

Creating SNS Projects

The SNS utility in QuikMap allows the user to create and configure a SNS exchange database and a vehicle configuration file. The exchange database contains information about the coordinate system, how the map layers are configured and various other parameters. The vehicle configuration file contains specific information about the users vehicle including its appearance, radio configuration and GNSS antenna placement details.

What files will be minimum number of files necessary for the SNS system? Normally, a registered raster image or a shape file of the area being navigated. If you want to navigate to points, adding a CSV file is the easiest way to accomplish that. Additional files the you can supply are as follows:

Shape Files - For drill and vibe products you can use point shape files for point targeting. For all products, line shape files can be used for route navigation. Polygon shape files can be used as exclusion or inclusion zones for all products.

Digital Elevation Model (DEM) - The DEM can be used to render the topography. Raster images are basically 'draped' over the DEM to portray a realistic landscape.

Grid Definition Files - Grid definition files can be used by vibe products to determine where the vehicle is in a bin.

CRK Files - CRK files can be used to determine distances offline for crooked lines.

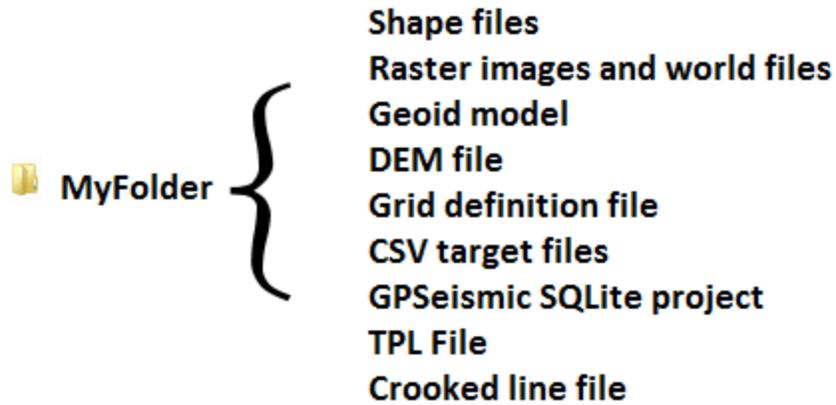
TPL Files - The Vibe Array product use a template TPL file to assign each vehicle to a template node. This has the effect of shifting the target to the location that the vibe should navigate to.

Geoid Model - This can be used to derive local heights in the field.

CSV Files - You can use station, easting, northing CSV files for your target points in the Drill and Vibe products.

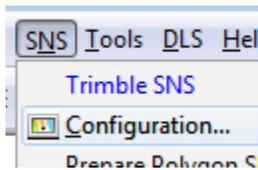
Project Databases - You can use an SQLite database as the source of target points if you wish. The utility allows you to define queries that isolate source and receiver points.

How do you use this utility for the first time? Before starting QuikMap, create a folder and place whatever files you believe you might use (based on the discussion above) into the folder. This includes shape files, registered raster images and any of those you see below:



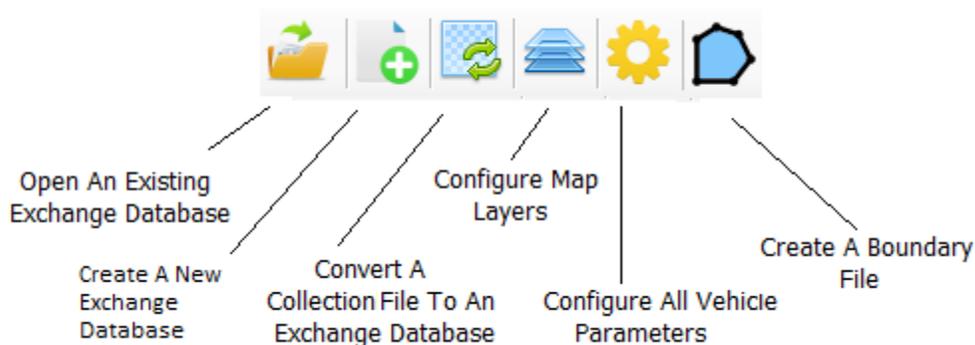
Remember however, that all that is required at a minimum is one shape or raster image file. If you plan on navigating to points your best option is a CSV file with the comma delimited items "Station, Easting, Northing, Height, Descriptor". Height and Descriptor are optional.

