

# Mobile Mapping Application for Updating AGRG Weather Station data



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## Directed Research Applications

### Assignment #2: Mobile Mapping and Geoprocessing

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This second assignment is to develop a mobile mapping application which uses ArcPad to assist in recording information collected during a visit to one of our weather stations.

#### Section 1: Mobile Mapping Application

You are asked to create an ArcPad tool that can be used when visiting one of the AGRG weather stations, or when using the handheld weather station. This tool should provide information about existing stations and at the same time allow one to collect information about the visit. The tool needs to launch a multi-page form (created using ArcPad Studio) and would ideally handle the following ...

##### Page 1: Station Visit

- **Station Name** (filled with a value of "Stn10", ... or "Stn100" when the user points to a station on the map with the activating tool or by way of a dropdown menu; allow for a value of "Kestrel" for the handheld station)
- **Location** (filled automatically if a value of "Stn10" to "Stn100" is specified above; i.e. "Moshers Corner", "Clarence", "Middleton", etc.)
- **Date** (default to the current date)
- **Visit Start Time** (provide a button to set the current time)
- **Visit End Time** (default to the current time and set by the Save button)
- **Visitor**
- Provide a checkbox for **Data Collected?** and a **Save** button

##### Page 2: Equipment

- **Station Name** (automatically filled in based on the Page 1 value)
- **Tripod Okay?** (provide a checkbox for this and each of the following ...)
- **Wind Monitor Okay?**
- **Solar Panel Okay?**
- ...
- **Rain Gauge Okay?** (... provide a **Check All** button)
- **Notes** (allow entry by via recording or text input)

##### Page 3: Photographs

- **Station Name** (automatically filled in based on the Page 1 value)
- **Number of Photos Taken**
- **Panorama?** (specified via a checkbox; default is false state)
- Allow for the entry of **Photo Number(s)** and **Compass Orientation(s)** where the photo number to enter is derived from the camera.

##### Page 4: Station Information

- **Station Name** (automatically filled in based on the Page 1 value)
- **Property Owner Name**
- **Property Owner Telephone Number**
- **Property Owner Address**
- **Directions to the Station**

(The above values should be automatically filled in if the station is known, while all of the values should be blank and editable if a new station was specified)

- Provide a **Center Map on Station** button.

## Introduction

ArcPad software combines both mobile mapping and geographic information system (GIS) technology together. It also provides database access, mapping, GIS, and global positioning system (GPS) integration when you are out in the field via a handheld computer device. The advantage to ArcPad is that you can incorporate your existing data such as database, vector and raster images along with the data that you collect. The following are some of the many functions that are possible with ArcPad:

- Move around your map with navigation tools including zoom and pan, and center on the current GPS position.
- Query your data—Identify features, display hyperlinks, and locate features.
- Measure distance, area, and bearings on your ArcPad map.
- Navigate with your GPS—Connect a GPS and let ArcPad guide you.
- Edit your data—Create and edit spatial data using input from the mouse pointer, pen, or GPS.



Figure 1 – ESRI ArcPad Logo.

ArcMap has an extension that allows the user to “check-out” data from a project to use with ArcPad in the field and then bring it back into the project when completed. This function known as “disconnected editing” is great for updating an existing database and project without having to create a new one each time. It also allows you to bring a subset of the data you need and not the complete data sets, allowing you to save disk space.

Although ArcPad is designed to be flexible and easy to use, it is still important to customize interface to reflect our own preferences. Customization of ArcPad is done using the ArcStudio program. All customization is performed on the PC and deployed to ArcPad on the mobile device. Some of the customizations possible are:

- Creation of new toolbars with built-in and custom tools.
- Design of custom forms to streamline data collection in the field.
- Write scripts that automate tasks and interact with ArcPad software's internal objects.
- Build applets to accomplish your organization's unique goals.

During the fall of 2003, the AGRG added eight Campbell Scientific weather stations to their weather network. The weather stations are spread through out the Annapolis Valley region from Digby to Grand Pre.

The data from these stations need to be periodically collected and they also need to be inspected from time to time for any maintenance issues. A mobile mapping application would be a great benefit to help with the update process of this information. Therefore the task of this assignment was to design an ArcPad application that could aid in the collection of the weather station data.



Figure 2 – AGRG weather station tripod setup in the Grand Pre area (photo facing south east).

There are several different approaches to consider when designing a mobile mapping application. For this situation I have chosen to create a separate layer file to

incorporate the station visit data, instead of updating the main AGRG weather station layer.

**WeatherUpdate2.shp** was created to store the spatial data and most of the details from the weather station visits as attributes. The other details would be sorted into appropriate database files (**DBF**) by the customized application. The form was designed and contained within the associated **WeatherUpdate2.apl** file. This method would ensure that the shapefile containing the locations of the weather stations would not get altered or edited by mistake while in the field. The **WeatherUpdate2.shp** could be later related to the **AGRG\_Weather.shp** file via a common STATIONID field.

The new application tool is represented by an icon with a pen and notepad on it and is located on the AGRG Weather Station Update toolbar. Some other common map tools are also included on the tool bar to aid in the data capture process.

