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This version of the documentation has been updated for Probe version 3.0

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When Probe first loads, the application's window will be empty. You must open or create a study in order to load Probe's main interface. To create a study, choose "New" from the <u>File Menu</u>. This will open the <u>wizard</u> which will guide you through the creation of a new study. After exiting the wizard, Probe's main interface will be displayed and signal calculation will begin. While signal is being calculated you can still use any of Probe's functions. The <u>Signal Progress Bar</u> will appear at the top of the main window while signal is being calculated. When the signal is finished being calculated, you will be asked if you would like to redraw the map. You can redraw the map at any time by pressing the "Redraw" button (located on the <u>Transmitter List Box</u>).

# **Probe's Main Interface**



### **General Toolbar**

The icons on the general toolbar are shortcuts to common operations such as creating a new study, saving and loading studies, and printing. Map Tools Toolbar

Using this toolbar, you may select one of Probe's interactive map tools. These tools can be used to perform tasks such as zooming, adding text, getting map information, examining profiles, and counting population in a rectangular region.

### **Functions Toolbar**

This toolbar has shortcuts to some of the program's more commonly used functions such as map settings, study editing, contour overlaps, population reports, NAD conversion, and access to the help file.

### **Transmitter List Box**

This box contains a list of all of the transmitters in a study. The "Transmitter List Box" can be used to choose which transmitters are displayed and which color is associated with a transmitter. There are four buttons at the bottom of the transmitter list box. The "All" and "None" buttons are used to automatically select all or none of the stations in the list. The "Redraw" button can be used to force the map to be redrawn (use this after changing a transmitter selection). The "Display Options" button can be used to access the <u>"Display Options Window"</u> which allows you to set the map's properties.

Cutoff List

The cutoff list displays the currently defined field strength value cutoffs and their corresponding colors.

Window List

The window list displays a list of all of the windows within Probe that are open (population reports and profile plots for example). Click on the name of the window you would like to have displayed to make it appear.

**Status Bars** 

Probe has two status bars located at the bottom of the program window. The top status bar is used to display information about the tool bars and menu items. When the mouse is located over a toolbar or menu item, the top status bar will show a description of the items functionality. The status bar on the bottom is used to display information about the study. This status bar displays the current drawing mode and calculation status. It also shows extended information about the map when the "Map Information Tool" is used.

#### **Terrain Toolbar**

This toolbar shows the selected terrain configuration for the current study. It is in the form of "Primary" / "Secondary". If only a primary database for the study was specified, that is all that will be displayed.

#### **Map Settings Toolbar**

The map settings toolbar displays the current center coordinates of the map along with the map's scale and projection.

This is the display area of Probe's main window where the map is drawn. Probe is designed to be a completely WYSIWYG environment, so the map window will show you exactly what will appear on the printed output. The map window is set up to represent a sheet of paper containing a map and several objects which can be added to the map and manipulated. Items such as text and legends can be placed anywhere on the map (these objects can be interactively moved using the selection arrow, see <u>Map</u> <u>Tools</u> for more information).

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To install insert the Probe CD in your CD-ROM drive. The setup program should automatically start shortly after inserting the CD. After running the installation program, you will need to set up the paths to the various databases which Probe uses. To do so, run Probe and select "Path Setup" from the <u>View Menu</u>. This will load the <u>Path Setup Form</u> where you can select the paths to the databases.

Probe requires the use of a hardware key provided by V-Soft Communications. A device driver for the key must be installed before the program will run. Insert the CD-ROM labeled "HASP Installation" and the install program for the device driver will automatically start. When running Probe the key is used to check user authorization. The key is a bi-directional device which plugs into your parallel printer port or USB port. The parallel key is fully transparent to other operations using the parallel port.

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Probe uses several databases which must be installed on the computer. Choose "Path Setup" from the <u>View Menu</u> to setup or change path settings.

Path Setup		
FCC TV Database:	c:\V-Soft\tv	Browse
FCC DTV Database:	c:\V-Soft\tv	Browse
FCC FM Database:	c:\V-Soft\fm	Browse
Map Data:	c:\V-Soft\vmap	Browse
Street Level Data:	c:\V-Soft\Tiger	Browse
Land Cover Data:	c:\V-Soft\landcov	Browse
V-Soft Reference Directory:	c:\V-Soft\refer	Browse
Tower Data:	c:\V-Soft\geofiles\to	Browse
	🗸 ОК	X Cancel

To set up the path data you can enter the directory which contains the specific database in the appropriate edit boxes, or click the "Browse" button next to each edit box to find the directory using a tree view.

The terrain path is configured using the <u>Terrain Setup Window</u> and the census data paths are setup using the <u>Population Data</u> <u>Path Setup Window</u>.

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Terrain Setup	<u>Тор</u>
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Probe's terrain database setup can be configured by selecting "Terrain Path Setup" from the <u>"View" menu</u>. Note - you cannot have a project open when configuring the terrain databases.



Probe is set up in such a way that "terrain drivers" are used for accessing various terrain databases. The terrain setup window shows all of the databases that you have installed (so the list on your computer may look different based on your situation). Databases that appear to be correctly configured will show "Tested Successfully" next to them. Click the "Edit Button" to select the terrain driver file and supply the path to the actual terrain data for the selected database:

🔏 Edit Datal	oase Settings	
V-Soft 3 Se	cond US Terrain	
This data function the filena	abase requires a driver file and path to terra properly. Please supply these below. For ame of the standard terrain driver is:	ain data for it to this dataset,
S	tandard Driver Name: vsoft03.vtd	
VTD File:	C:\probe3\vsoft03.vtd	Browse
Data Path:	D:\3sec\	Browse
	🗸 ОК	🗙 Cancel

The program will tell you the standard driver name for the database that you are editing. Once you have setup the database, click OK. Then check to see if the database list shows "Tested Successfully". If it shows "Test Failed", then you have a configuration problem.

**Available Databases** 

# The V-Soft US 3 Arc-Second Terrain Database

Terrain Driver: vsoft03.vtd

The V-Soft US terrain database has 3 arc-second data for the 48 contiguous states, Puerto Rico, and Hawaii. The path must be specified to the location of the actual ".dat" data files.

The V-Soft 30 Second World Terrain Database

Terrain Driver: vsoft30.vtd

The V-Soft 30 second world terrain database covers the entire world at 30 arc-second resolution. The path to the "g30info.dat" data file for the database must be specified as the path in order for it to work correctly.

The V-Soft 3 Second Alaska Terrain

Terrain Driver: vsoftak.vtd

The V-Soft 3 arc-second terrain database is based on an older 3 second USGS Alaska dataset.

The V-Soft 30 Second US Database

Terrain Driver: vsus30.vtd

This is the older 30 arc-second NGDC terrain database that is generally used for FCC contour calculation.

The NED 3 Second US Database

Terrain Driver: ned03.vtd

This is a US 3 arc-second database that was generated from the 30 meter National Elevation Dataset.

The NED 3 Second AK Database

Terrain Driver: ned03ak.vtd

This is an Alaska 3 arc-second database that was generated from the 30 meter National Elevation Dataset.

The NED 30 Meter Database

Terrain Driver: ned30m.vtd

This is the 30 meter National Elevation Dataset data.

# **Using Terrain Within The Program**

The program can be setup to access two terrain databases at any given time, a primary and secondary database. The primary database is first used to obtain the elevation at a point. If the elevation at the point in question cannot be found in the primary database the secondary terrain database is accessed.

# **Population Database Setup**

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The population database setup window lists all of the population databases that are available to the program (databases that the user is not authorized to use will not appear on the list). If the path that is set up for a given database and data is found, "Tested Successfully" will appear to the right of the database name. If the path is incorrectly configured, "Test Failed" will appear and the database will not function properly within the program. To configure the path to a given database, select it with the mouse and click the "Edit" button.

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Default Settings	<u>Top</u>
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When a study is created using the wizard a number of default settings are used. You can set these defaults by using the default settings window which can be accessed by selecting "Study Defaults" from the <u>View Menu</u>. The default settings window has four tab sheets with various options (click on the tab at the top of the window to change pages).

# **The General Options TAB**

Default Settings	
General Options TV Interference Options FM Interference Misc Options	1 Misc Options 2
Signal Rendering	Calculation
Use Interpolated Signal Values	Block Size: 1.25 km 🗢
Use <u>G</u> radient Shading	Profile Increment: 0.1 km 💌
Map / Page Settings	Terrain Databases
Set Default Layout 1:1,500,000	Primary Not assigned
Default Transmitter Token	Secondary Not assigned
Show the following by default when creating a study:	Change
Map Scale Transmitter Information	
Signal Cutoffs Transmitter List	Printing
Show a company name on the map	Default Graphics Printer \\Bigp4\HP OfficeJet T Series Printer 💙
Company: V-Soft Set Font	Default Text Printer
	\\Bigp4\HP OfficeJet T Series Printer 💌
	OK X Cancel

# Signal Rendering

Set the default signal <u>special effects</u> used for signal drawing.

Calculation

Here you may set the default signal resolution and profile spacing that appears in the <u>wizard</u> when creating new studies. This setting affects the block size resolution. When the original DTV allocation table was created, the FCC used a 2 km block size. Blocks of smaller size give better resolution, however smaller blocks require more processing time. A profile increment of 0.1 km corresponds to a 3 arc-second terrain database resolution.

### Map / Page Settings

Click the "Set Default Layout" button to set the default layout page settings (this will load the <u>Layout Setup Form</u>). The default map scale is set in the edit box labeled "Map Scale", the illustration above shows a default map scale of 1:1,500,000. A number of label items can be automatically added to the map by checking the appropriate box. When the study is created, Probe will try to find suitable locations for all of the label items by examining the page layout settings. For example, if you want the labels to appear along the left side of the page, make the left margin larger than the other margins (see Page Layout). Use the "Default Transmitter Token" button to specify the transmitter token properties to be used by default. Probe can also automatically add a company name to the map. To show this name check the box next to "Show a company name on the map" box and enter the company name in the edit box below. The company name will always appear in the upper right corner of the page when a study is created, however it can be moved to any location by the user.

# **TV Interference Options**

The "<u>TV Interference Options</u>" TAB allows the user to set default options for the various television interference switches. These switches match the options shown in the <u>TV interference wizard</u>.

# **Miscellaneous Options**

Default Settings		
General Options TV Interference Options FM Interference	Misc Options 1 Misc Options 2	
Miscellaneous Options		
Default Contour Color:	he Default Transmitter Info Template	
Contour Line Width: 2 Set the D	efault Transmitter Info Display Properties	
Show <u>Title</u> with population reports		
Title: V-Soft Communications Population R	eport	
<ul> <li>Print maps using "Thin Lines"</li> <li>Plot polygons on the raster map layer</li> <li>Show HAAT with Transmitter Information</li> <li>Use high resolution political boundary data</li> <li>'No Propagation Model' Identification: None</li> </ul>		
FCC Databases Default Transmitter Type		
💿 Use "state" based data files	⊙ TV O DTV O FM O Other	
Use the TVR/FMR master database file Census Database Always use program defaults Set Default	Show Shadows Text Box Map Scale Cutoff Box Transmitter List Backdrop Legend	
	Cancel	

**Miscellaneous Options 1** 

Here a few miscellaneous options can be configured. Click on the color box to set the default contour color used when adding new contours to the map. The "Set the Default Transmitter Info Template" can be used to configure the default format of transmitter information that is placed on the map. The "Set the Default Transmitter Info Display Properties" button can be used to set the default appearance of the transmitter information box that appears on the map.

### **Show Title With Population Reports**

If this option is selected then the first line of the population reports will reflect the title given.

### **Default Transmitter Type**

This option sets the default transmitter type when adding the first transmitter to a coverage study.

### **FCC Databases**

Use this option to select which V-Soft FCC database the program looks at when accessing FCC data. The "state based" files have one file for each state. The FMR/TVR master database has all of the database records in one file.

**Census Database** 

Use this to set the default census database selection used for population reporting. If the "Always use program defaults" box is checked - then the program will always use the defaults you have selected here and not show a window asking which census database to use (Hint: turn this on if you only have one census database installed).

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Using the Wizard	Тор
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The wizard is used to create a new study (to open the wizard choose "New" from the <u>File Menu</u>). The first step is selecting which type of study you would like to run:

Coverage Study

A coverage study consists of calculating the signal values for one or more transmitters.

FM Interference • Standard

An FM Interference study is for examining the interference caused to an FM station by others around

D/U Study • Full

In a D/U, study a desired and any number of undesired stations are supplied. The D/U ratio can be plotted on the map, and population can be counted in user defined D/U regions.

Incoming TV Interference (This is an optional feature)

An incoming interference study calculates interference received by a given station using the FCC's rules defined in OET Bulletin #69.

<u>Outgoing TV Interference</u> (This is an optional feature)

An outgoing interference study will calculate the interference caused to other stations by the reference station using the FCC's rules defined in OET Bulletin #69.

it.

General Interference (This is an optional feature)

This type of study allows the user to supply his/her own D/U ratios for specified channel relationships to define a custom incoming or outgoing interference study.

## The Second Page of the Wizard

Wizard 🔀
Terrain Setup Primary: V-Soft 3 Second US Terrain Secondary: Not Specified
Change Geographic Options Datum: NAD27 ▼ Dist/Bear: Flat Earth ▼
Signal Cell Spacing: 2 km 🗢 Profile Increment: 0.1 km 🔽
< <u>B</u> ack <u>N</u> ext> <b>X</b> Cancel

This is where the terrain and geographic options for the study are defined. Use the "Change" button to select the primary and secondary terrain. Here the datum, distance and bearing method, signal cell spacing, and profile increment for terrain profile based calculations can be selected.

# **Continuing On**

After clicking the "Next" button, the wizard will guide you through a series of steps for specifying the parameters required for the selected study type. Once you have selected the parameters you want for each page, click the "Next" button to go to the next step. At any time you may go back to the previous page by pressing the "Back" button. Be aware that if you go all the way back to the first page of the wizard, all of the information you have entered on the subsequent pages will be cleared.

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Coverage Study	<u>Тор</u>
	<u>Next</u>

After selecting "Coverage Study" from the first page of the <u>wizard</u> and setting up the geographic options on the <u>second</u> <u>page</u>, you are ready to begin defining the parameters for the coverage study.

First Page - Coverage Options

On this page you have two things to consider. First, select whether or not land cover will be considered in the coverage study. The land cover attenuations can be selected by clicking the "Setup Land Cover" button. Second, define the default <u>area of calculation</u> to be used when adding transmitters to the study. After you have selected the desired values, press "Next" to continue to the next step.

Second Page - Stations to be Considered

Press the "Add" button to add a transmitter to the study. Pushing the "Add" button will bring up the <u>Transmitter</u> <u>Properties Window</u> where you can enter the parameters for the transmitter (either by loading a station from an FCC database or entering its parameters by hand). After entering the transmitter information and pressing the "OK" button on the transmitter properties form, the station information which you entered will appear in the list. If you wish to edit a transmitter's properties, select the transmitter by clicking on its line in the list, then press the "Edit" button (or double click on the transmitter you wish to edit). To remove a transmitter from the study, select the transmitter and press the "Remove" button.

Use the "Edit AOC" button to edit the "area of calculation" for the selected transmitter. The "Match Propagation Settings" button can be used to automatically configure the propagation model (and model settings) of all the other transmitters in the list to match the selected transmitter. The "Cull" button can be used to access the advanced database searching feature to load several stations from an FCC database at once.

After you have added all of the transmitters that you wish to include in the study, press the "Next" button to move to the final step.

Third Page - Study Creation (Finish)

This is the final page in the wizard. If you wish to go back and change anything in the coverage study, press the "Back" button. If you are satisfied with the parameters entered press the "Finish" button to display the map and begin signal calculations. There will be a delay while the signal buffers are set up and the study is created.

	Previous
FM Interference	<u>Тор</u>
	Next

After selecting "FM Interference" from the first page of the <u>wizard</u> and setting up the geographic options on the <u>second</u> <u>page</u>, you are ready to begin defining the parameters of the study.

\* Note: This feature is only available in the Standard and Full Edition.

First Page - FM Interference Options

On this page you have two things to select.
### **Include Translators**

This determines whether translators should be included in the database search for possible interferers.

#### D/U Ratios

Here you can select to use the standard FCC D/U Ratios (20 dB, 6 dB, -40 dB, and -40 dB), the old FCC standard ratios (20 dB, 6 dB, -20 dB, and -40 dB), or you can opt to specify your own D/U ratios to be used in calculating interference within the study.

After choosing the desired parameters, press the "Next" button to continue.

Second Page - Set Up Station To Be Analyzed

At this point you must define the reference station to be considered for incoming interference. To do so, click the "Setup Parameters" button, which will bring up a "<u>Transmitter</u> <u>Properties Window</u>" where you can enter the station's parameters or load from the FCC database. After setting up the parameters you will be returned to this page.

To continue press the "Next" button.

Third Page - Define the Area to be Considered for Interference

On this page there are two main boxes:

# With Respect to the Main Station

This is where you define the area within which you wish to consider interference to the main station. You have three

options for the area of calculation:

# Within Protected FCC Contour

This will consider interference from other stations inside the main station's protected FCC contour.

## Within Other FCC Contour

Use this to consider interference within the main station's contour other than its protected contour. You may specify the contour signal cutoff (in dBu) in the edit box labeled "Field".

# Within Distance From Site

Select this option to consider interference to the main station within a specific distance from the transmitter's site. You can specify the distance (in

kilometers) in the edit box labeled "Distance".

# With Respect to Interfering Station(s)

In order to reduce the calculation's required, and to decide which stations from the database should be considered as possible interferers, you must specify the area within which possible interferers may be considered to interfere. There are two options:

# Within Interfering FCC Contour

Use this to consider stations that have FCC standard method interference contours that overlap the reference station's protected contour. When calculations are performed only the area within the overlap region will be considered for interference.

Within Distance from Site

Choose this item if you wish to consider every point within some distance from the possible interferer's site. You may specify this distance (in km) in the edit box labeled "Distance". When calculations are performed, only the points within the main station's area of calculation that are less than the specified distance from the interfering transmitter's site will be considered.

#### **Threshold for Reception**

There is an edit box labeled "Threshold for Reception", this specifies the minimum field strength that must be achieved by the reference station at a point in order for that point to be considered as having coverage (and thus being evaluated for interference).

On this page there is also a switch labeled "Search FCC Database for Potential Interferers". If it is checked, the FCC database will be searched for all possible interferers given the "Area of Calculation" criteria. If unchecked, the database will not be searched and you will need to select or specify potential interferers manually. After setting up the area of calculation, press the "Next" button to continue. If you chose to search the database, it will be searched at this time.

# Fourth Page - Select Stations to be Considered

If the database was searched, this page will display a list of all possible interferers (if not, the list will be blank). At this point you can add, remove, and edit the transmitters to be considered for causing interference. To edit a transmitter it must first be selected (click on the station in the list to select it), then press the "Edit" button. You may remove transmitters from the list in the same manner. When you are finished editing the transmitter list, hit the "Next" button to continue.

Fifth Page - Study Creation (Finish)

This is the final page in the wizard. If you wish to go back and change anything in the interference study, press the "Back" button. If you are satisfied with the parameters entered, press the "Finish" button to display the map and begin signal calculations. There will be a delay while the signal buffers are set up and the study is created.

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D/U Ratio Study	<u>Тор</u>
	<u>Next</u>

After selecting "FM Interference" from the first page of the <u>Wizard</u> and setting up the geographic options on the <u>second page</u>, you are ready to begin defining the parameters of the study.

\* Note: This feature is only available in the Full Edition.

#### **First Page - Reference Station Setup**

Begin by specifying the reference station that you wish to use for the study. This station represents the "Desired" station. Next specify the calculation area, signal is calculated for each transmitter in the study for this region. Specify the "Threshold for Reception", this is the minimum signal that must be achieved by the reference station for the point to be considered as part of the study. Check the "Force 10% time variability for interfering signals" to cause undesired stations to have signal calculated using 10% time variability.

## **Second Page - Interfering Stations**

This list of stations represents the "Undesired" stations in the study. More than one can be specified, however the same set of D/U ratios are applied to all stations in the study - so generally all stations included in the study should have the same channel relationship with the reference station.

# **Third Page - Study Creation (Finish)**

This is the final page in the wizard. If you wish to go back and change anything in the interference study, press the "Back" button. If you are satisfied with the parameters entered press the "Finish" button to display the map and begin signal calculations. There will be a delay while the signal buffers are set up and the study is created.

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After selecting "TV Interference (Incoming)" from the first page of the <u>wizard</u> and setting up the geographic options on the <u>second page</u>, you are ready to begin setting up the parameters for the interference study. For information on the procedures used in calculating interference see <u>DTV/TV Interference</u> <u>Calculation Methods</u>.

\* Note - This feature is available in the optional DTV interference module.

First Page - TV Interference Options

On this page you have four things to select.

### **Consider NTSC Taboo Interference**

This box should be checked if you wish to consider taboo interference into NTSC stations in the study. Leaving the box unchecked will cause Probe to only consider cochannel and first adjacent channel interference.

### Do Not Consider KWX Error Points as Ix Free Coverage

OET 69 requires that KWX error points be counted as "interference free coverage" regardless of the D/U ratio and signal strength of the cell in question. Checking this box will cause cells where KWX errors are reported to be evaluated for interference (basically KWX errors will be ignored). Note - it is important that you have this switch turned on when trying to do 'real world' interference studies that consider areas outside of the reference station's grade B contour (see "DTV/TV Interference Calculation Methods" for more information).

## Apply NTSC LPTV/translator D/U rules

This causes the program to examine the channel offset relationship when LPTV and translators are involved and uses an adjusted D/U ratio when offsets are matching.