Note - For Trimble SNS Line Clear, polyline shape files are used for route lines navigation and must contain only 1 record in the DBF. If multiple lines are stored in a single SHP file, Trimble SNS will not recognize the file as a route to navigate



Next, start QuikMap and select 'Configuration' from the SNS menu.

Generally, when you first open the utility, you will work from left to right on the toolbar. If you already have an exchange database, use the left-most tool button to open it and skip the second button. If you don't have an exchange database, you use the second tool button to create a new one. The third tool button allows you to convert a Collection (COL) file to an exchange database. Once you have an exchange database, you configure the items on the main dialog including map layers, then configure the vehicle parameters, identify the other vehicles (vibe array product only), and finally create a boundary file:



Opening or Creating An SNS Exchange Database



Open an existing SNS exchange database by using the tool button or select 'Open SNS Exchange Database' from the File menu.



- You can create a new exchange database by pressing this button. Place the exchange database in the folder you created above. If you use this option you should press the 'Configure Map Layers' button and begin importing and configuring your shape and image layers (see below).



There is another way of creating an exchange database. You do this by using a QuikMap collection file (.COL). Press this button and you will be prompted for the COL file to use and the SQLite exchange database to save. Once created, all of the controls on the utility will be enabled.

Specifying the Geodetic Parameters

...
Group US_SPC27
System TX-27C
Datum NAD27
Units USFEET
... G12AUS.ggf
Geoid Model
 Apply height change from classical datum shift

Once you have an exchange database, one of the first things to address is the local system for the various shape files and images. You can also select the geoid model (.GGF) to use in the SNS system. If your datum shift is classical (3, 7 or 10 parameter), you can elect to apply your height change from the datum shift rather than use the geoid model by checking the checkbox shown.

automatically copy files to exchange database folder as selected and when converting a COL file

NOTE: Before we go much further, note that there is a preference on the utility (last tab page) which, when checked, will copy any file you specify (including the geoid model above) to the same folder as the exchange database (unless it is already there.) This is done so that it is easier to copy all relevant SNS files to a transfer medium (like a memory stick) . The only file you might use that is not copied is a project database. Should you use a project database and queries you specify with this dialog, it is up to the user to make sure the project database is copied to the tablet.

warn me on exit if there is no boundary shape file in the exchange database folder

- While we are at it, let's look at the other preferences on the Preference tab page. This includes a warning to make a boundary shape file (covered below). The boundary file is used to clip all shape files in use. This creates the most efficient set of files for the system.

backup files in exchange database folder on exit

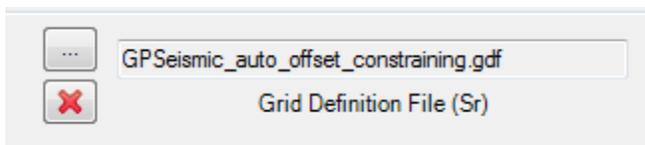
- Because your original shape files might get altered, this option makes a zip file of those for you.

Map preparation tile size. Suggested sizes are 50 when in meters and 150 when in feet.

500

- When you have configured map layers and exit this utility, QuikMap will automatically prepare shape file layers by re-creating them to cover the project area and use a tiling system to accomplish that. The size of the tile are in map units and are dictated by this dropdown. Suggested values are 50 if in meters, 150 if in feet, and a large value of 500 if the project is a large area with little relief or has no DEM.

Specifying Auxiliary Files



Auxiliary files that you may select include a grid definition file for source and one for receivers, a template file*, a crooked line file, and a Digital Elevation Model. As with the geoid model, if the preference is set for copying files to the exchange database folder, then as you select these files, a copy will be made in the exchange database folder should it not exist there.

Note that CSV point target files are placed in the folder by the user. There is no facility for selecting CSV files in the utility.

* - note that more than one template can be specified if you use a GPSeismic database for target points. See section below.

Using The Project Database And Queries To Define Waypoints

Name	Type	Query
1. PREPLOT	unknown	Select PREPLOT.* From PREPLOT

There are three possible ways that the SNS system might allow you to select target points. One is from a CSV file you copy to the tablet, one is from a point shape file you have included in your map layers and the last way is from a project database and queries that you specify using the utility..