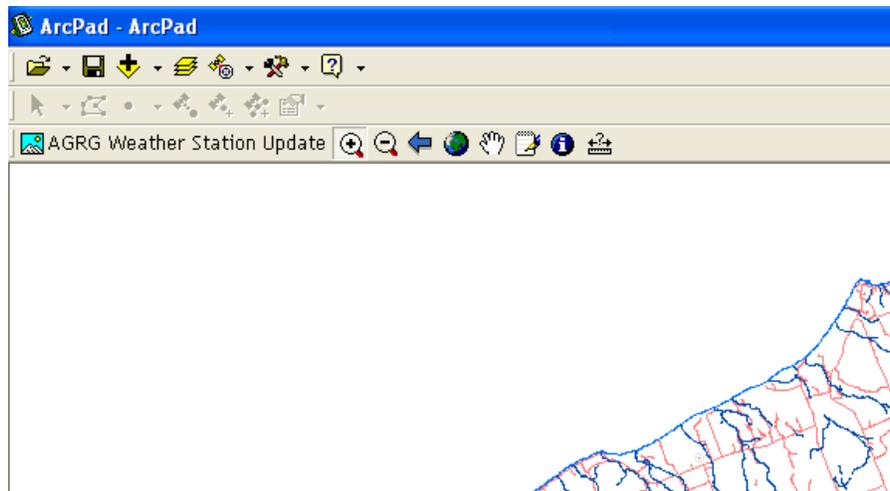


Figure 3 – The new toolbar will contain common map icons as well as the custom tool represented by the pen and notepad icon.

## Set-Up Details

In order for this application to work properly, you must ensure that you have everything set-up properly. Two folders must exist, a “**System**” folder and a “**Data**” folder. The **ArcPad.apx** and the **ArcPad.vbs** must be stored in the System folder, and the other entire map related and database files must be stored in the data folder.

Name	Size	Type	Date Modified
data		File Folder	11/30/2003 9:28 PM
Documents		File Folder	11/30/2003 10:35 PM
powerpoint		File Folder	11/30/2003 7:07 PM
System		File Folder	11/25/2003 7:30 PM
AGRG_logo.jpg	3 KB	Paint Shop Pro 6 Im...	11/24/2003 10:34 AM
schema.ini	1 KB	Configuration Settings	10/24/2002 3:49 PM

Figure 4 – Directory structure for the files associated with the application.

The first time you start up the ArcPad program, you will find that this application and data do not appear, and perhaps different project and / or application will be present. You need to ensure that the paths to the “**System**” folder and the “**Data**” folder are specified correctly. To do this, click on the **OPTIONS** icon in the main menu, and then scroll through the tabs of the **ArcPad Options** window that pops up until you reach the **Paths** tab. Here you must make sure that the correct paths to both the data and system folder are specified. To initiate these settings you must close the ArcPad program and then restart it. After the program has restarted, the map data will appear and a new tool bar called **AGRG Weather Station Update** should be included with the main toolbars at the top of the screen.

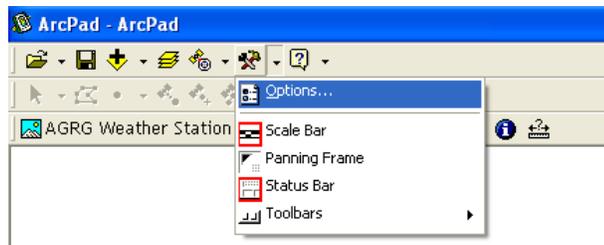


Figure 5 –The ArcPad options window is initiated by clicking the Options icon from the main menu.

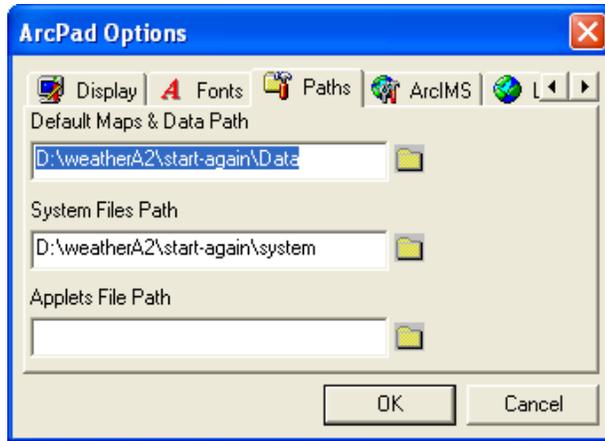


Figure 6 – The ArcPad Options window allows you to set the paths to your data and system folders.

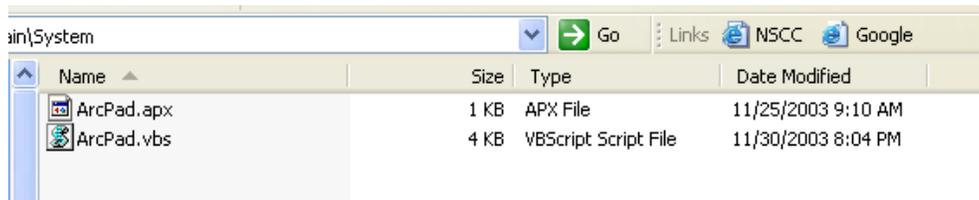


Figure 7 – The System folder should contain both the ArcPad.apx file and the ArcPad.vbs file.