Force Beam Tilt = 0

This forces the program to ignore beam tilt settings found in the FCC database and use the un-adjusted OET 69 vertical pattern for calculation.

# **Force use of OET 69 Longley/Rice Parameters**

If this switch is turned on, then OET 69 Longley/Rice input parameters will be used for calculation. If it is off, then the program will use the parameters entered for the reference station.

### **Use OET 69 depression angle determination**

The OET 69 processing technology does not consider terrain in its depression angle calculation (it compares the height above ground of both transmitter and receiver and calculates the depression angle from that). If this option is turned on, then Probe calculates depression angles this way. If it is off, then the depression angle is determined using the AMSL heights of the transmit and receive points.

#### Force LR time variability to 10% for interfering signals

This option should be turned on for FCC compliance. Uncheck this option to have the program use the time variability entered by the user for evaluation.

#### **Database Cull Options**

There are several options on the right hand side of the window that allow the user to determine which stations are to be included in the study.

**Include CPs** 

Include construction permit records in database search.

**Include APs** 

Include application records in database search.

# **Include Translators**

This determines whether translators should be included in the database search for possible interferers.

### **Consider DTV Allotments**

Include stations contained in the FCC DTV allotment database in the database search.

### **Consider STA Records**

Include special temporary authority records in the database search.

After choosing the desired parameters, press the "Next" button to continue.

Second Page - Set Up Station To Be Analyzed

At this point you must set up the reference station to be considered for incoming interference. To do so, click the "Setup Parameters" button, which will bring up a "<u>Transmitter</u> <u>Properties Form</u>" where you can enter the station's parameters or load out of an FCC database. After setting up the parameters, you will be returned to this page, click the "Next" button to continue. Third Page - Define the Area of Calculation

## Area of Calculation

Within reference station's NL (Noise Limited) contour

This is the standard area of calculation of OET 69 interference studies.

Within NTSC counterpart station's NL contour

In some cases interference should be analyzed within the reference station's NTSC counterpart contour.

Within a user specified FCC contour

Select this option to consider interference within an arbitrary FCC contour [F(50-50) is used for NTSC an F(50-90) is used for DTV].

Within a given distance from the reference transmitter

This option will consider interference within the specified distance from the reference transmitter.

# **Radial Options**

Use only 8 radials for HAAT calculation

The OET 69 processing methodology uses only 8 radials of HAAT calculations (and interpolates values for radials in between). If this box is checked, the program uses the OET 69 method. If unchecked, then the HAAT is calculated for each radial of the contour.

# of Radials

The OET 69 methodology uses 72 radials for contour calculation. The user may select 8, 36, 72, or 360 radials for generating the protected contour.

### **Threshold for Reception**

The threshold for reception is the minimum field strength a cell must have in order to be considered for interference. By default, this is the dipole adjusted grade B field strength.

#### **Search FCC Database for Potential Interferers**

If this box is checked, the FCC database will be searched to find stations that may interfere with the reference station. If unchecked, you will need to manually enter each station you wish to consider in the interference study. To continue, press the "Next" button. If the "Search FCC Database" box is checked, Probe will find potential interferers before continuing to the next page.

Fourth Page - Select Stations to be Considered

If the database was searched, this page will display a list of all possible interferers (if not, the list will be blank). At this point you can add, remove, and edit the transmitters to be considered for causing interference. Before removing or editing any transmitters, they must first be selected (click on the station in the list to select it). The "Import List" and "Export List" buttons can be used to save and restore a transmitter list (if you plan on creating multiple studies with the same transmitter list, you can export the list to a file and then import it in a later study). When you are finished editing the transmitter list, hit the "Next" button to continue.

Fifth Page - Study Creation (Finish)

This is the final page in the wizard. If you wish to go back and change anything in the interference study, press the "Back" button. If you are satisfied with the parameters entered, press the "Finish" button to display the map and begin signal calculations. There will be a delay while the signal buffers are set up and the study is created.

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After selecting "TV Interference (Outgoing)" from the first page of the <u>wizard</u> and setting up the geographic options on the <u>second page</u>, you are ready to begin setting up the parameters for the interference study. For information on the procedures used in calculating interference see "<u>DTV/TV Interference</u> <u>Calculation Methods</u>".

First Page - TV Interference Options

Nearly all of the options on this page are the same as for the Incoming TV Interference Study. Please see the section about Incoming TV Interference for more information on those.

Options specific to outgoing interference:

# Consider Masking (removed masked Ix)

Interference to a station by the reference station at a given point is said to be "masked' when interference from another transmitter already exists at that point. If the consider masking check box is checked, then masked interference will not be reported as interference. If it is not selected, then all interference will be reported, masked or otherwise.

After choosing the desired parameters, press the "Next" button to continue.

Second Page - Set Up Station To Be Analyzed

At this point you must set up the reference station to be considered for outgoing interference. To do so, click the "Setup Parameters" button, which will bring up a "<u>Transmitter</u> <u>Properties Form</u>" where you can enter the station's parameters or load a station out of an FCC database. After setting up the parameters, you will be returned to this page. There is one option on this page....

# **Search FCC Database for Potential Interferers**

If this box is checked, the FCC database will be searched to find stations which might receive interference from the reference station. If unchecked, you will need to manually enter each station you wish to consider in the interference study.

To continue press the "Next" button. If the "Search FCC Database" box is checked, Probe will find the stations that the reference station can interfere with before continuing to the next page.

Third Page - Select Stations to be Considered

If the database was searched, this page will display a list of the stations that the reference station can interfere with (if there were no stations found that could receive interference, the list would be blank). At this point, you can add, remove, and edit the transmitters to be considered for receiving interference. Before removing or editing any transmitters, they must first be selected (click on the station in the list to select it). When you are finished editing the transmitter list, hit the "Next" button to continue. At this point, if masking is being considered, then the program will search the FCC database for potential masking stations.

### **Considering Masking**

If the study was run with the "Consider Masking" option turned on, then after clicking "next", you will be prompted to specify which station types you want to consider for masking and then review the masking stations. The first window that appears asks what types of stations to include:

🕺 Stations for Masking	
Consider the following stations as potential masking stations:	
Application Record ( Lic Type = AP )	
Construction Permit Records (Lic Type = CP)	
✓ DTV Allotments (Lic Type = ALD)	
Translators (Service = X or C)	
V OK X Cancel	

The more stations types you include, the more interference will be considered as masked (and thus not counted as being interference within the study). After you specify the station types to load from the FCC database, the database will be searched and a second window will appear:

💰 Outgoing Interference Masking Stations 🛛 🛛 🔀	
Transmitters KYOUTV.C (15+) KDSMTV (17+) KDSMTV.C (17+) KPWBTV.C (23-) WTVO-D.C (16) WTJR (16+) WTJR.C (16+) KTCI-D (16) KTAJ (16-) KXNE-D.C (16) KTNE-D.C (16) KTVD-D (16) KTOTV-D (16) KXNETV-D (16) KXNETV-D (16)	Possible Masking Stations KUDU-D.C (14) KLJBTV (18+) KLJBTV.C (18+) KWWF.C (22-) WICD (15-) WICD.C (15-) WSEC-D.C (15) WTJR.C (16+) WMEC (22+) WMEC.C (22+) WMEC.C (22+) WMEC.C (22+) WMEC.C (22+) WMEC.C (15-) KM0S-D.C (15) KXV0 (15-2) KXV0.C (15
	<u>A</u> dd <u>E</u> dit <u>R</u> emove

The list of transmitters included in the study will be shown in the column on the left. The list on the right side of this window shows all the stations that will be considered as potential masking stations for the transmitter selected in the right hand column. Use the "Add", "Edit", and "Remove" buttons to modify this list.

Fourth Page - Study Creation (Finish)

This is the final page in the wizard. If you wish to go back and change anything in the interference study, press the "Back" button. If you are satisfied with the parameters entered, press the "Finish" button to display the map and begin signal calculations. There will be a delay while the signal buffers are set up and the study is created.

	Previous
Using Map Tools	<u>Top</u>
	<u>Next</u>



Select the tool you wish to use by clicking the button containing the icon for the specific tool. The picture above shows the "Selection arrow" being selected.

Available tools:

<u>Selection Arrow</u> - Select various objects on the map and move/modify them.

<u>Zoom Tool</u> - Zoom in/out on the map.

<u>Map Information Tool</u> - Displays information about latitudes/longitudes, signal strength, and elevation at the cursor.

<u>Text Tool</u> - Add transparent background text to the map.

<u>Text Box Tool</u> - Place a box with text on the map.

Profile Tool - Interactively select a profile to view. • Standard

Pop Up Census Information - Shows the census totals for a user selected area of the map. • Standard

<u>Arrow Drawing Tool</u> - Draw arrows on the map.

Road Label Tool - Use this to add road labels to the map.

<u>Polygon Tool</u> - This tool can be used to define a polygon on the map using the mouse (once defined it can be plotted and population can be calculated within it).

	Previous
Selection Arrow	Тор
	<u>Next</u>

The "Selection Arrow" tool can be used to select, move, and modify items on the map (such as transmitter tokens, text, text boxes, map scale, and other various moveable and modifiable objects on the map). To use the "Selection Arrow", first choose the "Selection Arrow" icon on the <u>map tools</u> toolbar. Next click on the item you wish to select... when the item is selected, four square boxes will appear around it. The following picture shows a transmitter icon before and after selecting it.



Moving items on the map

When using the selection arrow, the mouse cursor will change from an arrow to a hand when placed over an object that can be moved. To move an item, use the selection arrow to click on the object (using the left mouse button). While holding down the left mouse button, drag the object across the screen to where you wish to place it (the object should now move with the mouse), then let go of the left mouse button to place it at its final destination.

Modifying items on the map

Some of the objects on the map are modifiable (for example transmitter tokens, text, and text boxes). To modify the properties of an item on the map, using the left mouse button, double click on the item with the selection arrow. If the object is modifiable a window with properties for the specific item will pop up. Double clicking on a transmitter token will bring up the properties for that transmitter. Using the selection arrow to access contours

To access the contour setup for a particular transmitter, first select the transmitter using the selection arrow. Then right click on the transmitter token. This will make the contour list for that transmitter appear on the screen. For help with using contours see: <u>Using Contours</u>.

	Previous
Zoom Tool	<u>Top</u>
	Next

Zooming in on a region

To zoom in on a region, first select the zoom tool from the "<u>Map Tools</u>" toolbar (the icon for this tool looks like a magnifying glass). Select the region to zoom to by clicking and holding the left mouse button down and dragging the mouse to select the rectangle of interest. Once you have selected the region you wish to zoom to, release the left mouse button and Probe will automatically redraw the map.

Zooming in on a point

To zoom in on a point on the map select the zoom tool and then place the magnifying glass cursor over the point you wish to zoom in on and click the left mouse button once. This will move that point to the center of the map and decrease the scale by a factor of 2.

Right clicking with the Zoom Tool

Right clicking on the map with the zoom tool causes the following menu to pop up:

Zoom to <u>P</u> revious Scale Move Map C <u>e</u> nter
<u>Z</u> oom in ×1.5 Z <u>o</u> om in ×2 Zoo <u>m</u> in ×4
Zoom O <u>u</u> t ×1.5 Zoom Ou <u>t</u> ×2 Zoom Out <u>×</u> 4
<u>Scale 1:50,000</u> Scale 1:100,000 Scale 1:250,000 Scale 1:750,000 Scale 1:1,500,000 Scale 1:1,500,000 Scale 1:2,500,000 Scale 1:5, <u>0</u> 00,000
Choosing "zoom to previous scale" will cause the map to be redrawn using the scale and center coordinates it had before the last zoom. The "Move Map Center" function will move the center of the map to the current cursor location. There are options here to zoom in/out by a certain scaling factor (for zooming in: new\_scale = current\_scale / factor, for zooming out: new\_scale = current\_scale \* factor). The options at the bottom of the pop-up menu allow you to set the map's scale to one that is commonly used.

	Previous
Map Information Tool	<u>Тор</u>
	<u>Next</u>

To use the "Map Information Tool", first select it from the "Map <u>Tools" toolbar</u>. Once it is selected, the mouse cursor should look like a cross hair (or plus). By moving the map information tool over the map you can get information about various points on the map. This information shows up in the status bar at the bottom of the Probe window.

_						_	
	42-02-08.84 N	093-37-38.78 W	91.665 dBu	279.5 m	Urban		Calc Engine Sta

The first two boxes show the latitude and longitude of the point. The third number is the signal strength of the transmitter selected in the "<u>Transmitter List</u>" at the cursor point (if signal has been computed). The fourth box shows the elevation at the point (since this needs to be loaded out of the database there may be a slight delay before it comes up, in this case the elevation box will show "\*\*\*\*"). The fifth box shows the land cover at the point.

# Right clicking with the map information tool

Right clicking will show the following pop-up menu:

Show <u>Extended Information</u> <u>G</u>enerate Point Report Add a Custom <u>T</u>ick Mark <u>M</u>ove Transmitter

Show Extended Information • Full

This will make the extended map information window appear (see below).

Generate Point Report • Standard

Generate a point report.

Add a custom tick mark

Add a custom tick mark to the map.

Move Transmitter

This option is only available for coverage studies. After choosing this option, the user will be able to select a transmitter to move to the location where the mouse was originally right clicked. After moving the transmitter, field strengths and contours will be recalculated to reflect its new position.

Extended Information Window

The "Extended Information Window" can be displayed by right clicking with the map information tool and then selecting "Show Extended Information".

🔀 Information 🛛 🗶			X
ID	FS (dBu)	Dist (km)	Bear (deg)
WKOW-D	57.95	85.6	43.6
WCIUTY	51.68	214.7	334.1
WLAX	N/C	208.3	95.1
WGBA	80.39	106.1	218.6
WKOWTV	78.73	82.8	41.2
KBTV-D	N/C	442.6	61.4
WCCU-D	N/C	373.7	349.0
WCGVTV-D	60.42	93.1	309.0
Interpolate	: Signal		Close

The window shows all of the transmitters in the study and their signal strengths, distance, and bearing at the location of the map information tool cursor. For interference studies, the reference transmitter is highlighted in red if the cursor is over an interference free coverage point. If the cursor is over an interference point the interfering transmitter(s) signal is highlighted in red.

	Previous
Text Tool	<u>Тор</u>
	<u>Next</u>

To add a single line of text to the map, first select the Text Tool icon from the <u>"Map Tools" toolbar</u>. Once selected, the mouse cursor should change to the text tool icon when the mouse is over the map. To add text, just place the cursor over the location where you wish to place the text and click once with the left mouse button. This will bring up a window that allows you to enter text and set the font for the text:

🔣 Edit Text 🛛 🔀
Text:
Set <u>Font</u> Font Color:
Display Sha <u>d</u> ow Shadow Color:
Reference by:
Page Position O Lat/Lng Location
Assign current options as <u>D</u> efaults

Enter the text you want to add to the map in the box. A "shadow" may be

added to the text by clicking the "Display Shadow" box and setting the shadow color (this can used to make text more readable on a complicated map). The text can be referenced by its page position or by a latitude/longitude location. Referencing by lat/lng causes the label to move to the corresponding position on the map when the map scale or center is changed, and referencing by page position causes the text to remain in the same place regardless of the map settings. Check the box labeled "Assign current options as defaults" and click "OK" to make the settings you are applying the default settings for new text objects.

To modify and move text once it is on the map use the "Selection Arrow".

	Previous
Text Box Tool	<u>Тор</u>
	Next

To add multi-line text to the map, first select the text box tool on the <u>map tools toolbar</u>. Then place the text tool cursor over the area where you wish to add text. Click once with the left mouse button and the following window will appear:



Enter the text you wish to show in the large white box. You may also modify the text box's background color, border color, border width, and font. When finished click the OK button. The text you entered should appear on the map surrounded by a box. You can move or modify this text box using the <u>"Selection arrow"</u> tool.

## Referencing

Setting a text box to be reference by "Page Location" will cause the text box to stay in the same place on the page when the map scale or center is changed (use this to place a note or legend of some sort that doesn't reference a particular point on the map). Referencing by "Lat/Lng Position" will cause the text box to move when the map configuration is changed (use this to specify the location of something on the map).

## Setting the Text Box to Have No Border

If you wish to have a text box appear without a border, but still have a solid background for the text appear, set the border width to 0.

## Showing the Text Box without the 3D Shadow

To have a text box displayed without the 3D shadow, set the border width to a negative number. The magnitude of the number will determine the width of the single line border. For example, setting the border width to "-2" will yield a text box with no 3D shadow and a solid line border with a line width of 2. Check the box labeled "Assign current Properties as Text Box Default" to make the settings you are applying the default settings for new text box objects.

	Previous
Profile Tool	Тор
	Next

The "Profile Tool is used to specify a starting and ending point for the profile viewer. To use it, select the profile tool icon on the "Map Tools" toolbar. Place the "Profile Tool" cursor at the point you wish to be the beginning of the profile, then click the left mouse button once (if the point is near a transmitter token the point will be automatically snapped to the location of the transmitter). Next move the mouse to where you wish the profile to end, a line will be drawn from the starting point to the end point. Once the mouse is where you would like the profile to end click the left mouse button again... this will load the "Profile Viewer". If you wish to abort using the "Profile Tool" after you have selected the first point, click the right mouse button.

<sup>\*</sup> Note: This feature is only available in the Standard and Full Edition.

	Previous
Pop Up Census Tool	Тор
	<u>Next</u>

To get a quick census report for a rectangular region, first select the pop up census tool from the <u>"Map Tools" toolbar</u>. Then drag the pop up census tool cursor to select a rectangular region on the map. After selecting a region, there will be a small delay while the census data is gathered from the database, then a small window will appear with census information.

PopUp Census Information		
Bounds: ( 42-53-4 Total Area: 1,763.	47.92 N,092-57-00.50 W ) - ( 42-31-23.41 N,092-25-46.53 W ) .98 square kilometers	
Total Population: Total Housing Unit	39,952 ts: 15,820	
White:	39,272	
Black:	202	
Hispanic:	173	
Indian:	41	
Asian:	251	
Other:	13	

 $\ast$  Note: This feature is only available in the Standard and Full Edition.

	Previous
Polygon Tool	<u>Тор</u>
	<u>Next</u>

The "Polygon Tool" can be used to create a user defined polygon on the map. To use it, select the tool -- then start clicking with the left mouse button on the map to define the polygon points. A fine line will appear going from one point to the next. When you are finished defining the polygon, click the right mouse button and a heavy line will connect the first defined point with the last defined point. Once the polygon is defined the "<u>Selection Arrow</u>" can be used to interactively modify it (see the "<u>Polygon Object</u>" section of the manual for information about working with user defined polygons).

<sup>\*</sup> Note: This feature is only available in the Full Edition.

	Previous
Display Options Form	<u>Тор</u>
	<u>Next</u>

Use the "Display Options" form to change several of the map properties at once. To access the "Display Options" form, choose "Display Options" from the <u>Map Menu</u> or click the "Map Options" button on the Transmitter List Box window.

Display Options	
Signal Display Mode © <u>C</u> overage _ Interference O <u>H</u> ighest Signal 60 dBu	Signal Drawing Options           Use <u>G</u> radient Shading           Use Interpolated Signal
Additional Options	
Map Features (Colors/Overl	lays): <u>F</u> eatures
Signal Display Options	Signal
Map Settings (Center, Scale	e, Projection): <u>S</u> ettings
Signal Cutoffs/Colors:	<u>C</u> utoffs
Map Layout:	Layout
	OK Cancel

# Signal Display Mode

Depending on whether you are currently viewing an interference study or a coverage study, the available display options will change.

**Coverage Study** 

For a coverage study you may plot "Coverage" or "Highest Signal". When drawing "Coverage" each transmitter in the study will be drawn using the current signal cutoff values. Drawing "Highest Signal" will cause the transmitter color for the transmitter with the highest signal to appear at each point on the map. You may set the minimum field strength value to be drawn in the edit box below the "Highest Signal" radio button (for example, if you set this to 60 dBu and the field strength at a given point is less than 60 dBu there will be nothing drawn at that point). Use the <u>Transmitter List Box</u> to select which transmitters are allowed to be drawn.

#### **Interference Study**

For an interference study, you may plot "Coverage" or "Interference" on the map. The reason coverage can be drawn in an interference study is so you can see what signal strength values are used for the interference calculations (if desired), however for an interference study you can only draw the coverage for one station at a time (which you may select using the "<u>Transmitter List Box</u>"). To select which interferers are displayed use the "<u>Transmitter List Box</u>".

#### **Signal Drawing Options**

The check boxes in the "Signal Drawing Options" box will allow you to turn the listed <u>special effects</u> on and off.

# **Additional Options**

The buttons in the additional options box will take you to the following windows:

"Features Button" - <u>Map Features Form</u>

"Signal Button" - <u>Signal Display Options Form</u>

"Settings Button" - <u>Map Settings</u>

"Cutoffs" - Cutoff Settings Form

"Layout" - <u>Page Layout Form</u>

	Previous
Map Features Window	<u>Тор</u>
	<u>Next</u>

To access the map colors setup window, choose "Map Features..." from the "Map" menu (Note: A study must be open in order to access the "Map" menu). Here is the map color setup form with a few key items highlighted:



The color setup form displays the names of several items which may be drawn on the map. The properties for each item are located on the horizontal line containing the name. After you've finished setting up the desired map colors, press the "OK" button to redraw the map using the new colors and line settings. Color Setup Window Features

#### Feature TABs

Use the TABs at the top of the window to set up various advanced plotting features:

General - This is the default page of the map features window

Roads - Major and Street Level Road Properties

City Names - Extended City Name Properties

Backdrop - Map Backdrop Plotting

Extra Layers - Extra optional data layers

**Color Selection Boxes** 

By clicking on one of these boxes you can select the color used to draw a feature on the map. The first column of color selection boxes sets the line or border color for the item. The second column sets the fill color for the items on the map that are polygons. In the case of map location names, the color selection box indicates the font color to use when displaying them.