Add Query By Selecting Existing One

PREPLOT SRC

One way to specify queries to use is to select the GSQL queries that are listed in the dropdown. These queries are the ones (1-199) that you defined in GSQL. Simply select the one that represents sources and press the button above the dropdown and do the same for receivers.

Add Query By Building One

... GPSismic_training.sqlite

A second way to add a query is to build one using the standard

query builder. You first select a project database using -> . Then when the 'Add Query By Building One' button is pressed, the query builder will be displayed from which you can add the query.

Note that in each method of adding a query, that the query must refer to a single table and that table must be either the Preplot or Postplot table.

Station_Text	Station_Value	Track	TPL_File
15295001	15295001	1529	crossline.TPL
15295002	15295002	1529	Inline.tpl
15295003	15295003	1529	crossline.TPL
15295004	15295004	1529	Inline.tpl
15295005	15295005	1529	vIBes.Tpl
15295006	15295006	1529	Inline.tpl
15295007	15295007	1529	crossline.TPL

Also note that you can specify different TPL template files to use at each survey point. This is accomplished by adding and populating a column called 'TPL_File'. The field contents would be the TPL file name to use, and of course the TPL file would have to exist in the project folder.

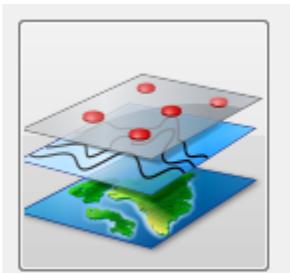
Specifying User Defined Point Records

You can specify up to ten specific point record types. For example, let's say that you will want to describe each archeological site you come across with a one line description. On the 'User Defined Point Records' tab page, you would enter a name for this point type and that the description will be one line:

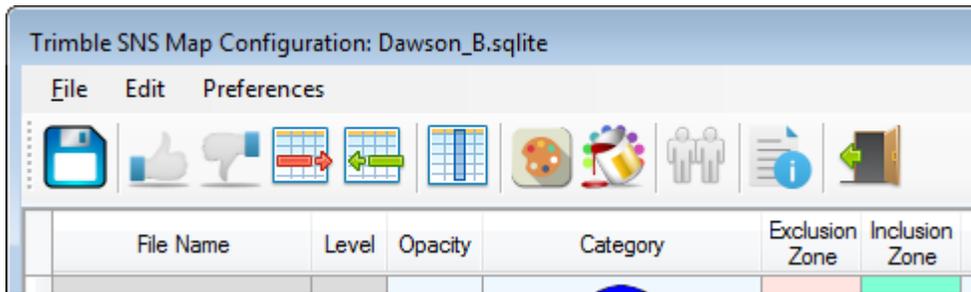
Use	Field Name	Type
<input checked="" type="checkbox"/>	Arc Site	Line
<input checked="" type="checkbox"/>	Eagles Nest	Paragraph
<input checked="" type="checkbox"/>	Hillyer Clifton	Line

You would also check the 'Use' checkbox and press the 'Update Exchange Database...' button to write this change to the database.

Configuring Map Layers



Map layer items that can be changed include layer position, opacity, bitmap for polygon shape file, exclusion/inclusion status for polygon shape file, applies to status, proximity, route width of line shape files, and label field for shape files. The various layers and parameters are depicted in a spreadsheet interface:



Saves changes made to the spreadsheet and exits.



These controls move selected rows up or down.



This deletes the selected row.



Images and shape files can be selected using this button. Multiple files can be selected at one time. Files are loaded so that from top layer to bottom layer we have the following: points shape files, line shape files, polygon shape files, and finally raster images.



Auto-resizes columns and rows



Saves a template file. The template file contains all layer names and settings and can be used to quickly configure another project with similar or identical map layers.



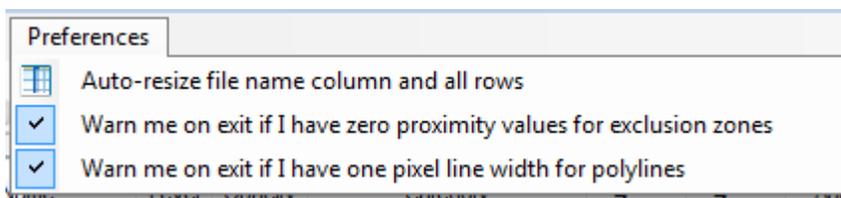
Retrieves a template file and configures layers to what is in the template based on file name match. This can be useful if a new project has many layers and layer attributes (bitmap, opacity, etc.) are the same.