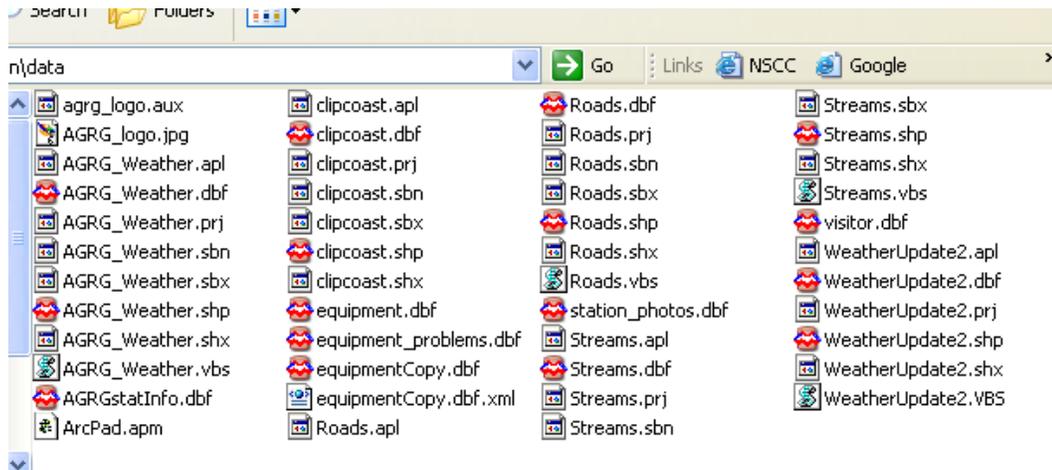


Figure 8 – The Data folder should contain all of the above layer files and database files.

## Prepare Map Data

ArcMap was used to prepare the map data because of the “disconnected-editing” feature that it includes. This feature allows data, to be “checked-out”, so that it may be used with a portable device, and then brought back in, after updating is complete.

All of the map layer and database files required for this project were opened in ArcMap. The ArcPad extension tool was selected from the **View Toolbars** menu.

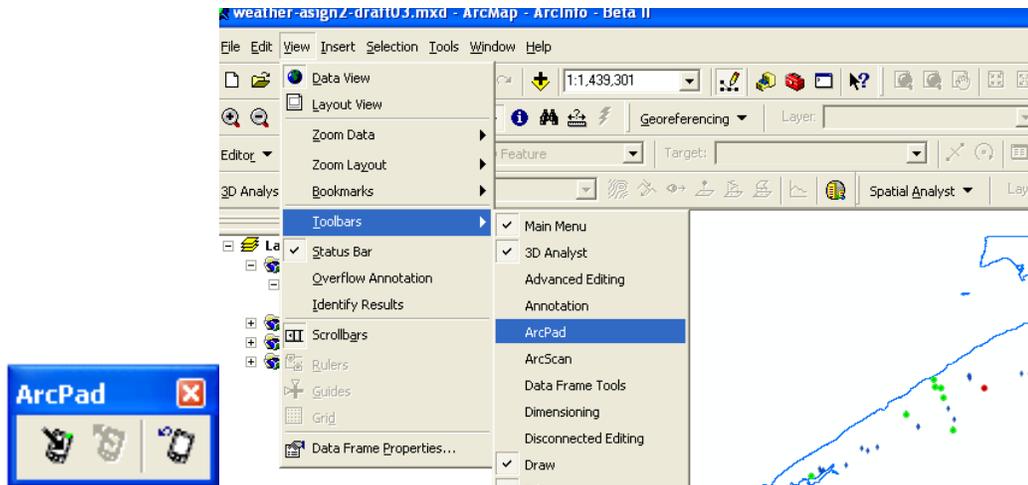


Figure 9 – The ArcPad toolbar (left) will appear after you select it from the View menu in ArcMap (right).

The ArcPad icon (furthest to the left on the toolbar) initiated the **Get Data for ArcPad** window. This window allowed the specification of which features to include in the data set that would be transferred to the portable device.

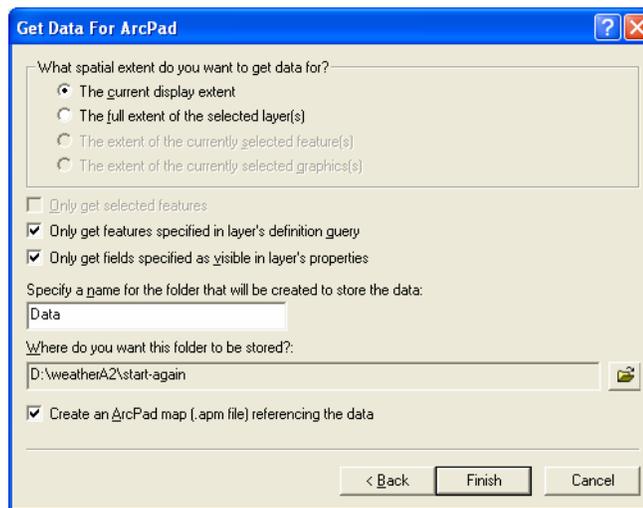


Figure 10 – The Get Data for ArcPad window.

An ArcPad map (**ArcPad.apm**) file was created, and all layers specified were copied into the desired data folder. An **.APL** and a **.VBS** file were automatically created for each shape file. A summary window displayed the results and any errors that the program encountered.



Figure 11 – The Get Data for ArcPad window.

## ArcPad Customization

### Customized Toolbar and Button

The customization of the ArcPad application took place with the ArcPadStudio, a program designed to customize the look and use of ArcPad applications. The next step was to create a system configuration file (**ArcPad.apx**) that would initialize the customized toolbar designed for updating the weather station data. The creation of the new tool bar and customized tool is reviewed in the attached PowerPoint file (pages 34 to 38). All of the details for the apx file are displayed in an XML format and are displayed in a file tree within the ArcPadStudio window. The file tree is good for displaying important features such as the script event called **AddField** that was called upon when the pointing device is lifted from the portable device screen.