### **On/Off Selection Boxes**

Use the On/Off selection boxes to choose whether or not an item gets displayed. If you check the box, the item will be displayed on the map.

## **Extended Properties Buttons ( the "Change" buttons )**

Use the extended properties buttons to set some of the extra properties for displaying lines and polygons, such as border/line width and line style. See "<u>Extended Properties for</u> <u>Lines and Polygons</u>" for more information on extended properties.

## **Relative Size Edit Box**

The relative size edit box allows you to set a relative size for the US County Names. When drawing the map, Probe sets the size of the county names based on the scale of the map. However, if you would like the names to appear at a different size, change the relative size edit box. The larger the relative size, the larger the names will be.

### Load/Save Map Color Schemes

Use these buttons to save the current color setup as a color scheme or load a previously saved color scheme.

#### **Grid Lines and Tick Marks**

Clicking the "Tick Mark Settings" button will bring up the <u>Tick</u> <u>Mark Settings</u> form where the grid line and tick mark attributes can be specified.

	<u>Previous</u>
Extended Properties for Lines and Polygons	<u>Top</u>
	<u>Next</u>

To change the extended properties for lines and polygons to be drawn on the map, press the "Change" button for the type of item you would like to change on the <u>Map Features Window</u>. Here is an example extended properties form:

Display Propert	ies
Political B	oundaries
Border Color:	Fill Color:
Border Width:	3 🗘
Border Style:	Dash - Dot 🔽
✓ Plot on ✓ Fill usin	map g the fill color
	Accept X Cancel

You can set the border and fill color by clicking on the color selection boxes. You can also set the border width and border style. The large box next to the border width selection shows a preview of what the line will look like. Use the "Plot on map" check box to select whether the particular line or polygon is drawn. Use the "Fill using fill color" check box to select whether polygons are filled (if this is unchecked, only the boundary of the polygon will be drawn). Press the "Accept" button to change the current item's properties (press "Cancel" to abort).

	Previous
Tick Mark Settings	<u>Тор</u>
	<u>Next</u>

The "Tick Mark Settings" form is where the properties of tick marks and grid lines can be set. This window can be accessed from the "<u>Map Features</u>" window.

Grid Lines and Tick Marks	
Visibility	Spacing
<u>○ T</u> ick Marks	
	Mark off Every
<u>○N</u> one	1 👶 degrees 💲
Settings Labels With Ticks Line Thickness: 1 Ticks/Lines <u>C</u> olor:	
	✓ OK 🗙 Cancel

# Visibility

The type of latitude/longitude reference marks can be selected as Tick Marks, Grid Lines, or None. Selecting none will cause the map to have no grid lines or tick marks.

Spacing

There are two ways that reference mark spacing can be set. Probe will automatically choose a spacing based on the map's scale if you choose "Automatically Space Ticks". If "Fixed Spacing" is defined, the user may select the reference mark spacing using the boxes labeled "Mark off Every".

#### Settings

The settings box allows the user to set the line thickness, line color, and whether or not labels will appear with tick marks. If the "Labels With Ticks" box is checked, Probe will print the latitude/longitude coordinates at reference mark intersections. When labels are printed, the northern-most visible ticks will have the longitude displayed, and the eastern-most ticks will have the latitude displayed.

	Previous
Road Drawing Properties	<u>Тор</u>
	Next

The road drawing properties are configured using the <u>Map</u> <u>Features Window</u>.

Map Features Settings		
General Roads City Names Backdrop Extra Layers		
Major Roads O Use global road database		
Road Color: Global Road Properties		
Use Enhanced US Road Database		
Show Interstates when scale is less than: 3,000,000		
Show Road Labels Interstate Properties		
Show US Hwys when scale is less than: 1,500,000		
Show Road Labels US Hwy Properties		
Show State Hwys when scale is less than: 1,000,000		
Show Road Labels State Hwy Properties		
Street Level Roads		
Show Street Level Roads when scale is less than: 200,000		
Show Street Level Names when scale is less than: 40,000		
Street Name Color: Street Level Road Properties		
Load Features     Save Features     OK     Cancel		

# **Major Roads**

Probe has two types of road databases. The "Global Road Database" has roads for the entire world, however there are no road names or labels contained within this database.

The "Enhanced US Road Database" \* contains roads for the US and its territories in three categories: Interstate (or divided highways), US highways, and state highways. For each type of road the user can specify a map scale cutoff at which the type of road will be displayed. Clicking the "Properties" button for each road type will display the following properties window:

🔏 Road Display Pr	operties		
Interstates			
Line Color:		Line Width: 🙎	
Border Color:		BorderWidth: 1	<b>•</b>
		🗸 ок	🗙 Cancel

Here a line color and a border color and line width can be specified.

\* Note: This feature is only available in the Standard and Full Edition.

**Street Level** 

Street level mapping is currently only available for the US. A map scale can be set at which street level roads and street level road names will be displayed. The street name color can be specified and the street level line color and width can be specified.

\* Note: This feature is only available in the Standard and Full Edition.

	Previous
Extended Name Properties	<u>Тор</u>
	Next

The city name display properties can be modified on the "City Names" page of the <u>"Map Features" window</u>.
Map Features Settings
General Roads City Names Backdrop Extra Layers
Large Cities         Border Color:       Font Color:       Large City Font         ✓ Show a border around markers       Marker Type       Background Type         ④ Circle       Square       None         Color:       Border:       Border:
Small Cities         Border Color:       Font Color:         Show a border around markers         Marker Type         O Circle       Square         None         Color:       Border:
General Options (US only)         Do not show cities with population less than:         25000         Population used to determine large/small cities:         100000
<ul> <li></li></ul>

Different properties can be set for large and small cities. For each city type, a border color and a font can be defined (use the City Font buttons to set the size and typeface for each city type). A circle or square marker can be drawn at the city location with a specified foreground color and border color (check "show a border around markers" to make the border visible). The "Background Type" specifies the type of background used for the city names border. A population cutoff can be set to determine which cities are plotted as "large cities" and which are "small cities". Check the "Do not show cities with population less than" check box in order to limit the cities displayed based on the specified population cutoff.

	Previous
Backdrop Plotting	<u>Top</u>
	Next

Probe has the ability to display certain data items as a backdrop to the map. The backdrop is configured via the <u>"Map Features"</u> window shown below.

Map Features Settings
General Roads City Names Backdrop Extra Layers
Selection
Type of Backdrop to be displayed:
Land Cover 🗸 🗸
Properties
Unknown 🔳 Forest
📕 Open Land 📕 Wetland
Agriculture 🗌 Urban
Water Snow & Ice
<u>M</u> odify Properties
② Load Features Save Features ✓ OK X Cancel

The drop down list box is used to select the type of backdrop you wish to display. The contents of the "Properties" section of this window will change depending on what type of backdrop the user has selected. Use the "Modify Properties" button to change the display properties of the various backdrop types.

# **Backdrop Types**

### Census Scattergram • Standard

The census scattergram backdrop shows the locations and populations of the census blocks. The "Modify Properties" button allows the user to set the color and scale cutoff used in determining when the block populations are displayed.



You can also select the database to be used and, if desired, a subset of the population to plot. Note that when the scale is greater than the specified cutoff - a 'plus mark' is shown for all points that contain any of the selected subset population (and when zoomed in the number displayed reflects the total number of that subset).

Census Density •

The census density plot allows the user to select a set of colors to represent various census density values.

🔏 Census Density Plot Properties	
Options Use Interpolated Values Draw using 'cool colors' Base Density Spacing: 2.0 km Colors	Population Database ✓ 1990 US Census ☐ 1990 PR Census ☐ 2000 US Census (SF1) ☐ 2000 US Census (SF1,Housing) ☐ 1996 Canada Census
<ul> <li>&gt; 80.0 ppl/sq. km</li> <li>40.0 - 80.0</li> <li>20.0 40.0</li> </ul>	Use data for a specific category [Note: Not all categories are available for all databases.]
0.0 - 20.0	Housing Units Asian White Pacific Islander Black Other Hispanic Mixed Race Native American
	OK X Cancel

Census density is calculated by creating a grid of cells and then counting the populations of each cell and dividing by the area of the cell. The "Base Density Spacing" value indicates the size of the side of each cell in the grid. Click on the graphic that shows the density color coding to modify it. Here you can also select the population database and a specific category within the dataset to use for density calculations.

### Basic Terrain Plot 🥄 📍 🏴

The basic terrain plot backdrop will display a "color coded" plot of the terrain on the map. The user can select the color for the minimum, mid, and maximum elevation (when displayed Probe will interpolate between the colors to generate the terrain plot).



### Enhanced Terrain Plot •

The enhanced terrain plot calculates a grid of elevation and allows the user to define cutoffs to use in plotting the terrain values.



Click on the colors graphic to edit the colors and elevation ranges.

### Land Cover Plot •

The land cover plot shows a graphical representation of the land cover on the map. The colors used to represent each type of land cover can be set using the "Modify Properties" button .



Click on the color for the given land cover type to modify it.

	Previous
Extra Map Layers	<u>Top</u>
	Next

Extra layers can be added to the map using the "Extra Layers" TAB of the Map Features Window.

General Roads City Names Backdrop Extra Layers     Plot Available   ZCTA Boundaries Image: City Case Towers   Image: City Case Towers CipCode Point Location   Image: City Case Towers City Case Towers   Image: City Case Towers City Case Towe	Map Features Settings
Plot Available   CTA Boundaries FC ASR Towers Spcode Point Location Import Data Layer   Edit	General Roads City Names Backdrop Extra Layers
<u>E</u> dit	Plot Available ZCTA Boundaries FCC ASR Towers ZipCode Point Location Import Data Layer
	Edit

Layers that are shown on the "Plot" list on the left hand side of the window will be drawn on the map. Layers that are in the column on the right are layers that are available but not plotted. To move a layer from one list to the other, select it in the list and then click the red arrow button pointing toward the list to which you want to move it. Select a station in the plot list and click the edit button to edit the settings for the selected layer. Note - the available layers will be site specific.

**Available Layers** 

# FCC ASR Towers (Optional)

Plot the FCC Antenna Structure Registration database towers on the map.

Tower Plotting
Color:
Display AMSL height when the scale
is less than: 200,000
Show Coordinates when the scale
is less than: 50,001
Make Default

Tower locations can be configured to show the AMSL tower height and the tower coordinates at user defined zoom levels (scales).

# **Zip Code Point Location (Optional)**

This plots the zip code point locations on the map (the zip code number will be centered on the location).

# **ZCTA Boundaries (Optional)**

This plots the Zip Code Tabulation Area (ZCTA) boundaries on the map.

ZCTA Properties	
Show Labels with 2	ZCTA Boundaries
Line Properties:	
	V OK X Cancel

The boundaries will always be plotted. To show labels on the map, check the box labeled "Show labels with ZCTA boundaries". Click the line properties preview graphic to set the line thickness, color, and style.

## Import Data Layer

This layer can be used to import new layers into the program. See <u>Importing Map Layers</u> for more information.

	Previous
Map Settings	<u>Top</u>
	Next

To set the maps center latitude, center longitude, scale, and projection - choose "Map Settings" from the "<u>Map Menu</u>". The following window will appear:

Map Settings		
Map Center	Coordinates	Projection <u>L</u> ambert Azimuthal
L <u>a</u> titude	42-30-45 N	<ul> <li>Lambert Conformal Conic</li> <li>Albers Equal Area</li> </ul>
L <u>o</u> ngitude	092-19-24 W	<u> </u>
<u>S</u> cale	1:1,500,000	O Mercator
	🗹 Ref 📝 Ref	Cancel

# Latitude and Longitude

Enter the latitude and longitude in the boxes labeled accordingly. This will set the center of the map to the specified coordinates. For help with valid latitude/longitude entry formats see "Entering Latitudes and Longitudes".

## Scale

Enter the desired map scale in the edit box labeled "Scale". The scale is entered as a single number (it may contain commas, however they are not required). In the example the map scale is 1:1,500,000.

## **V-Soft Reference Buttons**

Use these buttons to retrieve or save the current coordinates to/from the V-Soft reference file.

## Projection

Use the radio buttons on the right side of the window to select the map projection to be used. Note that the projection listed as "Cylindrical" is also know as "No Projection".

	Previous
Signal Options Window	<u>Тор</u>
	Next

The signal drawing options can be accessed by choosing "Signal Display Options" from the <u>"Map" menu</u>, or from the <u>"Display Options" form</u>.

Signal Options
General
Plot Signal Transparently
Plot City Polygons below the signal layer
✓ Draw Signal over water
Plot KWX propagation model error points
KWX Error Point Color:
Interference
Plot Interference Transparently
Show coverage and interference simultaneously
Highlight terrain blocked points (OET Ix Only)
Terrain Blocked Color:
Save these settings as defaults

# **General Options**

**Plot Signal Transparently** 

If checked, the signal colors are averaged with the background colors to enable the user to see objects below the signal layer.

Plot City Polygons below the signal layer

Normally city polygons are plotted above the signal layer and cover the signal. Check this box to plot the city polygons under the signal layer. Draw Signal over water

This switch determines whether or not signal is plotted over water (in this case "water" refers to oceans or other large bodies of water that are colored the same color as the oceans).

Plot KWX error points

The Longley/Rice propagation model reports what are known as KWX errors when it encounters situations where the model may not be completely accurate. This allows the user to plot the locations of these KWX error points.

# Interference

Plot Interference Transparently

If checked, the interference colors are averaged with the background colors to enable the user to see objects below the interference layer.

Show Coverage and interference simultaneously

This will cause interference to be plotted on top of coverage for interference studies.

Highlight terrain blocked points

This feature only works with OET 69 interference studies. This allows the user to flag the points in the study where the desired station's field strength falls below the required "threshold for reception".

	Previous
Page Layout Form	<u>Тор</u>
	<u>Next</u>

Probe is designed to be a full WYSIWYG (What You See Is What You Get) interface, allowing you to see things on the screen exactly as they will appear on the printout. The page layout form allows you to set up the margins used and the page size. The page layout form can be accessed by choosing "Layout" from the <u>Map Menu</u>.

Page Layout		
Page Size Height: Width: O Landscape O Portrait Use Prin Margins Top: Bottom: Left: Right:	8.5 "  11.0 "  ter Settings  1.0 "  2.3 "  1.0 "	Preview
⊙ <u>P</u> ub	lishing Mode	◯ <u>S</u> tandard Mode
Setup Printer VK X Cancel		

## Page Size

You should set the height and width (in inches) to match the size of your paper. You may also choose whether you want to print in portrait or landscape mode. Clicking the "Use Printer Settings" will set up the page size to correspond with the current default printer settings.

# Margins

By setting the margins you can set where the map will be displayed on the page. The preview window (on the right) will show the portion of the page where the map will be displayed.

### **Display Mode**

Probe supports two modes, "Publishing Mode" and "Standard Mode". When in "Publishing Mode", Probe uses the page and margin settings to give a WYSIWYG representation of the current study. When in "Standard Mode", Probe will not use the page size and margin settings. Instead it will display a fixed size bitmap containing the map and any objects you may have added using the "Add To Map" feature. You may select the display mode by selecting the corresponding radio button. When you switch to "Standard Mode", the margin and page settings will disappear and a box which lets you select the resolution of the bitmap will appear.

#### **Setup Printer**

Click the "Setup Printer" button to configure the current printer settings.

When you have finished setting up the layout, click the "OK" button (click "Cancel" to abort).

	Previous
Defining Cutoffs	Тор
	<u>Next</u>

To change the cutoffs used when drawing signal values on the map choose "Signal Cutoffs/Colors" from the <u>Map Menu</u>. The following window will appear:

Cutoff Setup	
<ul> <li>&gt; 100.0 dBu</li> <li>90.0 - 100.0</li> <li>80.0 - 90.0</li> <li>70.0 - 80.0</li> <li>60.0 - 70.0</li> </ul>	<u>A</u> dd <u>C</u> hange D <u>e</u> lete
Note: Press U to move up in the li Press D to move down in th Or use the mouse to select Sa <u>v</u> e current cutoffs as defaults	Save Cutoffs Load Cutoffs ist ie list

The box on the right shows the current cutoff setup (the current selected cutoff is highlighted in blue). To add a new cutoff, press the "Add" button. To modify the cutoff, highlight the cutoff you wish to change and click the "Change" button. You can select a cutoff in several different ways, using the U and D keys to move "Up and Down", you can use the N and P keys (for Previous and Next), or you can click on the cutoff using the mouse. Use the save and load buttons to save the current cutoff set to a file and load a previously saved cutoff set. When you are finished editing the cutoff set, click the "OK" button (after closing this window you will need to press the "Redraw" button on the main window to redraw the map with the new signal cutoff and color values). Check the "Save current cutoffs as defaults" to have this cutoff set be used by default when creating new studies.

	Previous
TV Band Based Cutoffs	<u>Тор</u>
	<u>Next</u>

The "Signal Coloration Mode" pop out style menu on the <u>Map menu</u> can be used to set the program to use the TV band based cutoffs. In this mode, the user can define different cutoff sets for each TV band. When you edit the cutoffs in this mode, the following window appears:

K Edit TV Band Cutoffs		
Low VHF (ch. 2-6)	High VHF (ch. 7-13)	UHF (ch. >= 14)
> 74.0 dBu	> 77.0 dBu	► 80.0 dBu
68.0 - 74.0	71.0 - 77.0	74.0 - 80.0
47.0 - 68.0	56.0 - 71.0	64.0 - 74.0
Edit	Edit	Edit
Save these cutoffs as <u>d</u> efaults	Edit Legend	OK X Cancel

The legend that is displayed on the map can be defined by clicking the "Edit Legend" button. A report can be generated that uses these cutoffs by selecting "TV Band Based Population" from the <u>Report menu</u>.

\* Note: This feature is only available in the Full Edition.

	Previous
Special Effects	<u>Тор</u>
	<u>Next</u>

The "Special Effects" menu is located on the "Map" menu. Each special effect can be turned on/off by clicking on the menu item for it (if it is turned on, a check will appear next to the name on the menu). After setting a special effect, you must press the "Redraw" button.

**Interpolate Signal Values** 

This causes Probe to use four-point interpolation to find the signal values at each point on the map. This effect makes the signal appear much less blocky, and more like the real world.

## Gradient Signal Shading • Standard

This causes the signal to be drawn in a more revealing way than by drawing cutoff ranges. Gradient shading will interpolate the color values for the defined cutoffs. For example, let's say you have two cutoffs defined -- one at 100 dBu (which is colored yellow) and one at 80 dBu (which is colored blue). Without gradient shading, every point where the signal value is between 80 and 100 will be colored solid blue. With gradient shading, points will appear more blue the closer their values are to 80 dBu and more yellow the closer they are to 100 dBu. Therefore if the signal at a point is 90 dBu it will appear to be "bluish yellow" or "yellow with a hint of blue".



Without Gradient Signal Shading



With Gradient Signal Shading

	Previous
Draw Modes	<u>Top</u>
	<u>Next</u>

Probe supports three different signal drawing modes, however the availability of these drawing modes depends on what type of study (either interference or coverage) is being performed. You can set the drawing mode by using the pop-out style menu on the <u>Map Menu</u>, or select it using the <u>Display Options Form</u>.

# **Coverage Study Drawing Modes**

When a coverage study is loaded, there are two drawing modes available:

Coverage

In this mode Probe will draw the field strength values of each station in the study using the defined cutoffs and special effects. For studies with more than one transmitter, the transmitter which has the highest field strength value at a given point will have its signal value plotted.

## **Highest Signal**

In this mode Probe will plot the color associated with the transmitter which has the highest field strength value at each point on the map (a transmitter's color can be assigned using the "<u>Transmitter List Box</u>"). You can also set the minimum field strength value at which a transmitter's color is plotted using the "<u>Display</u> <u>Options" form</u>.

## **Interference Study Drawing Modes**

When an interference study is loaded, there are two drawing modes available:

### Interference

This mode will show areas where interference occurs using the color associated with the interfering station (for an outgoing interference study the color of the station receiving the interference will be plotted). You can select the transmitters to be displayed using the "<u>Transmitter List Box</u>".

Coverage

In this mode you can plot the field strength values for one station in the interference study (you may select this station using the "<u>Transmitter List Box</u>"). For stations in the interference study, only signal which has been calculated for the station will be drawn.

	Previous
Map Commands	<u>Top</u>
	Next

The "Map Menu" contains a pop-out style menu labeled "Commands". This menu has several options that cause the program to perform a specific function with respect to the map.

## Force Map Redraw

Forces the map to be redrawn (this is the same functionality as the "Redraw" button in the <u>transmitter list</u> section of the main window).

**Hide All Contours** 

Hides all contours that have been added to the study (this turns off the visibility of all contours in the study).

#### **Show All Contours**

Shows all contours that have been added to the study (this turns on the visibility of all contours in the study).

### **Interference Study Color Reset**

This function is only available for interference studies. It resets the colors associated with each transmitter so that every transmitter that actually causes some interference is set to a color, and stations that do not cause interference have their associated color set to white. This allows the user to quickly determine which stations in the transmitter list cause interference and which ones don't. Note - if something in the study is changed that causes interference to be re-calculated this command should be used again (ie. this will not automatically be refreshed).

	Previous
Importing Map Layers	<u>Тор</u>
	Next

Use the "Import Data Layer" feature on the "Extra Layers" TAB of the Map Features window to add new data layers to the map.