Lists identically configured line and point layers (with regard to bitmap and color). For example if there are two point layers that have the same bitmap and same color, this routine will let you know.



Allows user to select a folder containing shape files and provides list of all files in spreadsheet not in folder and vice-versa. This is a tool for making sure you have not forgotten to add a layer or spot a layer that you added that should not be there.



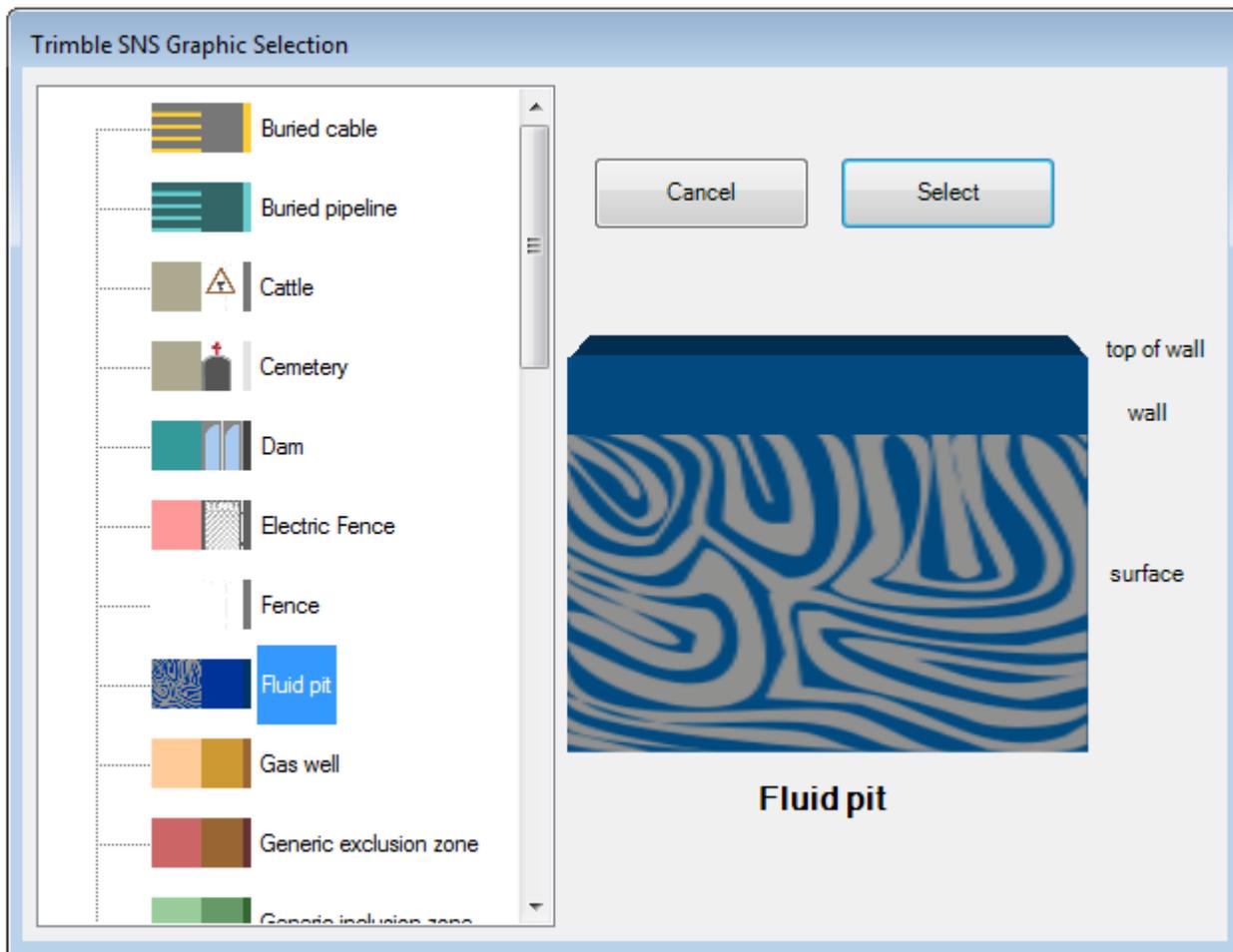
Preferences include suppressing warnings for zero proximity values and one pixel line widths.

