sweep of 160 points contains approximately 1600 bytes of information. Take into consideration that data is flowing at this rate every second, this amounts to over 60 times 1600 or 100,000 bytes of information per minute. It will only take 10 minutes to accumulate a 'meg' of data. Leaving this function on for an hour will amount to 6 Megs of information. Unless you have a lot of hard drive free space, you can soon get 'disk full' errors.

Clear Screen

Basically this is used in the event that the screen becomes so 'painted' with graphical display, that it no longer 'makes sense'. Repeated sweeping, without refreshing the screen, such as is possible for the "Averaging" function, can render the entire screen a meaningless 'blob'. Click this button to reset the entire screen, clear all graphics and start over.

Range List Scanning

Span

We prefer to call this "bandwidth control", but the function on the SDU is named 'SPAN'. Span is the frequency range from one side of the spectrum display to the other. The maximum is 10.7 MHz, which is also the IF bandwidth of the radio. Choose a new 'span' or bandwidth by clicking this button. Not ALL bandwidths are valid for the SDU unit, and refer to their owners manual for details. For all practical considerations, ANY bandwidth that is invalid will be 'defaulted' to the nearest useable value. Minimum is 500HZ, and maximum is the IF of the radio, or 10.7 MHz.

Pause

Each spectrum sweep takes approximately 1 second to complete. If there is a point of interest you wish to examine, you can momentarily 'pause' the sweep and reception of incoming data from the SDU unit.

It is advised to use this function sparingly. Since the SDU unit is continually sweeping, the data transmissions can become backlogged. The reception 'buffer' in the CATSCOPE is still 'open', can exceed it's maximum size (normally about 32,000 characters of data). This can lead to unpredictable 'quirks', such as erroneous data, or worse yet, the complete shut down of the SDU unit, due to it's inability to send data. If this occurs, sometimes the only way to reestablish communications is to turn off the power to the SDU unit and then reinitialize it by turning it back on. Once you wish to resume, click on the **Resume** command button.

Resume

Once you have Paused the display, pressing this command button will 'resume' the scanning sweeps, and update to the computer screen. If a lot of

Range List Scanning

data has built up, you may see several rapid passes until it catches up with the normal sweep data from the SDU. Read the description for the Pause command button for problems associated with pausing too long.

Tips On/Off

CATSCOPE uses an exclusive 'balloon' help tips feature. Clicking on this command button, toggles on off the function. When toggled ON, each time your mouse cursor 'comes to rest' over a command button, or area of the screen that contains a 'help tip', a balloon will pop up, showing a short description of that control or function.

Quit

Quits the Spectrum session, and returns you to the Main Menu. This does NOT end your session, but only returns, stops or pauses activity, and returns you to the Main Menu.

Range List Scanning

Range List Scanning

The Range List command button pops up a miniature database of frequency ranges you can cycle through. While several ranges are included with this program, the list can contain up to several hundred individual entries. Each entry consists of several columns of 'fields' of information

By Column they are:

1. Dwell Time

This is the time a particular range will 'dwell' or stay on a selected range IF you have chosen "Multiscan". Each time this range is used, it will stay on that range for this amount of "dwell" time before moving to the next selected range. The default dwell time if no value is entered will be 1 minute.

2. Select

Selects ON/OFF a range. If OFF, and you are using Multiscan, then this range will be skipped, or not used. This has no effect on the range being changed if you are not in Multiscan, as clicking on ANY range immediately changes the system to that new range regardless of its ON/OFF status..

3. Description

This description is the text that will be displayed in the top menu bar of the Spectrum Window after selecting one of the ranges, or if in MultiScan, as each range is automatically sequenced.

4. Lower Range Limit

The lower range of the spectrum display. You must choose a lower range that is no greater than 10.7 Mhz from the upper range. CATSCOPE will 'center' the range on your graphical sweep, and

Range List Scanning

maximize the display for full spectrum viewing. If the 10.7 MHZ range is exceeded, the center frequency will be valid, but the upper and lower ranges could be truncated at the 10.7 maximum and the range displayed may not match what you have programmed into the database.

5. Upper Range Limit

The Upper range of the spectrum display. You must choose a upper range that is no greater than 10.7 Mhz from the lower range. CATSCOPE will 'center' the range on your graphical sweep, and maximize the display for full spectrum viewing. If the 10.7 MHZ range is exceeded, the center frequency will be valid, but the upper and lower ranges may not match what you have programmed into the database.

6. Reception Mode

The proper mode for the frequency range you want to 'scan'. Only the programmed mode will be used. If frequency bands using different modes 'overlap', only the programmed mode will be used.