\* Note: This feature is only available in the Full Edition.
🕷 Imported Layers 🛛 🛛 🔀	
New Layer #1     Property Line	
<u>E</u> dit <u>R</u> emove Remove All	
Import MIF File	
🗸 OK 🔀 Cancel	J

Currently Probe supports importing data layers that are in MIF (Map Info) format. Once layers are imported, the red up and down arrows can be used to set the plot order (select the layer you wish to change and use the 'up' button to move it up in the plot order, items shown at the beginning of the list are plotted on 'the bottom'). Select a layer and click the "Edit" button to edit the layer's plot properties.

### **Editing Import Layer Properties**

🔏 Edit			3
Layer Na	ame: New La	ayer #1	I
P	lot this layer o	on the map	I
Line:			
🗹 Fill	Polygons	Color:	
		V OK X Cancel	]

The layer name can be edited by changing the text in the box. Click on the line preview to edit the line style properties. If the data imported was polygon data, the polygons will be filled with the specified color if "Fill Polygons" is checked.

# Importing MIF Files

When you click the "Import MIF File" button, the following window will appear:

🔏 Import A	AIF File			
File Name:				<u>B</u> rowse
Grouping © G	g Options roup all objects of Layer Name: reate a new layer	the same type into one layer MIF Import for each type of object in the file		
			🗸 ОК	Cancel

Use the "Browse" button to find the file you wish to import. There are two options for how you can import the map data objects within the file. If all of the objects are the same thing (for example, if all of the objects in the file are county lines - or some other data type where you would wish to set the same plotting properties for all of them at once) then choose "Group all objects of the same type into one layer". If the file contains different object types (or objects where you want to be able to set the plot properties independently for each one) then choose "Create a new layer for each type of object in the file".

\* Note: This feature is only available in the Full Edition.

	Previous
Page Layout Templates	Тор
	<u>Next</u>

The program allows the use of Page Layout Templates for saving and restoring a given page setup including labels and other objects added to the map. The basic idea is that you can interactively setup a page to appear how you would like other maps to appear, and then save this configuration to be loaded into a different study at a later time. This way you can prepare the labels (transmitter info, study data, user logos, etc), and quickly apply the same settings to another map.

To save and load a map template, use the save and load function located on the "Page Layout Templates" section of the <u>Map menu</u>.

What is saved to a template:

The <u>Page Layout</u> (page orientation and margins)

Non-study specific items added to the map (text boxes, text labels, user logos, map scale)

What is not saved to a template:

Study Specific Items (things like arrows and user defined polygons)

<u>Map Features Settings</u> (boundary and other map layer settings)

When preparing a page to be saved as a template, keep in mind that you only want to have generic information located on the map that can be applied to any situation that you plan to use the template for. You should not have any study specific information on the map that doesn't use variables for its definition.

\* Note: This feature is only available in the Full Edition.

	Previous
Study Variables	<u>Тор</u>
	Next

Text labels and text box items that have been added to the map can reference <u>internal study variables</u> to generate their content. This allows information on the map to be automatically updated when the study is changed (for example - modifying a transmitter). To reference a variable, place the variable's name inside of a set of two straight brackets.

Example:

[[VariableName]]

When the label is rendered to the map, all items enclosed in the double brackets will be replaced by its variable counterpart. You can access <u>information about specific transmitters</u> by specifying

"Transmitter(#)." with the number of the transmitter from the transmitter list inside of the brackets (starting with #1). So to reference the call letters to the 3rd transmitter in the list, use the following:

[[Transmitter(3).CallSign]]

As a final example, say you wanted a text box to show the call letters of the first station of the study and the current date, you would enter:

Station: [[Transmitter(1).CallSign]]

Map Printed on: [[TodaysDate]]

If the first station in the transmitter list was KXYZ and the current date was Dec 1, 2003 -- then this would appear on the map as:

Station: KXYZ

Map Printed on: 12/1/2003

	Previous
General Study Related Variables	<u>Top</u>
	<u>Next</u>

There are several <u>variables</u> that reference study information:

**CompanyName** - Shows the company name specified in the program study defaults.

**StandardStudyInformation** - This multi line variable returns the standard study information block that contains various information relevant to the study.

**StudyDate -** Shows the date that the study was created.

**TodaysDate -** Shows the current data according to the computer's internal clock.

	Previous
Transmitter Specific Variables	<u>Тор</u>
	<u>Next</u>

The following transmitter specific <u>variable</u> names can be accessed. Note that you must reference these using a preceding "Transmitter(#)." statement.

For Example:

To display the channel of the first transmitter in the transmitter list, you would use the following:

[[Transmitter(1).Channel]]

## Variables:

**CallSign** - The transmitter's call letters.

FileNumber - The transmitter's file number.

**ERP\_kw** - The transmitter's ERP in kilowatts.

**EIRP\_kw** - The transmitter's EIRP in kilowatts.

**Channel** - The transmitter's channel number.

Latitude - The latitude of the station.

**Longitude** - The longitude of the station.

**Frequency\_MHz** - The frequency in megahertz.

**Height\_AMSL\_m** - The AMSL height of the transmitter (in meters).

**Base\_Elev\_m** - The base elevation of the transmitter (in meters).

**HAAT\_m** - The transmitter's HAAT.

Class - Station class.

**City** - City of license.

**State** - State abbreviation.

**HPAT\_Status** - The status of the horizontal pattern. Displays "Directional" for direction stations and "Omni" for omni-directional stations.

**VPAT\_YesNo** - Displays the definition status of a vertical pattern. Shows either "Yes" or "No".

**All\_VPAT\_Info** - This multi-line variable returns a summary of the vertical patterns status. If electrical or mechanical beam tilt exists, this information is also shown.

**PropagationInfo** - This multi-line variable shows the propagation model and associated variables.

	Previous
Adding Objects to the Map	Тор
	<u>Next</u>

Probe allows you to add several different objects to the map. To add an object to the map, choose the object you wish to add from the "Add to Map" pop-out style menu on the <u>Map Menu</u>. Most of the objects which are added to the map will initially be displayed in the upper left hand corner of the map (with the exception of the scale which is shown at the bottom right of the map). Once added, these objects can be moved or edited using the <u>selection arrow</u>.

Available objects:

Scale

The map scale shows a scale for the current map (and the current map scale in a 1:XXXXX fashion). As you zoom in and out (or change the map scale) the scale object will change size to accommodate for the changing map scale.

### **Transmitter Info**

When you add transmitter information to the map, you will be prompted for which transmitter's information to display (you will also be able to specify whether or not to show propagation information with the transmitter's information). This information will be added using the default transmitter information template.

### **Signal Cutoffs**

A signal cutoff object will show the signal level cutoffs being used in a study.

**City Name** 

This enables you to add a city name to be displayed on the map, see "<u>Adding City Names</u>" for more information.

**Transmitter List** 

The transmitter list object will display all of the transmitters in the study along with associated colors (these are the colors used to draw interference and highest signal).

**Study Information** 

The study information object will display a brief summary of the parameters of the study that were specified in the <u>wizard</u>.

### **Backdrop Info**

The backdrop info will display a "legend" describing the current backdrop parameters (see "<u>Probe Backdrops</u>" for more information).

#### User Defined Logo • Standard

A logo or graphic can be loaded from a graphics file and added to the map (see "<u>User Defined Logo's</u>" for more information).

**Custom Tick Mark** 

A <u>user definable tick mark</u> can be added to the map to mark a location or point of interest.

Land Cover Info

If land cover was used in signal calculation, the land cover info object will display a list of the land cover attenuation values used in signal calculation.

### Color Legend

A color legend can be used to place a label on the map that looks like the one used for signal field strength but can contain user defined text.

#### Interference Transmitter List • Standard

For interference studies -- this creates a color legend similar to the transmitter list that includes only stations that actually cause interference.





When using the US enhanced road database, road labels will appear on the map. Road labels can also be added using the road label <u>map</u> <u>tool</u>. The graphic that appears depends on the type of road: Interstate, US Highway, or State Highway. The graphic on the right side of the window will display a preview of the current road label configuration.

	Previous
Arrow Drawing Tool	Тор
	Next

The arrow drawing tool is used to draw arrows on the map. To use it, select the arrow drawing tool icon from the <u>"Map Tools"</u> toolbar. To draw an arrow, place the cursor at the location on the map where you would like the head of the arrow to be and click the left mouse button. Then move the cursor to where you would like the tail of the arrow to end and click the left mouse button again. Once an arrow has been added to the map its properties can be edited. To change an arrow's properties, select the arrow using the <u>"Selection Tool"</u>. Then double click on the selected arrow to open the arrow properties window.

🔣 Arrow Properties 🛛 🛛 🔀
Arrow Properties
Line Width: 🙎 😂
Color:
Show a point at the end of this arrow
Fill the head of the arrow
Head Size (1 - 200): 🛛 15 😂
Head Width
Small O Medium O Large
Make these settings defaults
🗸 OK 🔀 Cancel

In the arrow properties window, you can set the line width and color of the arrow. You can also set whether or not a point is drawn at the head of the arrow (if the "show point at the end of this arrow box" is unchecked the arrow will be drawn as a line). The arrow head can be filled by checking the box labeled "Fill the head of the arrow". You can adjust the size of the arrow head by setting the "Head Size". There are three options for the width of the arrow head: Small, Medium, and Large. Check the box labeled "Make these settings defaults" to make the settings specified when the "OK" button is clicked the default settings for new arrows.

	Previous
Adding City Names to the Map	<u>Тор</u>
	<u>Next</u>

If you wish to add a city name to the map, choose "City Name" from the "Add to Map" pop-out menu on the <u>Map Menu</u>.

Add City Names to the Map	
Keats ( 39-13-25 N , 096-42-29.98 W )	
Add <u>E</u> dit <u>D</u> elete <u>C</u> lear List	
US Name Search	Close

The list shows the names which have been added to the map. If you know the coordinates of a city that you would like to add, click the "Add" button. To edit the coordinates of a city that has already been added, select the city's name in the list and click the "Edit" button. To remove a city which you have added to the map, click "Delete". If you do not know the coordinates of the city you wish to add, you may search Probe's comprehensive city name database by clicking the "US Name Search" or "International Name Search" buttons.

When you are finished adding cities to the map, click the "Close" button.

## **Searching US Name Database**



As you type in the city's name, a list will be displayed in the box below containing matches for that name. To add a city from the database, select it from the list in the bottom box and click the "Add to List" button.

### **Searching the International Name Database**

🕷 Global Name Search 🛛 🔀
Country: MX MEXICO
Name: jabalies
Jabalies, 00 ( 22-48-30 N, 104-40-30.01 W )     Jabalinco, 00 ( 20-02-00 N, 097-22-00.01 W )     Jaboncillo, 00 ( 21-58-30 N, 098-06-48 W )     Jaboncillo, 00 ( 17-41-42 N, 092-04-06.01 W )     Jacalas, 00 ( 21-00-18 N, 099-11-17.99 W )     Jacales, 00 ( 27-00-30 N, 106-06-18.01 W )     Jacales, 00 ( 27-00-30 N, 106-06-18.01 W )     Jacales, 00 ( 27-12-54 N, 099-12-48 W )     Jacales, 00 ( 27-21-24 N, 104-52-05.99 W )     Jacalilla, 00 ( 21-03-48 N, 099-02-24 W )     Jacarandas, 00 ( 23-41-12 N, 097-50-06 W )     Jacinto Lopez, 00 ( 29-11-18 N, 110-47-12 W )     Jacobo, 00 ( 27-05-12 N, 104-56-12 01 W )
Cancel

This works the same as US name searching, however you must specify the country you would like to search in the drop down list box at the top of the window.

## A note about how Probe plots names:

Probe plots city names on the map in such a way that overlapping will not occur. For example if two cities are adjacent to each other (in such a way that when they are displayed the names will overlap), the name of the city with larger population will appear and the other will not be drawn. Any city names you have added to the map will take precedence over other names and will always be plotted (unless you add two cities which overlap, in which case the first one entered will be drawn).

	Previous
User Defined Tick Mark	Тор
	<u>Next</u>

A user defined tick mark can be added to the map using the <u>Map</u> <u>Information Tool</u> or from the Map menu by choosing "<u>Add to</u> <u>map</u>" and then selecting "Custom Tick Mark".

🔣 User Defined Tick Mark 🛛 🔀					
Latitude:	45-00-00 N		E	ind US Street Addre	155
Longitude:	090-00-00 W			Per Ref	
				Tick Mark Size:	2 💌
🗹 Show	label with this ti	ck mark		Tick Mark Color:	
Label:	Point In Que	stion			
Horiz	ontal Position:	Right		~	
Ve	rtical Position:	Below		~	
Change Label <u>F</u> ont					
🗌 Make the	se settings <u>D</u> efa	ault		🗸 ок	🗶 Cancel

Here the latitude and longitude can be entered, read from the  $\underline{V}$ -<u>Soft reference file</u>, or found by <u>searching the tiger street level</u> <u>database for a US street address</u>. The tick mark size and color can be adjusted, and a label can be added to the tick mark. Use the position drop down list boxes to select the position that the label appears at with respect to the tick mark. Check the "Make these settings default" to make the current settings the defaults for new tick marks.

	Previous
User Defined Logo	<u>Тор</u>
	Next

🔏 User Defined Logo 🛛 🔀		
Load	Dimensions Maintain Original Aspect Ratio Height: 1.362 Inches Width: 3 Inches Pad Width: 0,1 Inches Appearance Border Width: 1	
	Display Shadow Make this logo the default OK    Cancel	

A user defined logo or graphic can be added to the map from the "<u>Map</u>" menu by choosing "<u>Add to Map</u>" and then "User Defined Logo".

Use the "Load" button to load a graphic from a file. The height and width can be entered in inches. These values reflect the size of the image on the screen and on the printer. If the box labeled "Maintain Original Aspect Ratio" is checked - then when changing the height or width the one that is not changed by the user will be automatically modified to match the aspect ratio of the orginal graphic. Note that in general the logo image will need to be scaled down to be plotted appropriately on the screen, however it will usually be stretched to fit on the printer. In many cases the image will not look good on the screen but will be fine on the printout.

The border width and border color can be set in this window, although they will not be reflected in the preview on the left. Click the "Make this logo the default" and press "OK" in order to save the current logo as the default (doing this will cause the logo to be automatically loaded the next time one is "Added to the Map").

<sup>\*</sup> Note: This feature is only available in the Standard and Full Edition.

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Select "Color Legend" from the "Add to Map" pop-out style menu located on the <u>"Map" menu</u>. User defined color legends can be used to place a label on the map that has color associated with user configurable text.

🔏 Edit Color Legend	
Proposed Contour	Add New Label
Existing Contour	Color:
	Text: Proposed Contour
	<u>R</u> emove Label
A Move Up	🗸 OK 🗙 Cancel

Use the "Add New Label" button to insert another item at the end of the list. The color and text associated with the label selected in the list can be edited on the right hand side of the window. Use the "Move Up" and "Move Down" buttons to change the order of the selected item in the list.

<sup>\*</sup> Note: This feature is only available in the Standard and Full Edition.

	Previous
Polygon Objects	<u>Top</u>
	Next

The <u>polygon map tool</u> can be used to add new user defined polygons to the map. Once these polygons are defined, they can be interactively manipulated. Use the <u>selection tool</u> to select a polygon by clicking on one of its vertexes, this will cause the polygon to become highlighted having "squares" appear on all of its vertices:



Once the polygon is selected, you can move individual points around by clicking (and holding) the left mouse button while dragging the point. Double clicking on one of the vertices will show the polygon properties window:

🔏 Polygon Properties 🛛 🛛 🔀		
Type O Line O Polygon		
Pen Style		
	ļ	
Edit Polygon Points		
🗸 OK 🔀 Cancel	]	

Here you can select the type of polygon. If the type is set to "Line" then the first and last point in the polygon will not be automatically "closed". Click

on the pen style preview to change the line width and style settings. The button labeled "Edit Polygon Points" will open the polygon editor.

🔏 E	dit Polygon		
	Latitude	Longitude	
1	45-40-19.35 N	113-43-17.30 W	
2	45-48-11.58 N	113-32-48.95 W	
3	45-35-22.45 N	113-22-09.83 W	
4	45-27-14.55 N	113-33-16.85 W	
5	45-34-39.57 N	113-33-31.27 W	
	Insert After	Insert Before	Remove
Reverse Order			
	Export	Po	pulation Report
	Import		)K 🗙 Cancel

The insert and remove buttons can be used to modify the individual points of the polygon. When "Insert Before" and "Insert After" are used, a new point is inserted relative to the position of the selected point. The default value for inserted points will be the average of the point directly preceding the inserted point and the point directly after it (so the new point will lie exactly in between). The "Export" and "Import" buttons can be used to save the polygon to a simple ASCII file. The button labeled "Population Report"
will generate a report of the population contained within the polygon with racial and county breakdown.

Tip: When editing the polygon interactively on the map, if you right click on one of the vertices the polygon point editing window will appear with the vertex that was clicked on as the selected vertex. This provides an easy way to add a new point that is next to one of the points that you see defined on the map -- simply click the "Insert After" button and press OK and you will see the 'new' point has been added.

This image shows the polygon after right clicking on the selected point in the graphic above and using the "Insert After" feature:



Note that the new point is directly between the two existing points.

\* Note: This feature is only available in the Full Edition.

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Using Contours	<u>Top</u>
	Next

Probe allows the user to define any number of contours for any transmitter in a study (these contours are drawn on the map as a solid curved line). Contours for a given transmitter can be accessed in several ways:

1. Use the <u>selection arrow</u> to select a transmitter token, and then right click on the transmitter token.

2. Choose "Transmitters" from the <u>View menu</u>, then highlight the call letters for the desired station and click the "Curves" button.

3. Right click on a transmitter's call letters in the transmitter list box.

Each transmitter has its own list of contours associated with it. After accessing the contour list using one of the previously mentioned methods, the following window will appear:

Contours - KBBG
▼ 50 50 Field Strength: 60.00 FCC
✓ Circle: Radius = 100.0 km
<u>E</u> dit <u>A</u> dd <u>D</u> elete
Benort T Export Contours to MIE File

Each contour has a check box next to it - this sets the visibility of the contour on the map (uncheck it to have the contour not be plotted on the map). After selecting a contour, the following operations can be performed (click the "Add" button to add a new curve):

### Edit

Editing the contour will bring up the same form that was used to add the contour to the study. There you can set the properties for the selected contour.

### Delete

Removes the contour from the study.

# Report

# **Distance To Contour Table**

This will create a table showing the "distance to contour" values.

🔏 Distance To Contour Report 💦 🚺	
Azimuths	
<ul> <li>36 (every 10 degrees)</li> <li>72 (every 5 degrees)</li> <li>360 (every 1 degree)</li> </ul>	
Custom 360	
Additional Azimuths to Show	
Add <u>R</u> emove	
Other Options	
Show HAAT in Report	
V OK X Cancel	)

The user may select how many radials to show in the report, and add addition azimuths to include those that may not be on standard radials. Check the "Show HAAT in Report" option to show HAAT values for each radial.

## **Population Report**

Creates a population report for the selected contour. This report will include: total population within the contour, total area within the contour, and a county by county breakdown of the population (with racial breakdown).

# Zip Code Report (Optional)

A zip code report generates a list of all of the zip code centroid points that fall within the contour.

Clicking the close button on this form will close the window and cause any new/edited contours to be drawn on the map.

Adding/Editing Contours

To add a new contour to the current transmitter, click the "Add" button. The following form will appear:

Edit Contour			
Contour Type: FC	C Contour		✓
General Calc Area	Terrain FCC	Contour	
-Location Variability			
010	⊙ 50	◯ 90	Custom:
T			]
1 ime Variability	50	0 90	
	0.00	0.00	
Field Strength:	60.00	dBu	Use only 8 radials for <u>H</u> AAT
			OK Cancel

The contour editing window is set up as a series of tab sheets which contain the various options for each contour. The "General" tab contains the settings used for drawing, the "Calc Area" tab contains the settings for the number of points and arc calculation, the "Terrain" tab shows the terrain database configuration used for this contour, and the fourth tab will change depending on what type of contour is being edited. At the top of this window, there is a drop down list box where you can change the contour type, available types are: FCC Contour, FMPTP, FMPTP2, Circle, Import, and calculated signal contours. An Import contour is used for importing and displaying contours created by other programs. Probe currently supports importing DTC and PLT files. A calculated signal contour uses the signal which Probe has already calculated for the transmitter to generate a contour. Calculated signal contours can be found for the first occurrence of a certain field strength along each radial, the last occurrence, or the mean (which is the average of the distance to the first occurrence and the distance to the last occurrence). When "OK" is pressed, Probe will perform any

necessary calculations for the contour and return the user to the contour list form, where pressing the close button will plot any new/edited curves on the map.

# The General Tab

Edit Contour		
Contour Type: FCC Contour		
General Calc Area Terrain FCC Contour		
General Properties		
Color: Line Width: 2 🗢 Border 🗾 Border 2 🗢		
From TX Line Style: Solid 🗸		
Show Cardinal Radials with this Contour		
Show radial every 45 👽 degrees. Line Width: 1 💌		
Show a special radial with this contour at 0 degrees.		
Show label with this contour		
Draw label at azimuth: 135 degrees		
OK X Cancel		

Clicking on the "General" tab will display the general contour display options. Here you can set the color, line width, choose whether or not cardinal radials are drawn (also which ones are drawn), and choose whether or not to have Probe automatically show a label with the contour on the map. Use the "From TX" button assign the color that is associated with the current transmitter shown in the transmitter list box of the main window.

# The Calc Area Tab

Edit Contour
Contour Type: FCC Contour
General Calc Area Terrain FCC Contour
<ul> <li>Calculate entire contour</li> <li>Number of Points</li> <li>8</li> <li>12</li> <li>36</li> <li>72</li> <li>180</li> <li>360</li> </ul>
Calculate an arc of the contour (1 point per degree will be calculated)
Arc Definition Start Bearing: Stop Bearing: 0
Cancel

When calculating an entire contour, the number of points (radials) to be calculated can be set to 8, 12, 36, 72, 180, or 360. Probe also supports the calculation of an arc instead of the

entire contour (this is useful when using FMPTP because of the large amount of time PTP contours take to calculate). You can specify the start and stop bearing for calculation by using the drop down list boxes. When an arc is calculated, probe calculates one radial per degree.