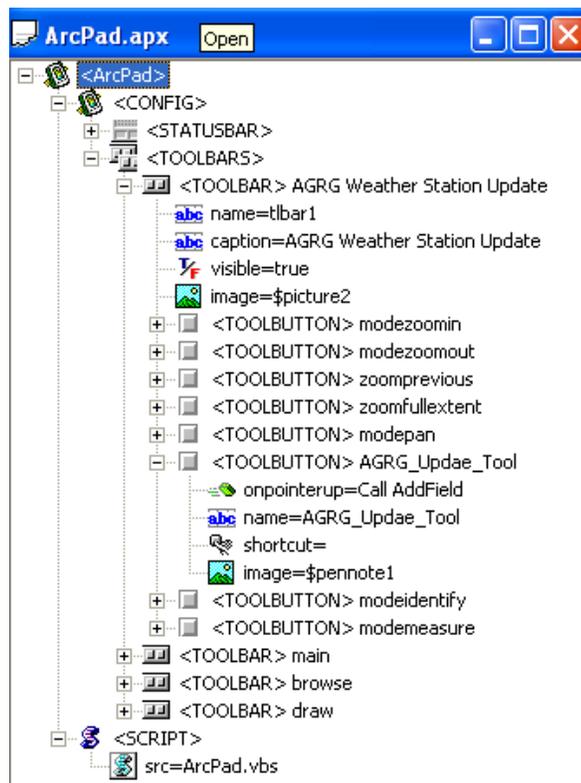


Figure 12 – The ArcPad.apx file structure tree, displaying the components of the file.

After the **ArcPad.apx** file was created and all preferences and options were selected a Visual Basic script file had to be written and associated with it. The Script file was called **ArcPad.vbs** and was placed in the system directory along with the ArcPad.apx file. The creation of the script file is reviewed in the attached PowerPoint file (pages 39 to 44).

## Customized Form

The APL file for the **WeatherUpdate2.shp** file that was created when “checking-out” the data from ArcMap was opened up with ArcPadStudio. The APL file contained a basic form that was customized to fit the requirements set out by the assignment criteria (page 3).

The procedure for this is outlined in the Power Point file (pages 45 to 56). The script file that was associated with the shape file was also loaded into ArcPadStudio and then Visual Basic Script code was written and added to the file to allow the various components of the form to operate.

All of the details for the APL file are displayed in an XML format and are displayed in a file tree within the ArcPadStudio window. The file tree is good for displaying important features such as the script event called **InitializeForm** that was called upon when the point was added to the map layer on the portable device screen.

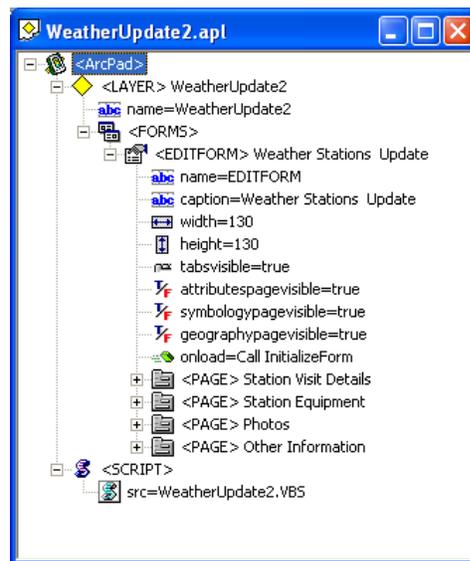


Figure 13 – The WeatherUpdate2.apl file structure tree, displaying the components of the file.

## ArcPad.apx

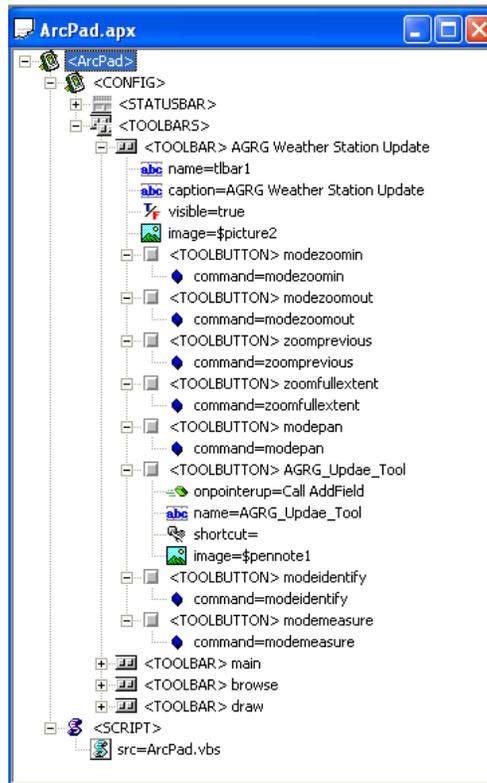


Figure 14 – The ArcPad.apx file structure tree, displaying the components of the file. The tree reveals important details such as the AddField Sub routine that is executed from the VBS script when the user lifts the pointer off of the map screen.