In addition to the Columns in the database, there are three Command Buttons:

1. Multiscan On/Off

Choosing ON, will start an immediate 'scan' of all records that have the selected field turned ON. Fields that are selected " OFF" , will not be used. This will let you selectively choose only certain areas of interest. ALSO since the SDU unit is only capable of a bandwidth of 10.7 MHZ, several records in succession, that have a range that is concurrent with the previous one, would permit you to 'scan' a bandwidth of many MHZ in successive sweeps.

2. Add (a record)

Click on this command button to ADD a new record. The cursor will be positioned at the

Range List Scanning

first column, and successive entries to the record can be made by pressing enter, and moving the cursor with the mouse or the left/right arrow keys.

3. Finished

Closes the database 'viewer', but does not necessarily stop the scanning function. If you have chosen 'multiscan', the scanning process will still continue until you turn it off by toggling the 'MultiScan' button to OFF.

Additional Features of the Range Scan Viewer

Editing (an existing record)

1. Position the mouse cursor over a 'cell', and double click. This will change the background to a different color, indicating you are in the edit mode. Make your changes, and press ENTER to accept. If you press ESC before pressing ENTER, the edit is not 'valid', and the cell will be restored to its previous contents. However if you move the cursor to another cell, the editing changes WILL be accepted automatically

2. Position the mouse cursor over a 'cell', and simply start typing. This will change the background to a different color, indicating you are in the edit mode. Make your changes, and press ENTER to accept. If you press ESC before pressing ENTER, the edit is not 'valid', and the cell will be restored to its previous contents. However if you move the cursor to another cell, the editing changes will be accepted automatically.

The exceptions to this are:

1. The Mode Column which has a small 'button' selector. You MUST use this selector button to pop down the modes in order to choose one.

Range List Scanning

2. The ON OFF Select column. Repeated clicking will toggle the ON OFF status of this column. Entering a 0 or 1 will also register as (0 for OFF) and (1 for ON)

Selecting/ Scanning a single range

Clicking once on any record will immediately tune the radio to the new 'center frequency" . If you do NOT have Multiscan enabled, the range will stay there until you manually change it to something else. This ability makes it really easy to store your favorite ranges for immediate retrieval without having to resort to manually typing in each one every time.

Tips and Hints

Tips and hints for using CATSCOPE

Getting "Set Up"

The most difficult part of 'getting started is to get proper communication between the SDU and the Radio and CATSCOPE. The Radio and the SDU are connected in a 'closed loop', and the SDU and the software are connected to another closed loop. Each is dependent on the other if you are using software to control the entire system. We have found that a 'systematic' approach is the quickest way to get trouble free performance.

Most customers will want to first boot up the software and start using the system immediately. The reverse approach is necessary. FIRST assure that you have proper communications between the SDU and the RADIO before proceeding to using the software. Since you are dealing with TWO 'closed loop' systems, it will be difficult to trouble shoot the 'system' unless you get one thing at a time running.

Read the SDU's manual. In particular the pages describing how to access the internal SDU's setup menus. The procedures for setting up the SDU unit are clearly detailed in the SDU manual, so we are not duplicating them here.

Cannot connect

One thing worthy of mentioning, is that the small slider switch on the rear of the AR5000 and AR3000A must be in the **remote position**. If you cannot 'connect' between the SDU and the radio, it could simply be this switch is not set

Tips and Hints

correctly. Also while most AR5000 models may have been modified for 9600 baud, the AR5000's should still be set for the factory default of 4800 baud.. The SDU and the AR3000 ONLY communicate at 4800 baud. **This baud should not be confused with the baud CatScope uses to communicate with the SDU unit.**

Baud Rate of Radio(s)

Mainly, the baud must be correctly set not only for the SDU to Radio connection, but also the software to the SDU. Once you get communications between the radio and the SDU, everything should be fairly easy. If you have an external video monitor, use it until everything is running properly.

Baud rate for CATSCOPE to the SDU is fixed at ,N,8,1

All 'supported' radios use 9600 baud between the radio and the SDU, except the AR5000 which uses 4800 baud.

Radios Supported are:

AR5000 - has an internal switch but should be 4800

AR5000 - can be set from the front panel of the radio

ICOM - ALL come set from the factory at 1200 baud.

So you must change this to 9600 internally before the SDU and the Icom can communicate. The Icom manuals clearly describe this. The Icom R8500 can be easily set from the front panel using the radio's

Tips and Hints

on screen special functions menu, by turning power on while holding in the " Sleep" button.