# The Terrain Tab

Edit Contour	
Contour Type: FCC Contour	]
General Calc Area Terrain FCC Contour	
-Terrain Settings	
Primary Database: V-Soft 3 Second US Terrain	
Secondary Database: Not Assigned	
	Edit
	V OK X Cancel

The Terrain tab shows the terrain configuration used for calculating this contour. This defaults to the terrain setup specified for the study, but can be changed independently for each contour. Use the "Edit" button to change the terrain configuration.

	Previous
Propagation Model Summary	<u>Тор</u>
	<u>Next</u>

Probe currently supports the following propagation models:

Longley/Rice - Also known as ITM (Irregular Terrain Model)

FCC Model - This is the same propagation model that is used in determining standard FCC contours.

<u>TIREM</u> - Terrain Integrated Rough Earth Model (Optional)

Line of Sight / Shadow - Indicates which cells have line of sight with the transmitter

<u>FMPTP</u> - The original implementation of the propagation model used in the calculation of the proposed FMPTP Contours. This is also known as the FM point-to-point model.

<u>FMPTPv2</u> - The latest FCC propagation model used for FMPTP Contours

Okumura/Hata - Computer implementation of the Okumura propagation model

<u>COST-231-Hata</u> - Computer implementation of the COST-231 propagation model

The propagation model used for signal calculations for a specific transmitter can be selected on the <u>Transmitter</u> <u>Properties Form</u>.

	Previous
Longley/Rice Propagation Model	<u>Тор</u>
	<u>Next</u>

The Longley/Rice propagation model is also know as the Irregular Terrain Model (ITM). Probe uses version 1.2.2 of the Irregular Terrain Model. The Longley/Rice model is intended for use with frequencies from 20 to 20,000 MHz, and distances less than 2,000 km.

Model Inputs

Conductivity

This is the conductivity of the ground over which the signal propagates (measured in Siemens per Meter). See

the <u>table of suggested values</u> for different types of ground (located at the end of this chapter).

# **Dielectric Constant**

The dielectric constant is the relative ground permittivity. See the <u>table of suggested values</u> for different types of ground (located at the end of this chapter).

## Refractivity

This is the atmospheric refractivity, measured in N-Units (parts per million). See the <u>table of suggested refractivity</u> <u>values</u> for different climate zones.

**Climate Zone** 

The climate zone can be one of the following:

None

Equatorial

**Continental Subtropical** 

Maritime Subtropical

Desert

Continental Temperate ( this is the most commonly used )

Maritime Temperate Overland

Maritime Temperate Over sea

## Antenna Polarization

This is the polarization of the transmitting and receiving antennas. Longley/Rice supports horizontal and vertical polarization.

**Receiver Height** 

This is the receiver height above ground (in meters).

**Receiver Gain** 

This is the receiver gain in dB.

**Time Variability** 

This is the time variability expressed as a percentage (between 0 and 100). When considering an analog station's coverage (NTSC and FM), a time variability of 50% is usually used. For digital stations (DTV), a time variability of 90% is generally used. For interference calculations, a time variability of 10% is standard for stations causing interference.

### **Situation Variability**

This is the situation variability expressed as a percentage (between 0 and 100). Generally a 50% situation variability is considered.

#### **Urban Clutter Factor**

The urban clutter factor is an additional loss factor determined by A.G. Longley to make the Longley/Rice model results resemble the results for the Okumura propagation model (for use in urban areas). LR Mode

There are two modes for the Longley/Rice propagation model, Broadcast and Individual. In general the broadcast mode should be used for signal calculations. The Satellite Home Viewers Act required the use of Longley/Rice in "individual" mode.

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FCC Propagation Model	<u>Top</u>
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The FCC Propagation model is the same model used to determine FCC contours.

**Model Inputs** 

# **Time Variability**

This is the time variability expressed as a percentage (between 0 and 100). When considering an analog stations coverage (NTSC and FM), a time variability of 50% is usually used. For digital stations (DTV), a time variability of 90% is generally used. For interference calculations, a time variability of 10% is standard.

# **Location Variability**

This is the situation variability expressed as a percentage (between 0 and 100). Generally a 50% location variability is considered.

	Previous
TIREM Propagation Model (Optional)	Тор
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The Terrain-Integrated Rough-Earth Model (TIREM) system is designed to compute transmission loss for transmitters of frequencies between 20 and 20,000 MHz.

Model Inputs

Conductivity

This is the conductivity of the ground over which the signal propagates (measured in Siemens per Meter). See the <u>table of suggested values</u> for different types of ground.

# **Dielectric Constant**

The dielectric constant is the relative ground permittivity. See the <u>table of suggested values</u> for different types of ground.

### Refractivity

This is the atmospheric refractivity, measured in N-Units (parts per million). See the <u>table of suggested refractivity</u> <u>values</u> for different climate zones.

## Humidity

This is the absolute humidity of the atmosphere (in grams per cubic meter). The humidity is usually set to 10.

## **Climate Zone**

The climate zone can be one of the following:

None ( if you choose this, TIREM will not perform power fading calculations )

Equatorial

**Continental Subtropical** 

Maritime Subtropical

Desert

Continental Temperate ( this is the most commonly used )

Maritime Temperate Overland

Maritime Temperate Over sea

## **Antenna Polarization**

This is the polarization of the transmitting and receiving antennas. TIREM supports horizontal and vertical polarization.

**Receiver Height** 

This is the receiver height above ground (in meters).

**Time Variability** 

This is the time variability used in TIREM's power fading calculations expressed as a percentage (between 0 and 100). If the climate is selected as "None", TIREM will not perform power fading calculations thus this value will not be used.

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Line of Sight Propagation Model	Тор
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The line of sight propagation model checks to see if the transmitter has a line of sight with the receiver. If it does, then the points signal value is set to 100 dBu. If there is not line of sight between the transmitter and receiver, the points signal value is set to 60 dBu. The user must set up colors to represent line of sight signals and shadowing.

Model Inputs

**Receiver Height** 

This is the receiver height above ground (in meters).

# Earth's Curvature

This is the Earth's curvature constant ("K" constant ) used in calculation of the profile, it is usually set to 1.33. To use flat earth (no curvature) set this value to 0.

	Previous
FMPTP Propagation Model	Тор
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This is an implementation of the propagation model used in computing the FCC's proposed Point-to-Point Contour Prediction Method for FM broadcast stations. Probe allows the use of the "propagation model" part of the method as a stand alone propagation calculation model (like Longley/Rice, the field strength is calculated using the terrain for each point in the specified area of calculation). This propagation model requires no inputs beyond the reference station's parameters. In order to plot FMPTP contours, see <u>Using Contours</u>.

Differences from the FCC's current implementations of FMPTP

The FCC specifies that the FMPTP model is to use 30 Second terrain with 0.25 mile (about 0.4 km) spacing along azimuths. For improved accuracy, Probe can use 3 second terrain with 0.1 km spacing along azimuths.

For more information on FMPTP see:

http://www.fcc.gov/oet/fm/ptp

	Previous
FMPTPv2 Propagation Model	Тор
	<u>Next</u>

This is an implementation of the FCC's latest propagation model to be used in computing the FCC's proposed Point-to-Point Contour Prediction Method for FM broadcast stations. Probe allows the use of the "propagation model" part of the method as a stand alone propagation calculation model (like Longley/Rice, the field strength is calculated using the terrain for each point in the specified area of calculation). This propagation model requires no inputs beyond the reference station's parameters. In order to plot FMPTPv2 contours, see <u>Using Contours</u>.

For more information on FMPTP see:

http://www.fcc.gov/oet/fm/ptp

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Okumura Propagation Model	<u>Тор</u>
	<u>Next</u>

The Okumura propagation model that Probe uses is the Okumura/Hata/Davidson implementation. Hata developed a set of equations that provide Okumura model predictions for computer use. The Davidson correction factors extend the frequency and base antenna height range.

Model Inputs

**Receiver Height** 

This is the receiver height above ground.

#### Environment

The Okumura propagation model supports five different environment types. These are Urban, Sub Urban, Quasi Open, Open, and user defined correction factor.

## **User Defined Correction Factor**

The Okumura propagation model works in such a way that the maximum (Urban) attenuation is calculated and then a correction factor is applied to generate the other environment attenuations. Probe allows the user to enter a custom correction factor instead of using one of the model defined corrections. In general this correction factor should be a "negative" number (dB attenuation).

Model Limits
Frequency Range: 30 - 1500 MHz

Transmitter Height: 20 - 2500 m

Maximum Distance: 300 km

	Previous
COST-231 Propagation Model	<u>Тор</u>
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Probe implements the COST-231/Hata version of the COST-231 propagation model. This model uses the HAAT along each radial to determine the attenuation based the following equation:

Path Loss (dB) = 46.3 + 33.9\*log( F) - 13.82\*log( H)

+ [44.9 - 6.55\*log( H )]\*log( D ) + C

where

F = Frequency (MHz)

D = Distance between base station and receiver (km)

H = HAAT in the direction of the receiver (m)

C = Environmental-correction factor (dB)

The Hata correction for receiver height and frequency is then applied to calculate the final attenuation.

Model Inputs

**Receiver Height** 

This is the receiver height above ground.

#### Environment

The COST-231 propagation model supports five different environment types. These are Dense Urban (-0dB), Urban (-5dB), Suburban (-10dB), Rural (-17dB), and user defined correction factor.

#### **User Defined Correction Factor**

The COST-231 propagation model works in such a way that the maximum (Dense Urban) attenuation is calculated and then a correction factor is applied to generate the other environment attenuations. Probe allows the user to enter a custom correction factor instead of using one of the model defined corrections. In general, this correction factor should be a "negative" number (dB attenuation).

# Suggested Refractivity Values

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Climate	Refractivity
Equatorial	360
Continental Subtropical (Sudan)	320
Maritime Subtropical	370
Dersert	280
Continental Temperate	301
Maritime Temperate, over land	320
Maritime Termperate, over sea	350

# Suggested Values for Electrical Ground Constants

	Dielectric Constant (Relative Permittivity)	Ground Conductivity
Average Ground	15	0.005
Poor Ground	4	0.001
Good Ground	25	0.020
Fresh water	81	0.010
Salt water	81	5.0

US Ground Conductivity Map

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# US Refractivity Map

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# Probe Menus



Probe has six main menus. For information on a specific menu, click the corresponding link:

File Menu - Common file options.

View Menu - General interface and setup options

Map Menu - Map specific options

Report Menu - Used for generating various printable reports

Tools Menu - Other tools included with Probe

Help Menu - Menu with help options and about box

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# **New Study**

Create a new study ( see <u>Using the Wizard</u> for information on how to set up a new study ).

## **Open Study**

Open a saved study.

# Save Study

Save the current study. If you have saved this study before, it will be saved to the same file. If this study has not been saved, you will be prompted for a file name.

Save Study As

Save the current study, using "Save As" will always prompt for a filename.

**Close Study** 

Close the current study.

#### Export Map to Graphics File • Standard

Use this to create a graphics file (BMP, JPG, GIF, or PNG) which contains the current map. See "<u>Exporting the Map to a</u> <u>Graphics File</u>" for more information.

#### **Export Transmitter List To a File**

This option will export the transmitters in the study to a file which can be loaded as the list of possible interferers in a future interference study. Use this feature if you wish to run an interference study with the exact same 'possible interferers' list that the current study has.

Print

Print the currently displayed map.

## **Print Setup**

This will bring up the printer settings dialog, where the properties of the printer can be changed.

## **Recent Files**

Probe keeps a list of recently accessed files which can be loaded using one of the quick links on the file menu.

#### Exit

Exit Probe. You will be asked if you wish to save the current study, then Probe will close.

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	Toolbars 🕨	۱
C)	Path Setup	
D,	Terrain Path Setup	l
2	Population Data Path Setup	l
1	Study Defaults	l
	Unit Setup	
	Windows Ctrl+W	l
	Edit Study and Transmitters List	

# Toolbars

Toolbars is a pop-out style menu that allows you to select which tool bars are currently visible. Use this to hide/show a particular toolbar. Path Setup

This will open the <u>path setup window</u> where you can configure the paths to the databases that Probe requires.

**Terrain Path Setup** 

Opens the <u>Terrain Setup window</u> where the terrain settings are established.

#### **Population Data Path Setup**

Opens the <u>population database setup window</u> where the paths to the available population databases can be configured.

**Study Defaults** 

Use this to <u>configure the defaults</u> used when creating a new study.

## **Unit Setup**

Setup the default units to be used by Probe for signal strength and power.

Windows

Shows the list of available windows in the window list form.

**Edit Study and Transmitter List** 

This will open the <u>study editing window</u>. Use it to modify transmitters in the study, access contours associated with each transmitter, and make changes to the study settings.

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	<u>Next</u>



# Copy Map to Clipboard

This will copy the current map to the Windows clipboard.

Add to Map

Use this to add objects to the map.

# **Special Effects**

Use this to select the <u>special effects</u> that are used in signal plotting.

# **Signal Coloration Mode**

This pop-out style menu can be used to switch between the standard cutoff mode (where the same field strength cutoffs are used for every transmitter) and the "TV Band Based" cutoff mode (where field strength cutoffs can be defined for each TV band).

#### Draw Mode

This sets the draw mode depending on the type of study you are performing. See "<u>Draw Modes</u>" for more information.

#### Commands

These map related "commands" tell the program to perform a specific task.

#### **Map Features**

Allows you to set up the overlays used on the map. See "<u>Setting Up Map Colors</u>" for more information.

#### Signal Cutoffs/Colors

This will load the <u>signal cutoff window</u> which can be used to set the cutoffs and colors used when drawing signal to the

map.

# **Signal Display Options**

Shows the <u>signal display options window</u> where things such as signal transparency and interference plotting options can be configured.

## Layout

Brings up the <u>"Layout Settings" form</u>, which can be used to modify the current pages margins and size.

**Map Settings** 

Allows you to set the center coordinates of the map, scale, and projection. See "<u>Map Settings</u>".

# **Transmitter Token Settings**

Configure how transmitter tokens are displayed on the map.

# **Page Layout Templates**

Save and load page layout templates.

# **Display Options**

This will bring up the <u>Display Options Form</u> which can be used to set all mapping/drawing options.

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Population... TV Band Based Popluation... Generate Table... Study Information... TV Interference Cull List... Zip Code Coverage...

# Population

For coverage studies this will show the <u>Population Report</u> <u>Form</u>, from which you can select the parameters of the population report. For interference studies, this menu item will create an interference population report with county by county break down.

#### TV Band Based Population

Generates a population report based on the <u>TV Band based</u> <u>cutoffs</u> defined for the study.

#### Generate Table • Standard

Use this to generate a table of signal values along certain azimuths. See "<u>Signal Table Generation</u>" for more information.

# **Study Information**

This will output information for the current study including the transmitters involved and the parameters used in the calculations.

# TV Interference Cull List (Optional in the DTV Module)

Generate a <u>TV interference cull list report</u>.

# Zip Code Coverage (Optional)

This option can be used to generate a <u>report of the zip codes</u> which are covered by a user specified field strength. [Note: This option is only enabled for users who have purchased the Probe zip code centroid database.]

## **Additional Interference Reports**

There are two additional reports that appear on the Report menu when they are available.

Interference Cell Report - Shows the population and relative location of the interference cells in the study.

<u>Masking Report</u> - Shows the stations that were considered for masking and cells where masked interference was found.

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	BMP Switch	I
	Coverage Matcher	
₩.	Profile Viewer	
	Data Export	
	Text Editor	
✐	Contour Overlap	
NAD	NAD Conversion	
	HAAT/COR Calculator	
	Point Info/Report	
	Multiple Contours	
	Database Cull	
	Delta H Calculation	

# BMP Switch • Standard

<u>BMP Switch</u> allows you to quickly switch back and forth between multiple BMP files containing map images.

# **Coverage Matcher (Optional in DTV Module)**

Loads the <u>coverage matcher</u> window.

#### Profile Viewer • Standard

Opens the <u>profile viewer</u>. To define the profile end points graphically, use the <u>profile tool</u> to access the profile viewer.

#### Data Export

Opens the <u>data export window</u> which allows the user to save signal data generated by Probe to a file.

#### **Text Editor**

Open the standard Probe text editor (like the one used for text reports).

#### Contour Overlap

Shows the <u>contour overlap window</u> where contour overlaps can be specified, edited, and have population reports generated.

#### NAD Conversion • Standard

This opens a <u>NAD coordinate conversion utility</u>, which can be used to convert coordinates from NAD27 to NAD83 and visa versa.

#### HAAT/COR Calculator • Standard

Calculates HAAT from COR and vice versa.

#### Point Info Report • Standard

Generate a <u>point information report</u> (a study must be open for this option to be available).

Multiple Contours

The <u>multiple contour tool</u> allows contours to be added to several stations in the study simultaneously.

#### Database Cull • Standard

The <u>database culling feature</u> allows data to be drawn from the FCC databases using user defined selection rules.

#### Delta h Calculation • Standard

Calculate "delta h" values for a given location and azimuth.

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Transmitter Properties Form	<u>Тор</u>
	<u>Next</u>

The transmitter properties form is used to setup transmitter and propagation model parameters. The following picture shows the transmitter properties form (before any data for the transmitter has been added) with a few key areas of the form highlighted.
Page selection tabs		
Transmitter Properti <mark>e</mark> s		
Transmitter Antenna Info Longley/Rice Parameters		
Transmitter Parameters Identification: KJHN Freque	ency: 88.10 MHz	
Latitude: 42-30-45 N Char	nnel: 201	
Longitude: 092-19-24 W	HAAT 47.0 m Calc HAAT	
ERP: 9.5 kW 💌 Base Elevat	Get Elevation Auto	
Antenna Height AG	56.00 m Calc COR	
To Ref Trom Ref	ify Xmitter Height AMSL	
Load From FCC Database Class Print Transmitter Info Max C3 Property Files		
Eroadcast Type ○ T⊻ ○ <u>D</u> TV ⊙ <u>F</u> M ○ Other Longley/Rice	<u>Import</u> <u>Export</u>	
0	<u>✓ O</u> K <u>X</u> Cancel	
Use this button to load transmitter info from an FCC database.	Propagation model selector	

The first thing to note are the page selection tabs at the top of the form. Because all of the parameters for the transmitter could not fit on to one screen, the transmitter properties form is broken into a series of "pages". You can switch pages by clicking on the tab for the page you wish to see. The second highlighted area is the "Load From FCC Database" button. If you would like to perform a study with an existing station, the first thing you should do is click on this button to select a station from the FCC database.

The third highlighted area is the propagation model selector. Use this to select the propagation model. Since each propagation model requires different inputs, the propagation parameters are located on a separate "page". Changing the propagation model will cause the appropriate parameters tab to appear at the top along with the other page selection tabs. For propagation model inputs see: "Propagation Models".

Changing "pages"

By clicking on the tabs located at the top of the form, you can change the active "page". There will usually be four tabs at the top:

Transmitter

This is the page shown in the illustration, where the properties of the transmitter itself are entered.

### Antenna

This page is used to set the antenna pattern for the transmitter (see "Using the <u>Antenna Pattern Editor</u>" for information on editing the azimuthal pattern and the "<u>Vertical Elevation Pattern Editor</u>" for information on changing the vertical pattern). All new transmitters default to an omni-directional pattern.

Info

Use this page to specify the city, state, and organization with which the transmitter is associated. This page also has a selection for whether or not the call letters for the transmitter are displayed on the map with the transmitter token (or whether the transmitter token is displayed at all).

### "Propagation Parameters"

The label on the fourth tab will depend on the propagation model selected. You may set the propagation parameters for the desired model by clicking the tab.

# Entering original transmitter parameters

In order to enter parameters for a new station not found in the database, do the following:

### Specify the Broadcast Type

Using the radio buttons next to the propagation model selector, choose the appropriate broadcast type for this transmitter.

**Specify the Frequency and Channel Number** 

If the correct broadcast type has been selected, you should only need to enter either the frequency or the channel number (as you enter these values in one box, the appropriate value should appear in the other). Note, the frequency is specified in megahertz.

#### Set the Latitude and Longitude

Enter the coordinates of the transmitter in the boxes labeled latitude/longitude. For help on the coordinate formats available see "<u>Entering Latitudes and Longitudes</u>". If the "Auto" check box (on the right hand side of the window) is turned on then the base elevation will automatically be calculated from the terrain database when changing the coordinates. If it is off - the you must click the "Get Elevation" to retrieve it, or enter a known value in the "Base Elevation" edit box (if you are in base elevation + AG height mode).

### Specify the ERP (Effective Radiated Power)

Enter the ERP for the transmitter in the edit box labeled "ERP". Use the drop down list box next to the ERP edit box to specify what units the ERP is in. Note that ERP is the transmitter power with respect to a dipole antenna, so the maximum power radiated by the transmitter in any direction is actually the ERP + 2.15 dB. If you have the EIRP (which is the power with respect to an isotropic radiator), then you must convert it to ERP for use by the program by subtracting 2.15 dB or dividing the kW value by 1.64.

#### Set the Transmitter's Identification

The transmitter's identification should be the call letters for the station or some other abbreviation that identifies the transmitter. The identification is drawn on the map as part of the transmitter token. It is also used to identify the transmitter in population reporting.