## XML Code of (Arcpad.apx)

```
<?xml version="1.0" encoding="UTF-8"?>
<ArcPad>
<CONFIG>
<STATUSBAR visible="true" units="true" scale="true" rockermode="true"></STATUSBAR>
<TOOLBARS>
<TOOLBAR name="tlbar1" caption="AGRGR Weather Station Update" visible="true" image="$picture2">
<TOOLBUTTON command="modezoomin"></TOOLBUTTON>
<TOOLBUTTON command="modezoomout"></TOOLBUTTON>
<TOOLBUTTON command="zoomprevious"></TOOLBUTTON>
<TOOLBUTTON command="zoomfullextent"></TOOLBUTTON>
<TOOLBUTTON command="modepan"></TOOLBUTTON>
<TOOLBUTTON onpointerup="Call AddField" name="AGRGR_Updae_Tool" shortcut=""
image="$pennote1"></TOOLBUTTON>
<TOOLBUTTON command="modeidentify"></TOOLBUTTON>
<TOOLBUTTON command="modemeasure"></TOOLBUTTON>
</TOOLBAR>
<TOOLBAR name="main" visible="true"></TOOLBAR>
<TOOLBAR name="browse" visible="false"></TOOLBAR>
<TOOLBAR name="draw" visible="true"></TOOLBAR>
</TOOLBARS>
</CONFIG>
<SCRIPT src="ArcPad.vbs"></SCRIPT>
</ArcPad>
```

## ArcPad.vbs

```
=====
'   AGRG Directed Research Applications Project
'
'   ArcPad.vbs
'   Ted MacKinnon
'   November 25, 2003
=====

Option Explicit
'-----
' AddField: Will add a new point to the WeatherUpdate2.shp
'           file. It will then initialize a pop-up form
'           to collect data about the point
'-----

Sub AddField

    Dim X, Y
    Dim objToolButton, blnLyrExists

    '-----
    'Get a reference to the tool button object
    '-----

    Set objToolButton = ThisEvent.Object

    '-----
    'Initialize blnLyrExists flag to False
    '-----

    blnLyrExists = False

    '-----
    'If layer exists set the blnLyrExists flag to true
    '-----

    Dim objLyr

    For Each objLyr in Map.Layers

        '-----
        'Check to see if the Layer exists
        '-----

        If StrComp (objLyr.Name, "WeatherUpdate2", 1) = 0 Then
            blnLyrExists = True
            Exit For
        End If
    Next

    '-----
    'If layer does not exist:
    'Notify the user, return the tool button to its original state, and
    'exit.
    '-----

    If Not blnLyrExists Then
        MsgBox "Layer is not present in the current map display.", vbExclamation, "Layer not
present"
        objToolButton.Click
        Exit Sub
    End If

    '-----
    'If the layer does exist:
    'Get the map coordinates where the user clicked
    '-----

    X = Map.PointerX
```

```

Y = Map.PointerY

Dim objLayer
Set objLayer = Map.Layers("WeatherUpdate2")

'-----
'If the layer can be made editable, make it editable
'-----

If objLayer.CanEdit Then
    objLayer.Editable = True

    '-----
    'Check if a point already exist at the specified XY location ...
    '-----

    If Not Map.SelectXY(X,Y) Then

        '-----
        'Add a point feature at the clicked location
        '-----
        Call Map.AddFeatureXY(X,Y)

    Else
        MsgBox "There is already a point there."
        Call IdentifyXY(X,Y)
    End If

    '-----
    'Return the tool button to its original state
    '-----

    objToolButton.Click

End If
End Sub

```

## WeatherUpdate2.apl

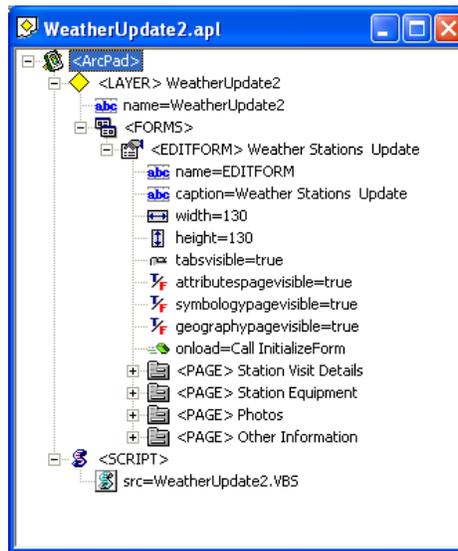


Figure 15 – The WeatherUpdate2.apl file structure tree, displaying the components of the file. The file tree reveals important details such as the InitializeForm Sub routine that is executed from the VBS script.