ICOM Interfacing

If your Icom radio does not have a built in DB-9 or DB25 Serial connector, In order to use the ICOM with the SDU you must use either the ICOM CT-17 or CAT232 (Uni-Versatile Interface) as a 'level converter'. (not supplied with the SDU5000). The level converter is connected between the SDU and the Icom's CI-V port on the back of the radio. The CT-17 must be connected as though the SDU unit was the 'computer' part of the connection.

Using the Range list

The Range list is an extremely versatile way of 'programming' your sessions. Create as many records as you want. The limit is 100 in all. If you have a broad area of analysis, since the practical limit of the SDU is 10.7 Mhz, you can create several records, each a smaller division of a larger scale analysis. For instance:

Range of Analysis 400 mhz to 450 mhz

				Lower	Upper
Mode					
Create range	1.	Dwell 2	ON	400.00	410.00
FM-N					
Create range	2.	Dwell 2	ON	410.00	420.00
FM-N					
Create range	3.	Dwell 2	ON	420.00	430.00
FM-N					

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Create range	4. Dwell 2	ON	430.00	440.00
FM-N				
Create range	5. Dwell 2	ON	440.00	450.00
FM-N				

Turn on Multiscan, and 'select' only the above 5 ranges. Each one will be analyzed for 2 minutes then advance to the next, and round and round until you finished but clicking on MultiScan OFF. You can also activate the 'spool' command. This way you can walk off and leave it running for some time, come back and playback the recorded file.

Range List - "Quick Pick"

If you create a number of different ranges, even without multiscan on, it is quite easy to change ranges 'on the fly'. Simply click on any range, and the analysis is immediately switched to the one you select. You can pop up/down the range list easily by using the **Range List** command button. This pop up/down procedure does not save any changes, so if you edit a record, exit the range list by choosing the **Finished** command button to assure the edit is saved.

Processing times

The processing times for commands sent to the SDU are not 'instantaneous'. The data flow from the SDU can build up not only in the SDU buffer (memory holding area), but the EDI software buffer. If commands are sent while the SDU is downloading a sweep, commands must wait to take effect until after the data is fully transmitted to the computer. Also amplitude from one signal area to another can cause false readings. This

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can usually be remedied by clicking on the **Retrace** or **Reset** command buttons. The agc of the radio may need to be changed as well. There are no software commands to enable AGC changes, so you will have to do this at the radio.

Technical Assistance

Technical Support

Technical support is available by three different means

1. EMAIL Scancat@scancat.com - This is the most economical method as most of us are now 'on the net'. Messages are checked (for) daily, and responded to within 24 hours. Usually all email is responded to 'while on line', but if the backlog is too great, messages are replied to and uploaded at the earliest opportunity. Generally in the evening.

FAX - 318-686-0449 - Our fax is on 24 hours a day, including weekends. This is a quick way to get a lot of information to us regardless of the time zone you are in. Messages are usually replied to in same business day, (9-5) or if on weekends, replies are within the next business day.

Phone - 318-687-2555 - Available only M-F (am to 2Pm Central time. If you call outside of these times you will get a recorder that does not take a message. It will refer you to one of the above methods. While not the cheapest method, it can be the most efficient if you have a complex problem that you just can't seem to get across on the written media. Support time is on a 'priority basis' by caller, but interruptions must be lived with. We are a small company and only have two people to answer phone lines.

If all else fails

Technical Assistance

Operator assisted calls - 318-687-4444 -The operators can only take messages " Off hours" and on weekends you can call this number to speak to an operator or order additional product. Because these people are 'order takers', NO technical assistance is available other than taking a 'brief message' about your problem. They will then fax our office your name etc.

MOST problems we encounter are associated with Serial Ports. CATSCOPE is a windows application. Windows can assign addresses and IRQ's to comm ports that are not 'standard'. Even if your DOS applications function properly, Windows has it's own set of configurations that can be different for the same hardware ports.

CATSCOPE recognizes ONLY standard Comm port Addresses and IRQ's. These settings are not an option from within the CATSCOPE software. If you cannot access the SDU, use the Control Panel in Windows to be sure this is not the problem.

Standard port and address

	Port	Address	IRQ
Comm 1		" 03F8" hex	4
Comm 2		" 02F8" hex	3
Comm 3		" 03E8" hex	4
Comm 4		" 02E8" hex	3

We appreciate your using CATSCOPE. WE have spent a lot of time and effort to bring you a high quality and easy to use product. We are always 'open for suggestions' on ways to improve and add features to our products. Your feedback is important and a necessary part of our producing a better product. Please feel free to 'drop us a line' with your suggestions.

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