### Specify the Center Of Radiation (COR)

The center of radiation can be entered in one of two ways:

1. Specify the base elevation and transmitter height above ground. If you have entered the latitude and longitude of the transmitter site, Probe can find the base elevation from the terrain database for you, simply press the "Get Elevation" button and the elevation above mean sea level (in meters) will appear in the box labeled "Base Elevation". Then enter the transmitter's antenna height above ground in the edit box labeled "Antenna Height AG". Note this height is in meters.

2. Specify the antenna height above mean sea level. In order to do this, click the large button labeled "Specify Xmitter Height AMSL". This should replace the edit boxes for base elevation and above ground height with one edit box labeled "Antenna Height AMSL". Enter the antenna height above mean sea level (in meters) in that box.

### **Specify the Propagation Model**

Use the propagation model selector shown in the picture to select which propagation model should be used in signal calculations for the transmitter. When you change the propagation model selector, a new "Page Selection Tab" will appear at the top of the window for that propagation model (clicking on the tab will take you to the propagation model's parameters page). For propagation model inputs see:

Notes:

HAAT

The HAAT that is shown in this window is not used and is mainly for display purposes (it is not used in calculations, with the exception being if the antenna is shown as being underground in OET 69 studies, it is used). If the station was loaded from a database then the HAAT will show the value loaded from the FCC database. If the "Auto" button is checked, the HAAT will be automatically updated when the antenna height or base elevation is changed.

The "Auto" Check box

If this box is checked, then the coordinates, base elevation, antenna height, and HAAT edit boxes become linked so that changing one of their values will update the others as appropriate. If this is unchecked, then the program does nothing automatically and it is up to the user to update these variables individually. The Class Selector

The class selector is only available for FM stations. The "Max" button will set the center of radiation and ERP to match the maximum allowed for the specified class.

The Import and Export Buttons

Use the "Import" and "Export" buttons to load and save transmitter properties to a file. This is useful if you are entering a new transmitter which you plan on using in a future study. You can use the "Export" button to save all of the transmitter properties (including antenna pattern, station info, and propagation parameters) to a file. Use the "Import" button at some later date to load previously saved transmitter properties.

	Previous
Searching the FCC Database	<u>Тор</u>
	Next

To load a station's transmitter parameters from the FCC database, click on the "Load From FCC Database" button on the <u>Transmitter Properties Form</u>. Here is what the FCC search window looks like after a search has been performed:

Search					
Search	-Datab	base T⊻/DTV	○ <u>D</u> TV ALLOT	<u>○ FM</u> ○	FRZ
Criteria <u>E</u> ntire	e Databa	ise	<mark>()</mark> Ву <u>9</u>	<u>i</u> tate :	]
Search F <u>o</u> r	: kdsm				ind
List Details					
Call <+>	Lic I C	Ch.   Cls	City	St Power	DA
KDSM-D S KDSM-D C KDSMTV C KDSMTV I	51 1 CP 1 PM 1 LI 1	6 C 6 2C 7+ 2C 7+ 2C	Des Moines Des Moines Des Moines Des Moines	IA <u>9,0</u> IA 500.0 IA 3030.0 IA 3020.0	Yes Yes Yes
Apply OET69 Ver	tical Elev	vation Pat	tern		. <u>X</u> ancel

Searching is fairly straightforward, first select the database that you wish to search in the box at the top of the window labeled "Database". The TV/DTV database is the standard FCC TV engineering database, the DTV Allot database contains the DTV allotments, FM is the standard FM engineering database, and the FRZ database is a "Frozen" TV database consisting of the TV database at the time that the DTV allotment database was created.

Next select whether to search the entire database, or just a certain state (to search a specific state click on the "By State" radio button and enter the two letter state abbreviation in the edit box). Now enter a search string into the edit box labeled "Search For" and press the enter key (or press the find button). The program searches for the search string in the entire record, so you can enter any string value - like call letters, city of license, file number, etc. After the "Find" button is clicked, a list of stations that match the search string will be displayed in the list. To view the details of one of the found records, select it in the list and then click on the "Details" tab (you can also right click with the mouse on the results list to toggle between details and list mode). Click the "Accept" button to load the selected record.

When loading a station from the TV/DTV, DTV allotment, or FRZ database the "Apply OET69 Vertical Elevation Pattern" check box will be shown at the bottom of the window. If this box is checked, then the generic OET69 vertical elevation pattern for that station will be automatically assigned (if left unchecked a uniform full field vertical pattern will be assigned).

	<u>Previous</u>
Antenna Pattern Editor	Тор
	<u>Next</u>

To view/edit a transmitter's antenna pattern click the "Antenna" tab on the <u>transmitter properties form</u>. This will display a page which shows a picture representation of the antenna pattern. Click the "Change Pattern" button to load the antenna pattern editor. Here is an example of what the antenna pattern editor looks like:



Probe is capable of handling antenna patterns of a resolution up to 0.5 degrees. The zero degree azimuth is true north (this is the "up" direction on the graph). Antenna pattern values for any general radial are generated by interpolating between points which have been defined, so an antenna pattern can have anywhere from 1 to 720 points. Antenna patterns are stored as a list of values associated with azimuths and some "Rotation Angle". This rotation angle is the amount (in degrees) that the pattern is to be rotated when used by the program (this rotation is in a clock-wise direction).

Antenna Pattern Editor Functions

#### **Inserting a Point**

To insert a point into the antenna pattern, click the "Insert Point" button. This will bring up a window asking you for the azimuth and pattern value at that azimuth. Since the maximum antenna pattern resolution is 0.5 degrees, the value you enter for the azimuth will be rounded to the nearest 0.5 degree increment (for example, entering and azimuth of 10.2 degrees -- will be considered as 10.0 degrees, and entering and azimuth of 10.6 degrees will be considered as 10.5 degrees).

# **Deleting a Point**

To delete a defined azimuth from the antenna pattern, highlight the azimuth you wish to remove and press the "Delete Point" button.

**Editing Points** 

To edit the antenna pattern value for the point, select the azimuth you wish to edit. Then type in the new value for that azimuth in the edit box located below the antenna pattern list box. After typing in the value, press the ENTER key.

#### **Changing the Edit Mode**

The antenna pattern has two modes for editing. First is the "Pre-Rotation" mode. In this mode, all antenna pattern azimuths will be referenced before the pattern is rotated by the specified rotation angle. The "Post-Rotation" mode is a mode where all antenna pattern azimuths will be referenced after being rotated through the specified rotation angle. The reason for having two modes is because you may wish to enter a standard antenna pattern with values from the antenna's data sheet (these will be Pre-Rotated values), and then rotate it to suit your transmitter's needs. Because Probe's antenna patterns have a fixed maximum resolution (of 0.5 degrees), there would be a loss of accuracy if only the "Post-Rotation" mode existed.

#### **Rotating the Antenna Pattern**

To rotate the antenna pattern in a clock-wise direction, enter the amount (in degrees) of rotation in the edit box located next to the rotated button (either by using the up/down arrows or manually entering it in the edit box), and then press the "Rotate" button.

### **Clearing the Antenna Pattern**

Press the "Clear Pattern" button to reset the antenna pattern to an omni-directional pattern (this is the default pattern that comes up for new stations).

#### Loading and Saving

Probe is capable of loading and saving antenna patterns in three different formats:

#### **Original V-Soft Pattern Format**

Use this file format if you want your antenna pattern to be compatible with other V-Soft applications. Note

however that this file format is capable of storing patterns at a maximum resolution of 1 degree, so if you have any azimuths defined at 0.5 degree increments there will be a small loss in precision.

#### **Probe's Enhanced Antenna Pattern Format**

This is the recommended format for saving antenna patterns generated with Probe, however it is not compatible with all of V-Soft's other programs.

### **Dielectric Azimuthal Antenna Pattern Format**

Probe can read and save to the standard azimuthal pattern format distributed by Dielectric.

**ERI Format** 

This is the ERI format that has a standard file extension of .TXT.

# **Andrew Text Format**

The .PAT text file generated by some Andrew pattern software.

#### **CSV** Format

This is a "Comma Separated Value" format that is generated by some antenna planning tools.

### Printing

To print the antenna pattern press the "Print" button. This will print a page containing the pictorial representation of the antenna pattern and a table of azimuths/values. The antenna pattern editor prints using the default printer and its current settings.

	Previous
Vertical Elevation Pattern Editor	Тор
	Next

To view or edit a transmitter's vertical elevation pattern, click on the "Antenna" tab on the transmitter properties form. Then click the "Change Vertical Pattern" button to display the vertical elevation pattern editor.



The buttons in the lower left hand part of the window can be used to Add, Remove, and Edit points. The "Clear Pattern" button will remove the current pattern and apply a uniform full field pattern. Electrical beam tilt can be assigned in the edit box labeled "Beam Tilt". This will be reflected in the graph and used in signal calculations -- however the table on the right will still reflect the "pre-tilted" pattern. Mechanical beam tilt can be supplied in the box labeled "Mechanical Beam Tilt" (use the check box at the top to have the mechanical tilt included in the plot at the specified azimuth). The "Shift Pattern" button can be used to shift the entire vertical pattern, using this function affects the "pre-tilt" values shown in the table.

#### **Loading and Saving**

Probe is capable of loading and saving vertical elevation patterns to three different formats:

# Generic Vertical Elevation Pattern (.vep)

The generic vertical elevation pattern is a simple ASCII format which can be used to store patterns for later use.

# **Dielectric Vertical Elevation Files (.el)**

This is the standard format distributed by Dielectric.

### CSV Format (.csv)

This is a comma separated value format used by some other programs.

	Previous
The Study Edit Window	<u>Top</u>
	<u>Next</u>

Use the study edit window to add and remove transmitters from a study. You can also use it to view <u>transmitter properties</u> and plotted signal <u>contours</u>. To access it, choose "Edit Study and Transmitter List" from the <u>View Menu</u>.

🔏 Probe Study		
Study Options	Transmitters & Contours	Contours
Cell Size: 1.25 km 💙	TRANS (201) KJHN (201)	✓ 50 50 Field Strength: 60.00 FCC ✓ Circle: Radius = 100.0 km
Profile Increment: 0.1 km 💌		
Study Specific Options		
		Edit Add Remove
Import AM DTC		Area of Calculation
		Circle: R = 100 km
		Edit AOC
	Add <u>E</u> dit Remove	]
		С

### **Adding Transmitters**

To add a transmitter to the study, click the "Add" button. The area of calculation for the new transmitter will be set to the study default, but can be changed by selecting it and clicking the "Edit AOC" button.

### **Removing Transmitters**

Select the station you wish to remove and click the "Remove" button. After the "OK" button is clicked, some re-calculation

may occur in order for interference studies to update.

#### **Transmitter Properties**

To view the properties of a transmitter, select the transmitter's call letters and click the "Edit" button. The <u>"Transmitter</u> <u>Properties" form</u> will appear and the transmitter properties can be edited.

# Contours

The contours applied to the selected transmitter are shown on the right hand side of the window. Here you can add, remove, and edit the station contours. The check box shown selects whether the given contour is plotted on the map.

### Area of Calculation

The area of calculation for the selected transmitter is shown at the bottom of the right hand side of the window and can be <u>edited</u> by clicking the "Edit AOC" button.

### **Study Options**

The right hand window shows study specific options that can be changed. Changing these will generally cause the program to completely re-calculate signal and interference. Use the "Study Specific Options" button (if enabled) to change options specific to the type of study open (for example, edit the masking list for outgoing TV studies where masking was considered).

#### **Misc Options**

Import AM DTC - This option allows the user to specify a .DTC file created by another program. Probe creates a new transmitter that has the call letters and coordinates from the .DTC file and loads all contours within that file as imported contours.

	Previous
Area Of Calculation	<u>Top</u>
	<u>Next</u>

When defining the area of calculation, the following window appears:

🛋 Area Of Calculation	×
Area Type: Circle	
Consider points within 100.0 km of the transmitter.	
General Options Number of Radials: O 36 O 72 O 360 Use 8 Radials for HAAT	
Cancel	

Use the drop down list box at the top of the window to select the type of area you wish to assign to the station.

# **Circle Centered at Transmitter Site**

Choose this if you want each transmitter in the coverage study to have its signal calculated within some distance from the respective transmitter's site. With this option you can specify the distance in the second box on this page.

# **Region Defined by Latitude/Longitude Boundaries**

Select this option to calculate the signal for all transmitters in the study within some Latitude/Longitude based rectangle. After selecting this alternative you will be able to enter the coordinates of the corner points of the rectangle in the second box on this page (see <u>Entering Latitudes and Longitudes</u> for help on coordinate formats that Probe accepts).

Area within Grade B Contour

This option will use an area containing all cells within each transmitter's dipole adjusted Grade B FCC contour. If any of the stations in the study are not TV or DTV stations, coverage will be calculated within their F(50-50) FCC 60 dBu contour.

# **User FCC Contour**

Choose this option if you wish to calculate signal in an area bounded by a station's FCC contour. After selecting this alternative you will be able to select the signal cutoff value of the FCC contour and the time variability [ie. F(50-10), F(50-50), F(50-90)].

# **Station Based FCC Contour**

This also allows for a standard FCC contour to be used, however there is no selection for the time variability (it is chosen automatically based on the station type - F(50-50) for NTSC TV and FM, and F(50-90) for DTV).

### **General Options**

**Number Of Radials** - This defines the number of actual points on the contour to be calculated (other radial distance to contour values will be calculated by interpolating between these points).

**Use 8 Radial HAAT** - This will cause the contour to be calculated using HAAT calculated for 8 evenly spaced cardinal radials and HAAT values for other radials being calculated by interpolating between these values.

	Previous
Transmitter List Box	Тор
	<u>Next</u>

The transmitter list box displayed in the main window allows you to select which transmitters are displayed on the map and to define the color associated with each transmitter in the study.



The top of the transmitter list box shows the current <u>draw mode</u>. Use the check boxes in the first column to select whether the associated transmitter's signal or interference is displayed on the map. For drawing interference and highest signal, the color used for each transmitter can be selected by double clicking on the colored box next to the station's call letters. After making changes to the transmitter list, you must click the "Redraw" button to redraw the map.

Double clicking on a transmitter's call letters will display the station's parameters on the <u>"Transmitter Properties" form</u>. Right clicking on a station's call letters will display the station's <u>contour</u> <u>list</u>.

### The All/None Buttons

Use these buttons to select either all or none of the stations in the list.

#### The Redraw Button

Use the redraw button to redraw the map. You will need to click this button if you make any changes to the transmitter list or change any of the pop-out style menus on the <u>"Map"</u>

<u>menu</u>.

# **The Display Options Button**

Use this button to load the <u>"Display Options" form</u> which will allow you to change all of the various map settings and options. After exiting the <u>"Display Options" form</u>, the map will automatically be redrawn.

	Previous
Profile Viewer	<u>Top</u>
	Next

The profile viewer can be used to view elevation profiles, signal along a profile, and Fresnel zones.


To open the Profile Viewer, use the <u>Profile tool</u> or choose "Profile Viewer" on the <u>"Tools" menu</u>.

# Manually Entering Profile Parameters

To specify the profile you wish to view, type in the latitude and longitude for the starting point, and either specify a

latitude/longitude for the end point, or enter a distance and bearing in the appropriate edit boxes (NOTE: The distance is in kilometers and the bearing is in degrees). After you have entered the parameters for the profile you wish to view, press the "Draw" button to draw the profile. For options for entering latitudes/longitudes in Probe see: "Entering Latitudes and Longitudes".

Choosing what gets displayed

Use the check boxes in the upper right hand corner of the profile viewer window to choose what you want to display. The color of each item can be changed by clicking on the color box next to the corresponding item. If you choose to display a Fresnel zone, you can pick which zone is displayed by clicking the appropriate radio button located under the "Fresnel" check box. Use the "Antenna Properties" button to set the transmitter height, receiver height, and frequency to be used in the Fresnel calculations.

**Displaying Signal** 

The profile viewer will display interpolated signal values for a given transmitter if they are already calculated in the study. You can use the drop down box (to the left of the cancel button) to select which transmitter's signal gets displayed along a profile (if you used the <u>profile tool</u> to select the profile, this will default to the transmitter to which the starting point is

snapped).

## Earth's Curvature

You can set the earth's curvature "K" constant which is used in computing the elevations in the edit box located directly above the close button. Typical values for this constant are 1.33 for 4/3 earth and 1.0 for true earth. Setting this value to 0 (or <0) will cause the profile viewer to use flat earth (i.e.. no elevations will be added to the profile to compensate for the earth's curvature). The earth's curvature is displayed as the amount of elevation (in meters) added to the profile as a function of distance, however all of the elevations will be shifted up by the minimum value of the elevation graph (this is so the earth's curvature can be displayed with the rest of the profile).

# Copying to the Windows Clipboard

To copy the graph shown in the window to the Windows clipboard, click the "Copy" button. This will allow you to then paste this profile into another application, such as a word processor or graphics package.

Saving to a Windows Bitmap

Click the "Save" button to save the current profile to a Windows Bitmap (.BMP) file. When "Save" is clicked you will be prompted for a file name.

### Printing

To print the current profile, click the "Print" button. The following box will appear in the window:

Printing: Title:			
Print Mode:	C <u>P</u> ortrait	<ul> <li>Landscape</li> </ul>	
	🗸 ОК	X Cancel	

You may enter a title for the printed output in the edit box labeled "Title:". Probe will print a full page printout of the current profile. You may choose whether this is printed in landscape or portrait mode (Landscape is the default printing mode). Press "OK" to send the profile to the printer.

	Previous
Database Cull Window	<u>Тор</u>
	<u>Next</u>

Probe's advanced database culling feature can be accessed by choosing "Database Cull" from the <u>"Tools" menu</u> (or clicking the "Cull" button in the coverage study wizard).

🔏 Load From Database		
Requirements Record Contains "public" State Contains "ia" Service Contains "V" LicType Contains "LI" Clear List on Query	Add Edit Remove	Database         ⊙ TV/DTV       ○ FM         ○ DTV ALLOT       ○ FRZ         Reference Point       US City         Lat:       45-00-00 N
Call <+>         Lic         Ch.         S           KBINTV         LI         32Z         K           KDINTV         LI         11+         K           KHIN         LI         36Z         K           KIIN         LI         12+         K           KRIN         LI         32-         K           KRIN         LI         32-         K           KNIN         LI         27-         K           KTIN         LI         21Z         K           KYIN         LI         24+         K	ive Cls City St Po V 2E Council Bluffs IA 5 V 2E Des Moines IA 3 V 2E Red Oak IA 20 V 2E Iowa City IA 3 V 2E Waterloo IA 50 V 2E Sioux City IA 40 V 2E Fort Dodge IA 15 V 2E Mason City IA 17	Lng: 090-00-00 W
Remove		Clear List

The box labeled "Requirements" is where the rules that determine what is retrieved from the database are defined. Use the "Add", "Edit", and "Remove" buttons to change the query. Select the database you wish to cull from in the "Database" box. Click the "Query" button to retrieve the records from the database that match the requirements. Note - if the "Clear List on Query" box is checked, then the results will be cleared before searching. If it is unchecked, then the results will be added to the list that is already displayed. The "Reference Point" box is where the point that is used when distance is part of the query is defined. Use the "US City" button to load the point from the US city database. The "Station" button will allow the user to load the point from the FCC station database.

Items can be removed from the list using the "Remove" button. The list can be printed by clicking the button that has a picture of a printer on it. Use the "Clear List" button to clear the entire list.

#### **Requirement Variables**

**Record** - This compares the entire records to the specified string.

**Distance** - This compares the distance from the point defined in the "Reference Point" box.

**LicType** - The license type field of the record is compared to the supplied string.

**CallSign** - The call sign field of the record is compared to the supplied string.

**State** - The state field of the record is compared to the supplied string. Note, this is the state abbreviation (example: IA = Iowa).

**City** - The city of license field of the record is compared to the supplied string.

**Azimuth** - The azimuth from the point defined in the "Reference Point" box is compared to the entered value.

**Channel** - The channel field of the record is compared to the supplied channel number.

**Service** - The field of the record is compared to the supplied string.

 $\ensuremath{\textbf{Class}}$  - The class field of the record is compared to the supplied string.

	Previous
Multiple Contour Tool	<u>Top</u>
	<u>Next</u>

The "Multiple Contour Tool" can be used to add a contour to several stations simultaneously. To use it select "Multiple Contours" from the <u>"Tools" menu</u>.

add Contours to Multiple	Stations 🛛 🕅
<ul> <li>✓ KDINTV (11+)</li> <li>✓ KIIN (12+)</li> </ul>	Contour to Add: FCC Contour
<ul> <li>✓ KTIN (21Z)</li> <li>✓ KYIN (24+)</li> <li>✓ KSINTV (27-)</li> <li>✓ KRIN (32-)</li> <li>✓ KBINTV (32Z)</li> <li>✓ KHIN (36Z)</li> </ul>	<ul> <li>&gt; F(50-10)</li> <li>● F(50-50)</li> <li>&gt; F(50-90)</li> <li>Field Strength:</li> <li>60.0</li> <li>dBu</li> </ul>
	O Use Transmitter Color
	O Use Specified Color:
	Line Width: 2 💙 Style: Solid 💙
	Border Color: Border Width: 2
	Number of Radials: 🔿 36 🛛 72 💿 360
	Use 8 Radials for HAAT
	Add Contours
Select All Select None Select Map	Remove Contours

The marks in the station list on the left hand side of the window show which stations will have contours added. Choose the type of contour to add at the top of the right hand side. Each contour type has specific properties that can be configured in the section below the type selection. Below, the appearance properties for the contours can be configured. Select "Use Transmitter Color" to have the contours default to being the same color as is associated with the transmitter in the "<u>Transmitter List</u>". Select "Use Specified Color" to have all contours added be displayed with the color specified in this window. Click the "Add Contours" button to add the configured contour to each station selected in the list. The "Remove Contours" button will remove ALL contours from the study.