## XML Code of (WeatherUpdate2.apl)

```
<?xml version="1.0" encoding="UTF-8"?>
<ArcPad>
<LAYER name="WeatherUpdate2">
<FORMS>
<EDITFORM name="EDITFORM" caption="Weather Stations Update" width="130" height="130" tabsvisible="true"
attributespagevisible="true" symbologypagevisible="true" geographypagevisible="true" onload="Call InitializeForm">
<PAGE name="WeatherStationPageOne" caption="Station Visit Details">
<LABEL name="lblVisitor" x="1" y="46" width="35" height="9" caption="Visitor:" tooltip="" group="true"
border="false"></LABEL>
<LABEL name="sblDate" x="2" y="31" width="36" height="10" caption="Date:" tooltip="" group="true"
border="false"></LABEL>
<EDIT name="" x="0" y="0" width="0" height="0" defaultvalue="" tooltip="" group="false" tabstop="true" border="true"
readonly="false" required="false" sip="auto" field=""></EDIT>
<DATETIME name="dtpDate" x="49" y="33" width="78" height="12" defaultvalue="" group="false" tabstop="true"
border="false" readonly="false" required="false" sip="auto" field="DATE_" allownulls="true"></DATETIME>
<LABEL name="lblStationID" x="1" y="3" width="37" height="10" caption="Station ID:" tooltip="" group="true"
border="false"></LABEL>
<EDIT name="txtFID" x="106" y="116" width="21" height="11" defaultvalue="" tooltip="" group="false" tabstop="true"
border="true" readonly="false" required="false" sip="auto" field="ID"></EDIT>
<LABEL name="lblComments" x="2" y="75" width="39" height="10" caption="Comments:" tooltip="" group="true"
border="false"></LABEL>
<COMBOBOX name="cboStationID" x="48" y="1" width="80" height="100" defaultvalue="" listtable="AGRStatInfo.dbf"
listvaluefield="STATIONID" listtextfield="STATIONID" group="false" tabstop="true" border="false" readonly="false"
required="true" sip="auto" limittolist="false" sort="false" field="STATION_ID">
<LISTITEM value="Kestrel" text="Kestrel"></LISTITEM>
</COMBOBOX>
<EDIT name="txtComments" x="1" y="87" width="123" height="12" defaultvalue="" tooltip="" group="false" tabstop="true"
border="true" readonly="false" required="false" sip="auto" field=""></EDIT>
<LABEL name="lblStartTime" x="2" y="63" width="40" height="10" caption="Start Time:" tooltip="" group="true"
border="false"></LABEL>
<LABEL name="lblLocation" x="1" y="17" width="40" height="10" caption="Location" tooltip="" group="true"
border="false"></LABEL>
```

```

<COMBOBOX name="cboVisitor" x="47" y="47" width="81" height="13" defaultvalue="" listtable="visitor.dbf"
listvaluefield="VISITOR" listtextfield="VISITOR" group="false" tabstop="true" border="false" readonly="false" required="false"
sip="auto" limittolist="false" sort="false" field="VISITOR"></COMBOBOX>
<LABEL name="" x="71" y="119" width="33" height="10" caption="Record #" tooltip="" group="true"
border="false"></LABEL>
<EDIT name="dtpTime" x="48" y="63" width="78" height="12" defaultvalue="" tooltip="" group="false" tabstop="true"
border="true" readonly="true" required="false" sip="auto" field="START_TIME"></EDIT>
<EDIT name="txtLocation" x="47" y="17" width="80" height="12" defaultvalue="" tooltip="" group="false" tabstop="true"
border="true" readonly="false" required="false" sip="auto" field="LOCATION"></EDIT>
<IMAGEBOX name="" x="5" y="102" width="49" height="24" defaultvalue="&quot;AGRG_logo.jpg&quot;" group="true"
tabstop="false" border="false" readonly="false" required="false" field=""></IMAGEBOX>
</PAGE>
<PAGE name="WeatherStationPageTwo" caption="Station Equipment">
<EDIT name="txtStationID" x="91" y="114" width="33" height="12" defaultvalue="" tooltip="" group="false" tabstop="true"
border="true" readonly="true" required="false" sip="auto" field="STATION_ID"></EDIT>
<LABEL name="" x="91" y="103" width="37" height="10" caption="Station ID" tooltip="" group="true"
border="false"></LABEL>
<LABEL name="" x="143" y="3" width="40" height="25" caption="Components of" tooltip="" group="true"
border="false"></LABEL>
<EDIT name="" x="143" y="22" width="40" height="18" defaultvalue="txtStationID" tooltip="" group="false" tabstop="true"
border="true" readonly="false" required="false" sip="auto" field=""></EDIT>
<LABEL name="" x="7" y="3" width="97" height="20" caption="Is there any problems with the Weather Station?" tooltip=""
group="true" border="false" fontsize="9"></LABEL>
<EDIT name="" x="143" y="43" width="40" height="22" defaultvalue="dtpDate" tooltip="" group="false" tabstop="true"
border="true" readonly="false" required="false" sip="auto" field=""></EDIT>
<COMBOBOX name="cboEquipment" x="17" y="23" width="92" height="13" defaultvalue="" listtable="equipment.dbf"
listvaluefield="EQUIPMENT" listtextfield="EQUIPMENT" group="false" tabstop="true" border="false" readonly="false"
required="false" sip="auto" limittolist="false" sort="false" field=""></COMBOBOX>
<EDIT name="txtEquipmentNotes" x="8" y="39" width="117" height="63" defaultvalue="" tooltip="" group="false"
tabstop="true" border="true" readonly="false" required="false" sip="auto" field=""></EDIT>
<BUTTON name="btnEquipment" x="2" y="111" width="85" height="14" onclick="Call EquipmentUpdate" caption="Add to
Equipment File" group="false" tabstop="true" border="false" alignment="center"></BUTTON>
</PAGE>
<PAGE name="WeatherStationPageThree" caption="Photos">
<EDIT name="txtStationID" x="95" y="112" width="27" height="15" defaultvalue="" tooltip="" group="false" tabstop="true"
border="true" readonly="true" required="false" sip="auto" field="STATION_ID"></EDIT>
<LABEL name="" x="2" y="33" width="111" height="10" fontcolor="255,0,255" caption="Description" tooltip=""
group="false" border="false" font="Tahoma" fontsize="6" fontstyle="bold"></LABEL>
<LABEL name="" x="1" y="21" width="30" height="10" fontcolor="255,0,255" caption="Direction" tooltip="" group="false"
border="false" font="Tahoma" fontsize="6" fontstyle="bold"></LABEL>
<LABEL name="" x="67" y="15" width="54" height="20" fontcolor="255,0,255" caption="N=0 E=90 S=180 W=270"
tooltip="" group="false" border="false" font="Tahoma" fontsize="6"></LABEL>
<LABEL name="" x="0" y="3" width="52" height="10" fontcolor="255,0,255" caption="Photo Name" tooltip="" group="false"
border="false" font="Tahoma" fontsize="6" fontstyle="bold"></LABEL>
<LABEL name="" x="41" y="115" width="50" height="10" caption="photos taken at" tooltip="" group="true"
border="false"></LABEL>
<LABEL name="" x="1" y="60" width="67" height="10" caption="Panorama Photo" tooltip="" group="true"
border="false"></LABEL>
<EDIT name="txtPhotoName" x="41" y="1" width="86" height="12" defaultvalue="" tooltip="" group="false" tabstop="true"
border="true" readonly="false" required="false" sip="auto" field=""></EDIT>
<EDIT name="txtDescription" x="2" y="44" width="119" height="12" defaultvalue="" tooltip="" group="false" tabstop="true"
border="true" readonly="false" required="false" sip="auto" field=""></EDIT>
<CHECKBOX name="cbxPanorama" x="60" y="60" width="50" height="12" defaultvalue="Yes" caption="Yes" group="false"
tabstop="true" border="false" readonly="false" required="false" field="" alignment="left"></CHECKBOX>
<EDIT name="txtDirection" x="33" y="18" width="27" height="12" defaultvalue="" tooltip="" group="false" tabstop="true"
border="true" readonly="false" required="false" sip="auto" field=""></EDIT>
<EDIT name="txtNumPhotos" x="7" y="112" width="32" height="14" defaultvalue="" tooltip="" group="false" tabstop="true"
border="true" readonly="false" required="false" sip="auto" field=""></EDIT>
<BUTTON onclick="Call PhotosUpdate" name="btnPhotosUpdate" x="25" y="81" width="77" height="14" caption="Add to Photos File"
group="false" tabstop="true" border="false" alignment="center"></BUTTON>
</PAGE>
<PAGE name="WeatherStationPageFour" caption="Other Information">
<EDIT name="txtStationID" x="95" y="114" width="32" height="12" defaultvalue="" tooltip="" group="false" tabstop="true"
border="true" readonly="true" required="false" sip="auto" field="STATION_ID"></EDIT>
<LABEL name="" x="1" y="1" width="50" height="9" caption="Property Owner Name" tooltip="" group="true"
border="false"></LABEL>
<LABEL name="" x="3" y="55" width="43" height="12" caption="Directions" tooltip="" group="true"
border="false"></LABEL>
<EDIT name="txtOwner" x="9" y="12" width="115" height="12" defaultvalue="" tooltip="" group="false" tabstop="true"
border="true" readonly="false" required="false" sip="auto" field=""></EDIT>