A proximity value for a polygon exclusion zone is used to create a buffer around the actual polygon boundary. For example, if you specified 100 map units, as soon as the vehicle moved to within 100 map units of the actual polygon boundary, a alarm would be raised.

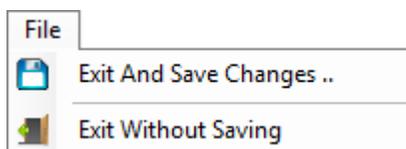
One pixel line widths can sometimes be invisible on a map when zoomed out, therefore there is a preference to warn you about these.

Selecting Bitmaps For Point, Lines and Polygons

To select a bitmap for a polygon layer, you press the 'Category' button and select from a list:



Similar dialogs and mechanics are present for selecting point symbols and line symbols.



When you are finished with your changes, you can use 'Exit And Save Changes' in the file menu.

Final note: If you make changes to the Map configuration, when exiting the utility, some image processing

and preparation will occur which optimizes the images for use in the SNS tablet. So expect to see perhaps a few progress bars on exit representing the progress of this image preparation. This processing includes clipping and simplification of shape files and tiling of images.

Creating And Editing XML Configuration Files



Press this button in order to create or edit an XML configuration file. This file determines what correction source you will be using, your vehicle name, vehicle type and antenna height. Start by pressing the tool button here or select 'Create/Edit Configuration File' from the File menu.

Vehicle configuration window showing options for Vehicle Type (Utility), Model (NA), and IMU controls (checked). The General tab is active, displaying fields for Vehicle Name (MyVehicle), Fleet Name, Antenna Height (meters), and Alternate Antenna Height (meters). A warning icon is present next to the Antenna Height field.

Start by assigning your vehicle a type. When you select a type, you might have to select a model. For example, the Dozer type has several models. Note that for types that don't normally use an IMU, you can still configure for an IMU by checking the 'enable IMU controls' checkbox.

Now give your vehicle a name. This name is displayed on the tablet and is used to identify itself when sending messages to a base or other vehicles. Fleet name is optional.

Enter an antenna height in meters. The antenna height is used to compute the elevation at ground.

Antenna Offset configuration window showing the Relative Position Of Antenna W/Respect To Vibe Pad dropdown menu and two input fields for Distance from vibe pad to antenna parallel to IMU orientation (m) and Distance from vibe pad to antenna perpendicular to IMU orientation (m). Warning icons are present next to the input fields.

Antenna Offset Tab Page - allows you to describe where the GNSS antenna is relative to the point of interest (e.g., the vibe pad). The description is accomplished as two values in meters, one parallel to the IMD and one perpendicular to the IMD. The third item is what these offset values refer to (e.g., antenna is front and right of point of interest, etc.).

Pitch/Roll Thresholds configuration window showing Pitch Threshold and Roll Threshold input fields, both set to 20. A note at the bottom states: note - 0 or 90 for none. Warning icons are present next to the input fields.

Pitch and Roll Threshold -

values in degrees that indicate the maximum angle before alarms sound.



IMD Orientation - This allows the user to describe how you have mounted the IMD. In the depiction, the nose of the vehicle is towards the top.

LV 59	SBAS	2	4
Antenna Type	Autonomous SBAS Range Point RTX OmniSTAR HP/XP/G2 CenterPoint RTX Modem (Standard Convergence) CenterPoint RTX Satellite (Standard Convergence) CenterPoint RTX Satellite (Fast Convergence) VRS RTK	Hor. Prec (m)	Ver. Prec (m)

Correction

Source and Antenna Type - The user should select an antenna type from the dropdown list and select a correction source. You will have one or several other controls to configure depending on the correction source. Note that every time you select a different source, the estimated convergence precisions will be selected for you (if the option for that is checked).

Messaging - These optional set of parameters allow the user to describe all possible message outputs. these include a record trigger, pps output, and a NMEA sentence.



Once you have made all of your selections, you can save the XML file by pressing the 'Save' tool button. The file will have the name 'SNS_Config_MyVehicle.xml' where 'MyVehicle' is the name you entered for the vehicle.



If you want to modify an existing XML, open it, make your changes and then save it.