	Previous
Using the Coverage Matcher	Тор
	Next

The coverage matcher can be loaded by choosing "Coverage Matcher" from the "Tools" menu. The coverage matcher is intended to be used for TV and DTV, when you wish to change a station's parameters and match the original transmitter's grade B contour (this is accomplished by varying the new station's antenna pattern). Here is what the coverage matcher looks like when first loaded:

Coverage Matcher	
Transmitter Coverage to Match	New Transmitter to be Matched
Center of Radiaiton: 0	Center of Radiaiton: 0
Latitude: 00-00-00 N	Latitude: 00-00-00 N
Longitude: 000-00-00 W	Longitude: 000-00-00 W
ERP: 10	ERP: 10
Channel: 2	Channel: 2
Type: 💿 Analog 🔵 DTV	Type: 💿 Analog 🔵 DTV
Configure Transmitter View/Edit Antenna Pattern	Configure Transmitter View/Edit Antenna Pattern
<b>∐ ⊻ary power</b> 	Cļose

How to use the Coverage Matcher

As you can see, the coverage matcher window is divided into two sides. The left side contains the parameters of the existing station, the coverage of which you wish to match. The right side contains the parameters of the new transmitter that you wish to match. Before performing the coverage match, each transmitter must be loaded using the "Configure Transmitter" buttons (this will pop up the <u>Transmitter</u> <u>Properties Form</u>). Once a station is loaded, you can view its antenna pattern by clicking on the "View/Edit Antenna Pattern" button ( this displays the <u>Antenna Pattern Editor</u> ). There are two ways that the coverage matcher can perform the matching process:

#### Varying the New Transmitter's Antenna Pattern

This type of matching will keep all of the new station's parameters as they were entered, and only vary the new transmitter's antenna pattern. In some instances, the "distance to contour" required to match the existing station's coverage will be greater than the transmitter is capable of reaching at full field. In these cases, the antenna pattern in that direction will be set for a full field -- meaning that the coverage in that direction will not be matched (the "distance to contour" for the new transmitter will be less than what it needs to be in order to match the existing transmitter's coverage). To use this mode, make sure that the "Vary Power" check box at the bottom is unchecked.

# Varying the New Transmitters Antenna Pattern and Power

This type of matching will change the antenna pattern and the power of the new transmitter. The reason you would want to do this is to compensate for the fact that the "distance to contour" needed to match the existing station's coverage in some directions may be unreachable using the transmitter's initial power ( the problem discussed in the previous paragraph). This type of matching should be able to match the existing station's coverage exactly. To use this type of matching, make sure that the "Vary Power" check box is checked.

When you have entered the parameters for the existing transmitter and the new transmitter, and have set the "Vary Power" check box to the desired state, press the "Find Match" button. There will be a short delay while the required antenna pattern (and power if the "Vary Power button was checked) for the new transmitter is calculated. When Probe is finished calculating, the required antenna pattern will be displayed in the Antenna Pattern Editor. At this point, you can save/print the required antenna pattern. If you clicked "Find Match" with "Vary Power" checked, the coverage matcher will display the required power for the new in transmitter in the place labeled ERP on the right hand side of the coverage matcher window.

# Examples of Using the Coverage Matcher

#### **DTV Allotments**

The coverage matcher is intended to give results similar to the method used by the FCC to create the DTV allotments based on the original NTSC coverage. If you wish to take an NTSC station and create a DTV station which matches the original NTSC stations coverage, load the NTSC station into the "Transmitter Coverage to Match" side of the coverage matcher (the left side). Then, enter the parameters of the new DTV station into the "New Transmitter to be Matched" side of the coverage matcher (the right side). Set the "Vary Power" check box to the desired setting (discussed above), and click the "Find Match" button. This will tell you what antenna pattern (and power if varied) the DTV station requires to match the original NTSC stations coverage.

#### Moving a Transmitter

If you wish to move a transmitter's site and you want to find out what antenna pattern would be required to match the coverage of the original location, enter the parameters for the original station on the left side. Then enter the parameters for the new transmitter on the right side. Choose whether or not you would like to vary the power, and press the "Find Match" button. This will calculate the antenna pattern that is required to match the coverage from the old site.

	Previous
BMP Switch	Тор
	<u>Next</u>

BMP Switch will allow you to quickly alternate between multiple saved bitmaps. To load the BMP Switch program select "BMP Switch" from the <u>Tools Menu</u>.

BMP Switch		
<u>F</u> ile		
A B C D E F G H	A V B V	A No File Loaded
Load	Switch	

The letters A through H are reference letters representing the bitmaps that you can load and from which you can switch back and forth. To load a bitmap, select the letter you wish to assign and press the "Load" button. Once you have loaded the bitmaps you can switch to them by clicking their associated letter. If you wish to quickly switch back and forth between two bitmaps, use the drop down list boxes located above the "Switch" button to select which two bitmaps you wish to alternate. To switch between them, click the switch button. On the right side of the bar at the top of the screen, the large letter in the box shows which bitmap is currently being displayed. The area where it says "No File Loaded..." will show the filename of the currently viewed bitmap when loaded.

	Previous
Contour Overlaps	<u>Тор</u>
	Next

The contour overlap list can be accessed by choosing "Contour Overlap" from the Tools Menu.

Contour Overlap Regions	X
TRANS1 / TRANS2	
	•
Create New Overlap Begion Edit Overlap Begion	
Population Report Remove All Regions	
Service Counting Options	
Build Overlap Areas Service Count Report	
× 0	.jose

The contour overlap list contains a list of all the contour overlap regions defined for the current study. Here a new overlap region can be defined, or an existing overlap region can be edited or removed from the study.

Overlap regions that are plotted on the map are plotted in such an order that the ones that appear first on this list are plotted first on the map. Use the red up and down buttons on the right hand side of the window to change the location of the selected overlap region in the plot order.

To generate a population report for the area within an overlap region, select

the region's name from the list and then click the "Population Report" button.

#### **Service Counting Options**

The functions in the "Service Counting Options" section are specifically designed for determining the uniqueness of service of a given transmitter using contours as service regions. So, the "First Service" area will be all the locations where the reference station is the only station with service to that area. "Second Service" is all the areas where the reference station and one other station provide service, and so on.

#### **Build Overlap Areas**

This function will automatically determine overlap relationships for all stations in the study. When the "Build Overlap Areas" button is clicked, the following window appears:

🔣 Service Counting 🛛 🛛 🔀	
Reference Transmitter: TRANS1 (201)	
Maximum Number Of Services: 3	
Note: The number of possible combinations increases dramtically with the number of services considered.	
First Service	
Second Service	
Third Service	
Fourth Service	
Fifth Service or More	
Edit	
Use these options as defaults	
🗸 OK 🔀 Cancel	

The number of services selection determines how many service combinations are considered. This number should be set to a fairly low value, as the number of possible combinations increases dramatically with the number of services (and number of transmitter included in the study). Select a service count in the list and click the "Edit" button to change the color assigned for it.

#### **Service Count Report**

This function assumes that the contour overlap list was generated by using the "Build Overlap Areas" feature. If this was not used, then the service contour report may contain unexpected results. This report gives a population count of each of the service count areas considered.

# **Defining Contour Overlap Regions**

Overlap Region	
Transmitter: TRANS1	Overlap Region:         Auto Name           Name:         TRANS1 / TRANS2           TRANS1:         FCC F(50-50) 60.00 dBu           TRANS2:         FCC F(50-50) 60.00 dBu
Add Contour Edit Contour Remove Contour	Type Intersection Union
Plot Options Overlap Col	or:

The "Overlap Region" edit window has three sections. The "Transmitter" section on the left is used for selecting a transmitter's contour to add to the overlap region. Use the drop down list box at the top of this section to select the transmitter. When a transmitter is selected, a list of its defined contours will appear. Here contours can be added, edited, and removed from the selected transmitter.

The "Overlap Region" section on the right shows all of the contours that are contained in the current overlap region (the name of the overlap region is

also defined here). Select a contour from the left side of the window and then use the "- >" button to add the contour to the current overlap region. If the "Auto Name" check box is checked, then the region's name will be automatically defined by showing the call letters for the station associated with each area in the overlap region separated by slashes.

The "Type" selection on the overlap region side of the window specifies type of overlap region. An "Intersection" overlap region consists of all points that are contained within all of the contours considered for the region. The "Union" overlap region consists of all points that are contained in any of the contours considered for the region.

The "Plot Options" section at the bottom of this window is used to define how/if this overlap region will be plotted on the map.

#### NOTE:

When a contour overlap region is created, its area becomes fixed. If a transmitter's contour is changed outside of the contour overlap editor, the user will need to "re-add" it to the overlap region.

	Previous
Street Address Lookup	Тор
	Next

When creating a point report or adding a <u>user defined tick mark</u>, the street level data can be searched to find the coordinates of a street address.

🔏 US Street Add	ress 🔀
Number:	721
Street:	W 1st St
5 Digit Zip Code:	50613
	🗸 OK 🗶 Cancel

The street level data is organized by five digit zip code. When finding the location of an address, the street name must exactly match the street name in the database. After entering a zip code and part of the street name, click the search button to get a list of all the streets in the zip code that match the "street" string... then select one of those to use as the street. When entering the "number" you must enter a whole number (for example if you are looking for number "13B" just enter "13" for the number).

# Previous NAD Conversion Top Next

To open the NAD conversion utility, choose "NAD Conversion" from the <u>Tools Menu</u>.

😹 NAD Conv	version			
	NAD27		NAD83	
Latitude:	42-30-45 N	Latitude:	42-30-44.95 N	
Longitude: (	092-19-24 W	Longitude:	092-19-24.66 W	
			×	Close

This simple utility converts coordinates from NAD27 to NAD83 and vice versa. To convert from NAD27 to NAD83, enter the NAD27 coordinates in the Latitude/Longitude edit boxes on the left side of the window, the NAD83 coordinates on the right side of the window will be automatically updated to reflect the new NAD 27 coordinates. To convert from NAD83 to NAD27 just enter the coordinates on the right hand side of the window. NAD27 coordinates can be retrieved from the <u>V-Soft Reference</u> file using the reference buttons.

	Previous
HAAT/COR Calculator	Тор
	Next

The HAAT/COR calculator is designed to calculate a HAAT (Height Above Average Terrain) value given a COR (Center Of Radiation) value, or calculate a COR value from a HAAT value. It can be accessed by selecting "HAAT/COR Calculator" from the "<u>Tools</u> <u>Menu</u>", or by clicking the "HAAT" or "COR" button on the <u>transmitter</u> <u>properties window</u>.

HAAT Calculation			
Latitude:	44-02-39 N	Broadcast T	уре:
Longitude:	111-58-03 W	OIV	<u>о Е</u> м
Number Of Radials:	36	✓ Update Ave	rage Terrain
Average Terrain: 1610.824 m			
HAAT: 299.18 m AMSL Height: 1910.0 m			
		🗸 ок	X Cancel

Enter the latitude and longitude of the transmitter site. Use the "Number Of Radials" drop down list to select the number of radials considered in the average terrain calculation. Finally, select the broadcast type and click the "Update Average Terrain" button to cause the window to display the HAAT and AMSL height section at the bottom of the window. Here, if you enter a value in the HAAT edit box, the AMSL edit box will automatically update. If you enter a value in the AMSL Height edit box, then the HAAT will update automatically.

	Previous
Signal Table Generation	<u>Тор</u>
	<u>Next</u>

To generate a spread sheet style table showing the signal values along radials, choose "Generate Table" from the "Report" menu. The following window will appear:

Signal Table		
Start Bearing: Stop Bearing: Bearing Interval:	<b>[</b>	
Start Distance: Stop Distance: Distance Interval:	0	
Transmitter: TRANS1		

You can select the bearing (in degrees) starting point, ending point, and increment ... as well as the distance (in kilometers) along each radial's starting point, ending point, and interval. Use the drop down list box labeled "Transmitter" to select which transmitter's signal values are used. Press "OK" to generate the table. The table will be displayed on a <u>"Grid Output" form</u>.

The parameters shown in the picture would generate a table which contains the following bearings:

{ 0, 10, 20, 30, ..., 340, 350, 360 }

Each radial would show the signal strengths at the following distances:

 $\{0, 5, 10, 15, ..., 90, 95, 100\}$ 

**NOTE:** This report uses interpolated signal values from the current study (it does not generate new signal values). If you choose a distance which contains points where the signal has

not been calculated, an NC will appear in those cells where no signal exists.
	Previous
The Grid Output Form	<u>Тор</u>
	Next

Use the "<u>Signal Table Generator</u>" to display signal values in a spread sheet style table. The "Grid Output" form looks like this:

#### 🔏 Grid Output

<u>File E</u>dit

	Bearing (in degrees)										
		0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	^
	0.0	125.70	125.70	125.70	125.70	125.70	125.70	125.70	125.70	125.70	
	5.0	96.06	96.06	97.52	93.83	93.13	93.13	93.89	93.89	94.33	
	10.0	84.38	89.87	86.86	82.70	82.69	83.04	85.36	88.35	89.42	
	15.0	75.70	77.33	76.24	74.44	79.22	79.56	76.79	74.83	74.20	
2	20.0	72.00	71.24	70.18	68.98	67.38	71.78	69.43	74.02	68.62	
îп kп	25.0	71.18	65.80	65.43	66.70	63.23	67.84	65.97	66.31	70.27	
ance	30.0	63.45	61.62	57.04	61.55	64.57	60.92	68.93	67.69	55.64	
Dist	35.0	58.59	51.00	62.22	62.49	57.02	63.98	54.82	55.58	59.37	
	40.0	51.92	55.04	54.90	58.58	55.83	56.47	58.96	59.02	59.94	
	45.0	50.24	58.48	51.04	53.92	57.02	49.59	55.47	57.87	44.30	
	50.0	49.95	43.08	50.23	48.64	50.85	53.16	47.16	48.91	45.78	
	55.0	48.99	45.31	51.67	39.07	46.87	45.35	43.07	48.20	42.18	
	60.0	46.03	52.68	41.10	35.41	47.93	40.33	39.48	41.59	43.17	-
										>	

# Saving Data

# To an ASCII File

To save grid data to an ASCII (text) file choose "Save as Text File" from the "File" menu, or click the second speed button at the top. This will save to a column style text file which can be imported into Microsoft Excel. Copy to Clipboard

# Copying the entire table to the clipboard

To copy the entire table to the clipboard choose "Copy All" from the "Edit" menu (or click on the first speed button at the top). You should then be able to paste the table into Excel (by choosing "Paste" from the "Edit" menu in Excel).

# Copying selection to the clipboard

You can select certain cells by clicking on them and dragging the mouse. If you wish to copy the selected cells to the clipboard choose "Copy Selected" from the "Edit" menu. Printing

To print the table to the default printer, choose "Print" from the "File" menu, or click on the fourth speed button at the top.

	Previous
Population Report	<u>Тор</u>
	<u>Next</u>

To create a signal based population report for a study, choose "Population" from the <u>Report Menu</u>. For interference studies, special population report options will appear (see "<u>Incoming</u> <u>Interference Population Reports</u>"). For coverage studies, the following window will appear:

Population Report	
Population Report:	Options:
Simple report	✓ Include Racial Breakdown
Cutoff (in db): 60.00	Use interpolated signal values
	Show Transmitter Info
Report Based on Map Cutoffs	Treat all transmitters as one "superstation"
County Breakdown Report Cutoff (in db): 60.00	Census Data: ✓ 1990 US Census ☐ 1990 PR Census ☐ 2000 US Census (SF1) ☐ 2000 US Census (SF1,Housing) ☐ 1996 Canada Census
	<u>G</u> enerate <u>C</u> ancel

There are three types of population reports you can generate for coverage studies. If you have more than one transmitter in the study, population reports will be displayed for each transmitter.

# **Simple Report**

This report displays the total population count where the signal for a station is above the specified field strength cutoff.

### **Report Based on Map Cutoffs**

This report displays the population for each field strength cutoff defined in the current study (see "<u>Defining Cutoffs</u>" for help with cutoffs).

### **County Breakdown Report**

This type of report will display a county by county breakdown of the census information for areas where the field strength values are greater than the specified cutoff.

# **Population Reporting Options**

#### **Include Racial Breakdown**

This will cause the population report to include a racial breakdown as well as the total population covered.

#### **Use Interpolated Signal Values**

If interpolated signal values are used, the signal will be found using four point interpolation for each census block and then compared with the cutoff in order to decide whether or not it is counted. If you do not use interpolated signal values, Probe will use the signal value associated with the calculation cell which contains the census block for this comparison.

#### **Show Transmitter Info**

If this switch is selected, Probe will display transmitter and propagation model information with the population report.

#### Treat all transmitters as one "superstation"

This option is only valid in multiple transmitter coverage studies. If selected, a window will appear where the user can choose which transmitters in the study will be "joined" to create one "superstation" for the purpose of counting population.



Use this option to generate a population report for a number of transmitters without counting the coverage overlaps between them more than once. The required field strength for each transmitter to be counted defaults to the one that was entered on the first window, however at this point you can change it by selecting the station in the list you wish to change and typing in a new signal level.

	Previous
Incoming Interference Report Options	Тор
	Next

When a population report is performed the following incoming interference options window appears:

Transmitters					
✓ TMP1 (17Z) ✓ KTCITV_LIC (17Z)	Show County <u>B</u> reakdown				
✓ KTCITV_FRZ (17Ż) ✓ KDSMTV C (17+)	Show Interference Free Breakdown				
✓ WTV0.C (17+) ✓ K0DS-D C (17)	Show Iransmitter List				
KYIN-D.C (18)	Show <u>M</u> asking Summary				
	Report KWX Error Population				
	Report DTV Only Percentage				
	Baseline Population				
	<ul> <li>Not affected by terrain loss population</li> </ul>				
	O Bounding Contour Population				
	O User Defined Baseline Population				
	Population: 1				
	1990 US Lensus				
	2000 US Census (SF1)				
Select All Select None	2000 US Census (SF1, Housing)				
Select Map					
Make current options <u>D</u> efault	OK Cancel				

The check list box on the left can be used to specify which transmitters in the study are considered for incoming interference. If a transmitter is "unchecked", then the population report data will appear as though that transmitter was not included in the study.

Use the options on the right to select what appears on the population report.

**Show County Breakdown** 

This option will display population information for each individual county where the reference transmitter has coverage or interference. The county breakdown will show the total county population, population where the reference station has coverage, amount of interference contributed by transmitters that cause interference in that county, and the interference free coverage of the reference station.

#### Show Interference Free Breakdown

This option will cause the program to show a racial breakdown of the interference free population.

Example:

Interference Free Breakdown:

White: 402,060 ( 97.6% )

Black: 1,097 ( 0.3% )

```
Hispanic: 2,183 ( 0.5% )
Indian: 1,774 ( 0.4% )
Asian: 4,763 ( 1.2% )
Other: 61 ( 0.0% )
```

Total: 411,938

### **Show Transmitter List**

This will add a list of all the transmitters considered for causing interference in the study to the population report. This list will include the call letters, channel number, city of license, state, distance from the reference station, and bearing from the reference station.

🔀 Text Output				_	
<u>F</u> ile <u>E</u> dit					
Call Letters	City	State	Dist	Bear	
WCIUTV (26Z)	CHICAGO	IL	203.7	129.4	
WLAX (25Z)	LA CROSSE	MI	170.4	299.9	
WGBA (26+)	GREEN BAY	WI	191.4	40.3	
WKOWTV (27+)	MADISON	WI	4.6	94.6	
KBTV-D (26)	DES MOINES	IA	363.6	248.9	
WCCU-D (26)	URBANA	IL	333.4	155.6	
WCGVTV-D (25)	MILWAUKEE	WI	132.9	87.9	
					-
•					

#### **Report KWX Error Population**

This option is only available for OET 69 interference studies. It will add the KWX error population to the summary section of the report.

#### **Report DTV Only Percentage**

This option is only available for OET 69 interference studies. It will add the percentage of interference caused by DTV stations to the summary section of the report.

#### **Baseline Population**

There are three different values that the program can compute percentages with respect to in the report.

#### Not affected by terrain loss population

The "not affected by terrain loss population" is the total population within the reference station's bounding contour where the signal strength is at or above the threshold for reception for the study.

# **Bounding contour population**

This is the total population contained within the bounding contour of the reference station.

# User defined baseline population

The user can enter a figure to be used as a baseline population (for example, looking up the baseline population from the 6th Report and Order Appendix A table generated at the time the DTV allocations were assigned).

# **Incoming Interference Population Totals**

The summary section of incoming population reports looks like the following:

🔀 Text Output						
<u>F</u> ile <u>E</u> dit						
Totals for WKOW-D (26)						-
Calculation Area Population:	1,052,469	(	26363.4	sq.	km	)
Not Affected by Terrain Loss:	1,042,723	(	26138.7	sq.	km	) 🔲
Total NTSC Interference:	14,118	(	785.4	sq.	km	)
DTV Only Interference:	1,052	(	10.7	sq.	km	)
Total DTV Interference:	1,333	(	14.3	sq.	km	)
Interfered Population:	15,170	(	796.2	sq.	km	)
Interference Free:	1,027,553	(	25342.5	sq.	km	)
Percent Interference:	1.45					
Terrain Blocked Population:	9,746	(	224.7	sq.	km)	-
•						

It includes the population count for the "area of calculation" (this is the sum of the population in all of the cells in the study). The population "Not affected by terrain loss", is the total coverage that has a signal strength above the threshold for reception. For TV interference studies, the "total NTSC", "DTV only", and "total DTV" interference are reported. Finally, the interfered population and interference free coverage population are reported. This is followed by the total "percent interference" (which is the "interfered population" divided by the "baseline population" selected by the user). The "terrain blocked population" is simply the total number of people in the area of calculation where the field strength is less than the threshold for reception.