```

```
<EDIT name="txtPhone" x="9" y="26" width="115" height="12" defaultvalue="" tooltip="" group="false" tabstop="true"
border="true" readonly="false" required="false" sip="auto" field=""></EDIT>
<EDIT name="txtAddress" x="9" y="40" width="115" height="12" defaultvalue="" tooltip="" group="false" tabstop="true"
border="true" readonly="false" required="false" sip="auto" field=""></EDIT>
<EDIT name="txtDirections" x="3" y="65" width="121" height="21" defaultvalue="" tooltip="" group="false" tabstop="true"
border="true" readonly="false" required="false" sip="auto" field=""></EDIT>
<LABEL name="" x="63" y="116" width="30" height="10" caption="Station:" tooltip="" group="true"
border="false"></LABEL>
<IMAGEBOX name="" x="6" y="90" width="45" height="33" defaultvalue="&quot;AGRG_logo.jpg&quot;" group="true"
tabstop="false" border="false" readonly="false" required="false" field=""></IMAGEBOX>
</PAGE>
</EDITFORM>
</FORMS>
</LAYER>
<SCRIPT src="WeatherUpdate2.VBS"></SCRIPT>
</ArcPad>
```

## Form Pages of Weatherupdate2.apl

### Page 1 (Station Visit Details)

The first page of the form was for recording basic details of the visit. A combo box would retrieve the names of the stations from the **AGRStatInfo.dbf** file and display them to the user to select from. This field was required because it would be a key field when relating the data with the **AGRWeather.shp** file in ArcMap.

The selection from this combo box is stored in the “STATIONID” field in the WeatherUpdate2.shp file. The name “cboStationID” is given to this control to act as a variable to store the StationID. This variable will transfer the StationID to the other pages.

The location of the weather station will automatically be filled in based on the selection from the StationID combo box. This was possible because of code that would open the **AGRWeather.shp** and select the STATDESC Field based on the StationID. The value was stored as a variable that was also the name of the control, thus displaying the value in the text box. This box was editable in order to obtain a location of the Kestrel hand held device, and then stored in the “LOCATION” field in the WeatherUpdate2.shp file. (Note: Currently this function is not working properly, so the user must enter in the correct Location)

The date and start time are automatically filled into the form when opened and they are also stored in the “DATE\_” and “Time\_” fields in the WeatherUpdate2.shp file. These fields can not be changed by the user and are based on the internal clock of the portable device.

The visitor must be specified in the Visitor box, a list of names is supplied from the **Visitor.dbf** file, but any name can be entered. The results of this box are stored in the “VISITOR” field in the WeatherUpdate2.shp file. A comment box is available to record any brief notes that the visitor may want to add to file.

The AGRG logo and the Field ID are displayed on the bottom. The field ID is good to let the user know how many records they have added to the file.