Boundary File



On the main dialog, you can press this button to make a boundary file. A boundary file is a shape polygon file containing one polygon which encompasses the project area. It is used by QuikMap to clip all other shape files that exist in the project. This process is carried out every time you make any kind of modification in the map layers dialog and exit back to the main QuikMap interface. This particular utility creates boundary files by displaying all current map layers and their extents (sorted by descending area size) along with one row that represents the extents of all layers:

Create Boundary File From Map Layers

A boundary file allows SNS to quickly render the map by ignoring layer regions that don't fall inside it. Select the smallest area that defines where you will be working.

Use	Layer	Left	Right	Bottom	Top	Area
<input type="checkbox"/>	Extents Of All Layers	620826.6	625981.2	4821811.5	4826820.9	25821453.2
<input type="checkbox"/>	Source_Block1.SHP	620826.6	625981.2	4821847.5	4826784.3	25447229.3
<input type="checkbox"/>	Receiver_Block1.SHP	620934.6	625871.4	4821811.5	4826820.9	24730405.9
<input type="checkbox"/>	WindCave.jpg	621197.7	625490.0	4822128.8	4826406.5	18361096.7
<input checked="" type="checkbox"/>	Wells.shp	621453.1	625277.3	4822204.4	4825826.9	13853039.3
<input type="checkbox"/>	Wells_Buffer25.shp	621428.1	625017.4	4822629.2	4825851.9	11567003.9
<input type="checkbox"/>	Gates.shp	621453.8	624528.3	4822277.8	4825913.0	11176446.9
<input type="checkbox"/>	PavedRoads_NoBuffer.shp	621198.9	623825.5	4822150.8	4826348.5	11025233.2
<input type="checkbox"/>	PavedRoads.shp	621425.2	623845.5	4822521.9	4826113.7	8693235.1
<input type="checkbox"/>	SecondaryRoads_NoBuffer.shp	621471.3	625468.5	4822804.1	4824698.9	7573787.4
<input type="checkbox"/>	Secondary_Roads.shp	621461.4	625065.5	4822794.1	4824708.9	6901213.6
<input type="checkbox"/>	Buildings.shp	621425.2	624528.4	4823428.8	4824968.2	4777127.7
<input type="checkbox"/>	Waterbodies.shp	623909.1	624431.8	4823712.3	4824079.5	191945.1
<input type="checkbox"/>	Walking Path Labels.shp	623762.4	624380.1	4823639.9	4823852.2	131102.9
<input type="checkbox"/>	R_5405.shp	621332.6	621352.6	4821811.5	4826820.9	100188
<input type="checkbox"/>	Walking Path.shp	623813.4	624321.8	4823683.7	4823841.3	80101.9

On the dialog above, the user checks the row that encompasses the complete project area. Its best to select

the smallest area that accomplishes this. Once the row is checked, the  button is pushed and the file is created. The boundary file is given the name of the exchange database and suffixed with '_boundary'. So if your exchange database was named 'batman.sqlite', the boundary shape file will be called 'batman_boundary.shp'. It is automatically created in the exchange database folder.

If you want to see how specific extents compares to the 'Extents Of All Layers', check a row and press . You will see two rectangles. The red one is the 'Extents Of All Layers'. The blue is the relative size and location of the record you checked.

Finishing Up

I have everything configured. Now what? Once all files have been created, exit the utility. You should see that QuikMap takes a while to prepare your images. What is happening is that your image(s) are being copied to an 'Images' sub-folder and tiled so that the users position can quickly be used to find and render

the correct part of the image in the display. Also, shape files are being clipped and so everything outside the boundary is removed. Line and polygon shape files are also simplified so as to render with as few vertices as possible. You will note that after this process, there is a backup zip file of your original shape files.

Once the image processing is complete, you copy the entire folder (and images sub-folder) to a memory stick. Prior to doing so, you could make the folder size smaller by removing the shape file backup ZIP file and any original raster image (since the image tiles in the 'Image' folder are what the SNS system will actually use). Plug the memory stick into the TMX and follow the procedure for importing a project.

But wait. I have changes. What do I do? If you make changes to the exchange database and add new files, or simply add new target files (such as CSV's), then you would create an 'Updates' sub-folder to the main project folder on the memory stick and copy the new exchange database and additional files (if any) into this folder. When the TMX sees an 'Updates' folder, it will always replace the project files on the TMX with the ones in the folder. It will also add any files that exist in the Updates folder that are not present on the TMX.