# Previous Point Reports Top Next

# Generating a point report

A report for a specific point can be generated by right clicking on the map with the <u>"Map Information" tool</u> or from the <u>"Tools"</u> <u>menu</u>. This feature is commonly used for the Satellite Home Viewers Act studies. When the mouse is clicked the following window appears:

Point Report					
E	ind US street address				
Latitude:	43-48-15 N				
Longitude:	091-22-20 W				
Transmitter:	TRANS1				
	reate Report 🔀 Cancel				

The coordinates default to the point on the map where the mouse was clicked, however any set of coordinates where the signal has been calculated can be entered (use the <u>V-Soft</u> <u>reference buttons</u> to load coordinates from the reference file or the "Find street address" button to <u>use street level data to</u> <u>generate coordinates</u>). The "Transmitter" box is used to define which transmitters field strength should be reported. Click the "Create Report" button to create the following type of report:

Text Output	
<u>File</u> <u>E</u> dit	
Point Information Report	<u>^</u>
Latitude: 44-05-15.27 N Longitude: 090-38-19.75 W	
Signal Strength: 71.771 dBu Elevation: 300.965 m	_
Distance From Transmitter: 66.77 km Azimuth From Transmitter: 61.61 degrees	
Call Letters: TRANS1 File Number, PDCDm19991027, PS	<b>v</b>

	Previous
TV Interference Cull List	<u>Тор</u>
	Next

A TV Interference cull list shows a list of all of the stations in the FCC database that are within the culling distance table listed in 8-10-98 FCC Public Notice.

🔏 Cull List		
Reference S	itation	🗹 Ref 📝 Ref
Latitude:	43-48-15 N	
Longitude:	091-22-20 W	
Channel:	17	
Туре:	DTV 💌	
Report Param	neters:	
📃 Show	AP's	
📃 Show	CP's	
	🗸 ок	🗶 Cancel

The values on this window default to those of the reference station in interference studies. The coordinates can be obtained from the V-Soft reference file using the <u>V-Soft Reference file</u> <u>buttons</u>. After selecting the values you would like for the report, push the "OK" button.

🔏 Text Outpu	ıt						$\mathbf{X}$
<u>File E</u> dit							
	<b>R</b>						
TV Interf	erence Culling Tabl	е					^
Reference Latit Long: Chann Type:	station informatio cude: 43-48-15 itude: 091-22-20 nel: 17 Digital	n: N W					
Call	City	State	Chan	Dist	Туре	Lic	
KDSMTV	Des Moines	IA	17	288.0	A	ΓI	
WTVO	Rockford	IL	17	246.1	A	ΓI	
KTCI-D	St. Paul	MN	16	197.1	D	ΓI	
KTCITV	St. Paul	MN	17	197.1	А	ΓI	
WQOWTV	Eau Claire	WI	18	110.9	А	ΓI	
KYIN	MASON CITY	IA	18	127.4	D	ALD	
WYIN	GARY	IN	17	424.9	D	ALD	~

The cull list report is fairly straightforward, listing the call letters, city of license, state, channel number, distance, type (A for Analog NTSC and D for Digital), and license type (ALD is for a DTV allotment).

	Previous
Zip Code Coverage Report	Тор
	<u>Next</u>

Choose "Zip Code Coverage" from the <u>"Report" menu</u> to generate a report of the zip codes that are covered by a user specified field strength. The following window will appear where the user can specify which transmitter to generate a report for and other options pertaining to the report.

🌃 Zip Code Coverage 🔳 🗖 🔀		
Transmitter: TRANS1 (17)		
Minimum Field Strength: 39.044 dBu		
🗹 Show Call Sign		
✓ Show Field Strengths		
☑ Show Zip Code Lat/Lng		
Show Iransmitter Information		
✓ Use Interpolated Signal Values		
Format: ⊙ Te <u>x</u> t ◯ CS <u>V</u>		
🗸 OK 🗙 Cancel		

Example Text Format Report:

Zip Field Strength Latitude Longitude

----

50634 79.4 dBu 42-25-10.87 N 092-13-11.48 W

52313 66.1 dBu 42-15-14.78 N 092-05-56.26 W

52210 60.4 dBu 42-20-53.33 N 092-00-14.34 W

50643 76.9 dBu 42-22-59.94 N 092-24-58.04 W

50647 70.1 dBu 42-39-57.37 N 092-27-57.09 W

50612 61.7 dBu 42-16-18.87 N 092-23-20.07 W

50613 85.5 dBu 42-31-01.52 N 092-26-09.07 W

50651 77.4 dBu 42-22-10.42 N 092-12-21.96 W

	Previous
Additional Interference Reports	Тор
	<u>Next</u>

#### Interference Cell Report [Interference studies only]

An interference cell report lists all of the cells in the study where interference exists. It shows the station in question, population of the interference cell, interference margin, and the distance and bearing from the reference station and the transmitter in question to the "cell" where interference exists.

Example:

Interference Cell Report

Reference Station: KPOMTV (24+)

Population Database: 1990 US Census

Call Population Ix-Margin Reference Transmitter

Letters (people) (dB) Dist(km) Bear(deg) Dist(km) Bear(deg)

KHBS-D.C (21) 46 0.7 75.3 214.0 11.0 40.6

KHBS-D.C (21) 8 0.2 79.3 210.4 9.5 75.3

KHBS-D.C (21) 73 1.4 72.6 213.6 13.8 41.7

KVTN-D.A (24) 53 1.8 56.2 6.5 261.8 316.0

KVTN-D.A (24) 98 1.3 58.1 6.3 263.2 316.3

KVTN-D.A (24) 143 1.1 60.1 6.1 264.6 316.6

KVTN-D.A (24) 261 1.5 69.9 5.2 271.7 318.1

KOKITV (23Z) 35 0.8 61.7 299.4 85.4 93.0

KOKITV (23Z) 0 8.7 67.1 306.8 85.3 86.4

KOKITV (23Z) 0 2.9 55.0 289.6 88.9 100.6

Masking Report [Outgoing TV Interference Studies Only]

The masking report shows which stations are considered as potential masking stations for outgoing interference studies. It has two sections. The first section lists the stations that are considered as potential maskers for each station in the study that is being examined for interference. The second section lists all of the "cells" that were not considered as having interference caused by the reference station because they were masked by one of the masking stations. This section lists the cells location, desired field strength ("D"), undesired field strength ("U"), the D/U ratio, and which station masked the interference.

Example:

KTAJ (16):

WTJR (16) Quincy IL

KSNF (16) Joplin MO

KCPT-D (18) Kansas City MO

KCPT (19) Kansas City MO

KDSMTV-D (16) DES MOINES IA

KOOD-D (16) HAYS KS

KTWU-D (23) TOPEKA KS

KMBCTV-D (14) KANSAS CITY MO

KMOSTV-D (15) SEDALIA MO

KCPT-D (18) KANSAS CITY MO

KCTV-D (24) KANSAS CITY MO

KCWB-D (31) KANSAS CITY MO

KXNETV-D (16) NORFOLK NE

KTAJ (16-): [ 39-55-44 N, 094-05-20 W ] D = 66.45 U = 38.46 D/U = 27.99 Masked by: WTJR (16+)

KTAJ (16-): [ 39-57-52 N, 094-04-00 W ] D = 66.83 U = 40.18 D/U = 26.65 Masked by: WTJR (16+)

KTAJ (16-): [ 39-24-48 N, 094-02-40 W ] D = 62.18 U = 36.29 D/U = 25.89 Masked by: KSNF (16Z)

	Previous
Printing Maps	<u>Top</u>
	Next

To print the map that is currently displayed in the main screen, choose "Print" from the <u>File menu</u>.

Pr	int 🛛 🛛			
ſ	Printing Options			
	Page Orientation: <u>O P</u> ortrait <b>O</b> L <u>a</u> ndscape			
	Map Scale: 1,500,000			
	Rasterize Fonts (not recommended)			
	Print to <u>T</u> ransparency			
	(Only Prints Signal, Map Objects, and Ticks–No Geographic Features)			
	Print Using Thin Lines			
	Print Polygons on Raster Layer			
	Number of Copies: 1			
Current Printer: HP Color LaserJet 8500 PS				
	Printer Settings			

# **Printing Options**

**Page Orientation** - This will default to whatever orientation the current <u>Page layout</u> is set up for. The user should generally not change this option from the default unless the "standard mode" display is currently begin used.

**Map Scale** - If you wish to print the map at a different scale then the one shown on the screen map, enter the new scale here.

**Print To Transparency** - The option displays only the signal, contours, map objects, and tick marks.

**Rasterize Fonts** - This option should only be used if fonts do not display properly on your printer. This option will convert fonts into 'bitmaps' and then draw them on the printer (this will slow printing considerably and should not be used unless absolutely necessary).

**Print Using Thin Lines** - By default the program adjusts the widths of the lines on the printout to be the same physical width as they appear on the screen. Use this option to make the program render lines onto the printing device at the same pixel width as they are on the screen (this makes the lines appear much "thinner" than on the screen).

**Print Polygons on Raster Layer** - This option forces the program to render polygons onto a bitmap before putting them on the printing device. This option may lower the "sharpness" of the polygons and should only be used if your printer doesn't print properly with it turned off.

**Number Of Copies** - Sets the number of copies of the map to be printed. Note - not all printing devices allow for multiple copies

(this option will be greyed out if this is the case).

**Current Printer** - This shows the printer that is currently selected. Use the "Printer Settings" button to switch printers or modify the current printer's settings.

	Previous
Entering Latitudes and Longitudes	<u>Тор</u>
	<u>Next</u>

Probe is equipped with a logical string parser which should allow you to enter latitude/longitude coordinates in various formats. The following methods of specifying coordinates are available:

As an example, say we are interested in entering the following coordinates:

Latitude: 45-09-12 N

Longitude: 111-35-01 W

Long notation

Coordinates may be entered as they are shown above, specifying degrees-minutes-seconds and direction. If no direction is specified, latitudes default to "north", longitudes to "west".

Short notation

Coordinates may be specified in the following shortened notation:

Latitude: DDMMSS.FF

Longitude: DDDMMSS.FF

Where D is the place holder for degrees, M for minutes, S for seconds, and F is for hundredths of a second. Our example coordinates would look like the following in short notation:

Latitude: 450912

Longitude: 1113501
Also, Probe will allow the user to specify a direction with short notation:

Latitude: 450912N

Longitude 1113501W

Once again, if no direction is specified, latitudes are considered to be "north", and longitudes "west". Lastly, Probe removes all spaces before parsing the coordinates so the example latitude/longitude could be entered as follows:

Latitude: 45 09 12 N ( or just "45 09 12" ) Longitude: 111 35 01 W ( or "111 35 01" )

High resolutions coordinates with fractions of a second can be indicated by adding the number of hundredths of a second to the coordinates:

Latitude: 450912.45 N

Longitude: 1113501.94 W

**Decimal notation** 

You may also specify latitude/longitude coordinates as decimals, however these are sign dependent with the convention of north being positive and east being positive. In decimal notation our example coordinates would be entered as:

Latitude: 45.153333

Longitude: -111.583611

	Previous
The Window List	Тор
	Next

Probe allows you to have several dynamic windows open at once, these are generated when you create population reports, signal tables, and when examining profiles with the profile viewer. You may also have multiple instances of these windows open (for example you could have two profile viewers open at the same time). Since you can still access the main Probe window, these windows may become hidden behind it. In order to bring them back up to the top use the window list form. The window list form can be accessed by choosing "Windows" from the "View" menu.

🔀 Current Windows	
Text Output Grid Output Profile Viewer Text Output (1)	
<u>S</u> how Window	<u>Close</u>

The window list shows all of the dynamic windows which are currently open. To bring one of them to the top of the screen select the window you want and click the "Show Window" button. The window list form will remain on the top layer of the screen (you can still access the main Probe window with the window list open). If you wish to do a lot of switching back and forth between two dynamic windows it may be handy to leave the window list form open and place it down in the corner of the screen. To close the window list form, press the "Close" button. Each dynamic window is listed by its type. If there are multiple instances of the same type of window, the windows created after the first instance will be followed by a number in parentheses (the higher the number, the more recently it was created). The picture shows a case where there are 2 Text Output windows open. The one labeled "Text Output" was created first, and the one labeled "Text Output (1)" was created second.

	Previous
Exporting the Map to a Graphics File	Тор
	Next

To create a graphics file (BMP, GIF, JPG, or PNG file) from a displayed map, choose "Export Map to Graphics File" from the <u>"File" menu</u>. The following window will appear:

Bitmap Creation		
⊙ Generate a new, non '	'page style" map	
Center Latitude:	43-48-15 N	Resolution:
Center Longitude:	091-22-20 W	○1024×768
Center Longitude.		⊙ 800×600
Scale:	1:1,500,000	○ 640×480
Projection:	Lambert Azimuthal 🛛 👻	<u>◯</u> ustom
		X: 1056 Y: 816
○ Save the currently dis	played map	
		<u>G</u> enerate Graphics File

# Generate a new, non "page style" map

You can set the map settings in the window on the left (these default to the current map settings). Use the switches on the right side to select the resolution of the bitmap ( these are formatted as "Width x Height" in pixels ). If you choose a custom resolution, X is the width and Y is the height. The defaults in the X and Y edit boxes are the width and height of the current map being displayed. When the parameters that you want have been entered, click the "Generate Bitmap" button and you will be prompted for a file name.

When you export to a graphics file using this option you will only get a "map" and not all of the "page" information (margins and other map items that were only added to the page style map) that you see on the screen.

### Save the currently displayed map

This option will allow the user to save the map which is currently displayed by the program exactly how it is (with margins and legends).

### **Generating the Graphics File**

When generating the graphics file, a standard save dialog box will appear where you can specify the name and type of graphics file you want to generate.

<u>? ×</u>
🖻 🙍 😁 🔛
<u>S</u> ave

Use the drop down list box labeled "Save as type" to select the type of file you wish to save to.

	Previous
DTV/TV Interference Calculation Methods	<u>Top</u>
	Next

Probe performs DTV/TV interference calculations as defined in the FCC's OET Bulletin No. 69 and the Sixth Report and Order. The following is a quick summary of this methodology as implemented by Probe (see the previously mentioned documents for more detailed information).

# Stations to be Considered

To find possible interferers Probe begins by locating all licensed TV transmitters within a distance from the reference transmitter's site (this is 600 km for incoming interference and 1200 km for outgoing interference). All stations which do not meet the distancing rules and channel spacing requirements listed in Table 7 of OET 69 are eliminated.

### **Area of Calculation**

In order to maximize calculation speed, Probe will only calculate signal for points where interference may be considered as per the distancing rules in Table 7 of OET 69. This means that the area of calculation for an interfering station will be within the overlap area of a circle around the interfering station (the radius defined by table 7) and the bounding contour selected by the user (this is the noiselimited contour by default) of the station which is receiving the interference.

### **Signal Calculations**

After all of the stations to be considered have been loaded and the study is created (by pressing the "Finish" button at the end of the wizard), all transmitters in the study are set up to use the calculation parameters defined in OET 69 (Table 4 ). These are as follows: Propagation Model: Longley/Rice

Dielectric Constant: 15.0

Ground conductivity: 0.005

Refractivity: 301.0

Antenna Polarization: Horizontal

**Climate: Continental Temperate** 

Receiver Height: 10 m

Situation Variability: 50%

Time variability: This is set to 50% for analog stations receiving interference, 90% for digital stations receiving interference, and 10% for stations being examined for

causing interference.

All signal values are stored in square cells (square with respect to kilometer distance). You can specify the cell size in kilometers on the first interference page of the wizard in the box labeled "Resolution of Signal". If you specify a resolution of "2 km", Probe will use a grid with cells that are 2 km high and 2 km wide. OET 69 requires that the cell size be 2 km or less. When calculating signal for a specific cell as per the FCC method, Probe will use the population centroid of the cell as the point of calculation (this population centroid is a weighted average of the latitudes and longitudes of the census blocks contained in the cell).

One thing that Probe does differently than the FCC relates to it's choice of profile point spacing. OET 69 states that the point spacing along a profile was one kilometer. Probe can use a user defined profile spacing. The user can specify 0.1 km spacing along profiles for greater accuracy (this spacing corresponds with the best possible detail given by 3 second terrain data).

Signal values are calculated using the vertical elevation field pattern defined in Table 8 of OET 69.

### **Interference Calculations**

Interference is calculated for each cell using the U/D ratios listed in the Commission's update of the Sixth Report and Order. Before calculating the U/D ratios, a receiver antenna pattern is applied as described in OET 69 (page 11).

## **Outgoing Interference Considerations**

When examining a transmitter's outgoing interference (i.e. doing an outgoing interference study) the transmitter's signal may cause interference to another station at a point where interference from another transmitter already exists. Such a point is called a "masked" interference point. There is a switch on the first page of the wizard which determines whether or not "masked" interference is reported as interference.

### **Real World Interference Considerations**

When using the OET 69 model to determine "real world" interference (as opposed to for allocation purposes) it may be desired to set the area of calculation to a distance that goes beyond the reference station's noise limited contour. One of the requirements of OET 69 is that KWX errors point be considered as "interference free coverage". As a consequence of this there may be cells that do not achieve the signal threshold for reception, but are counted as "interference free coverage" because of this requirement. It is recommended that for "real world" interference calculations that you turn on the "Do Not Consider KWX points as Ix Free Coverage" switch.



While signal is being calculated, a progress bar will appear at the top of the Probe window. This progress bar indicates the calculation progress for the transmitter which is currently being calculated (you can find out which transmitter is being calculated by looking at the <u>Transmitter List Box</u> or the application's status bar). The progress bar will go from zero to one-hundred for each transmitter in the study. When signal calculation is complete, it will disappear.

	Previous
Data Export	<u>Тор</u>
	<u>Next</u>

Probe's data export feature can be used to save calculated field strength values to a geocoded file. The data export window can be accessed by choosing "Data Export" from the <u>"Tools" menu</u>.

\* Note: This feature is only available in the Full Edition.

🔏 Data Export	
Probe Data E	Export
<ul> <li>Export Coverag</li> </ul>	e Data
Transmitter:	TRANS1
Format:	V-Soft ASCII #1
O Export Interference Data	
	Export X Cancel

The "Transmitter" drop down combo box is used to select which transmitter's signal you wish to export. Then select the format you wish to export to and press the export button.

# **Coverage Export Formats**

V-Soft ASCII #1

This is a simple ASCII file format which is simply a list of "latitude, longitude, field strength".

### Sample

41.511111 , -94.644444 , 61.799534

41.528889 , -94.644444 , 58.445763

41.546667 , -94.644444 , 56.498852

41.564444 , -94.644444 , 58.065311

41.582222 , -94.644444 , 55.903187

41.600000 , -94.644444 , 66.788452

41.617778 , -94.644444 , 67.109291

41.635556 , -94.644444 , 43.940651

### V-Soft ASCII #2

This ASCII file format is a "buffer" style output with some limited heading information. The first lines of the file define the location, size of the buffer, and latitude/longitude spacing between points. The data portion of this format consists of a series of "scan lines" where each line represents a latitude and the values on each line are the values for each longitude at that latitude. The data portion of the output is in a "bottom up" type format (where the first scan line corresponds to the minimum latitude and the last scan line corresponds to the maximum latitude). Since many Probe studies are calculated in a nonrectangular region, when being saved to a rectangular buffer the points which were not calculated are given a value of -1000.

### Specification

1: Latitude of the lower left hand corner point

- 2: Longitude of the lower left hand corner point
- 3: DeltaLat (latitude spacing between points)
- 4: DeltaLng (longitude spacing between points)
- 5: Number of columns
- 6: Number of rows
- 7: the data begins on this line and continues "#6" lines

# Sample

40.622222

-94.666667

```
0.017778

0.022222

110

115

-1000.000000 -1000.000000 -1000.000000 ....

....

....
```

### **MIF Format**

This will save the calculated signal as a set of polygons in MIF (Map Info) format. There will be one region for each cutoff defined on the map. After selecting a filename to save to, the following window will appear:



The lower the render buffer precision is set to, the more accurate the polygons will be - however the amount of time and memory required to process will also be greater.

## **Exporting Interference Data**

Interference data is exported in a format similar to the ASCII #1 coverage format, except that it has extra data after the field strength.

Sample:

43.822222 , -92.488889 , 55.611271, 999

43.840000 , -92.488889 , 51.795769, 999

43.982222 , -92.488889 , 53.653976, 999

44.000000 , -92.488889 , 57.003384, 999

44.017778 , -92.488889 , 43.634651, 1, 2, 3

44.035556 , -92.488889 , 49.889423, 999

44.053333 , -92.488889 , 29.518801, 999

43.751111 , -92.466667 , 45.141254, 999

If the first column after the field strength is 999 then the point is an interference free coverage point. If it is not, then there will be a list of transmitters that correspond to the text report generated in the text editor when exporting the data. Numbers that are less than 50 are for NTSC stations and numbers greater than 50 are for DTV stations.

### **V-Soft Reference File**

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<u> Top</u>

🗹 Ref 📝 Ref

There are several places throughout the program where data can be saved to or recovered from the V-Soft reference file. Many V-Soft programs can read from and write to this file granting a level of connectivity between the various programs. The path to the V-Soft reference file can be set using the <u>Path</u> <u>Setup window</u> (note: this should be set to the same path in all of your V-Soft software in order for them to communicate).

**Reference Buttons:** 

Write data to the V-Soft Reference File



Read data from the V-Soft Reference File

The data which is written to or read from the reference file depends on the type of data available on the current window. The following are different types of data stored to the V-Soft reference file:

Latitude / Longitude ( to the nearest second )

**Call Letters** 

Class (for FM)

Channel

AMSL Height

HAAT (Height Above Average Terrain)

ERP

**Directional Pattern**