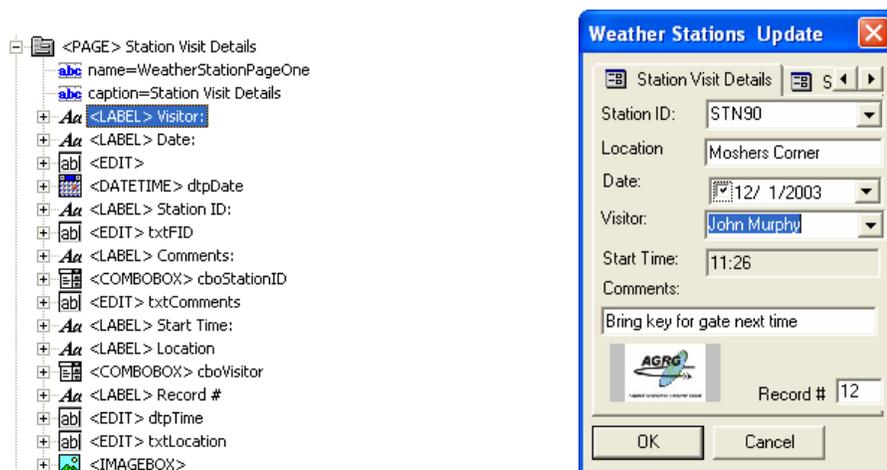


Figure 16 – The file structure tree (left), displaying the components of page 1 (right). The tree exposes important details about each control, and when expanded will reveal such information as the name of the control that can be used as a variable for passing data from page to page.

## Page 2 (Station Equipment)

The second page of the form is for recording details about the weather station equipment. The display of the portable device is fairly small, so to save space I choose to use a combo box method instead of the requested checkbox method.

The combo box can retrieve the names of the stations from the **equipment.dbf** file and display them to the user to select from. The selection from this combo box is stored in the “EQUIPMENT” field of the **equipment\_problems.shp** file. A “No Problems” Option can be selected from the combo box if everything is fine, or equipment parts can be selected and the problem with it can be entered into the large text box below.

Any equipment that is not part of the supplied list can still be entered to the file, by writing the name of the part into the combo box. This method will ensure that all possible problems are recorded.

To save the data to the dbf file, the user must press “Add to Equipment File” button. This will update the file with the equipment problems along with the StationID, date and time that are all automatically stored into the file when the user presses the button. A text box in the bottom right corner will remind the user what station will be recorded into the file.

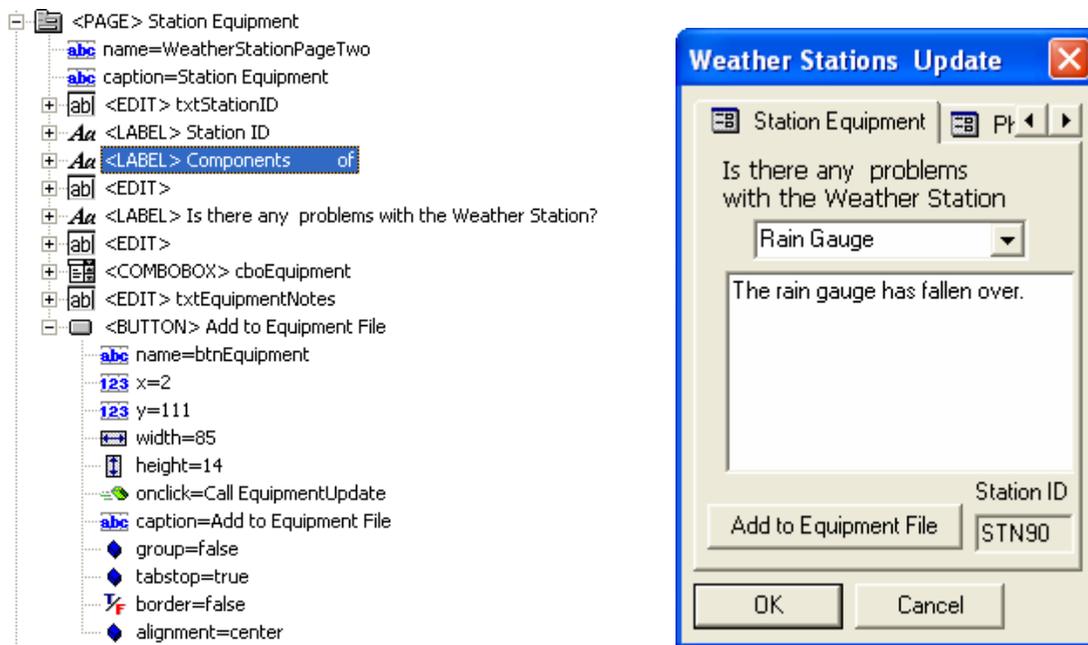


Figure 17 – The file structure tree (left), displaying the components of page 2. (right) The tree exposes important details about each control, and when expanded will reveal such information as the name of the button control that executes the EquipmentUpdate sub routine in the script to add the data to the dbf file.

## Page 3 (Photos)

The third page of the form is for recording details about any photographs taken during the visit to the weather station. The name, direction, and description of the photo are all stored into the associated control names. A check box was provided to specify if the photo is part of a panoramic shot, and will be represented in the dbf file by a Boolean expression of -1 for yes and 0 for no (unchecked box).

The data will be recorded to the **station\_photos.dbf** file when the “Add to Photos File” is selected. After the data is written to the file, a number (bottom left corner) will increment by 1 to allow the user to know how many photos they have taken at this station (bottom right corner).

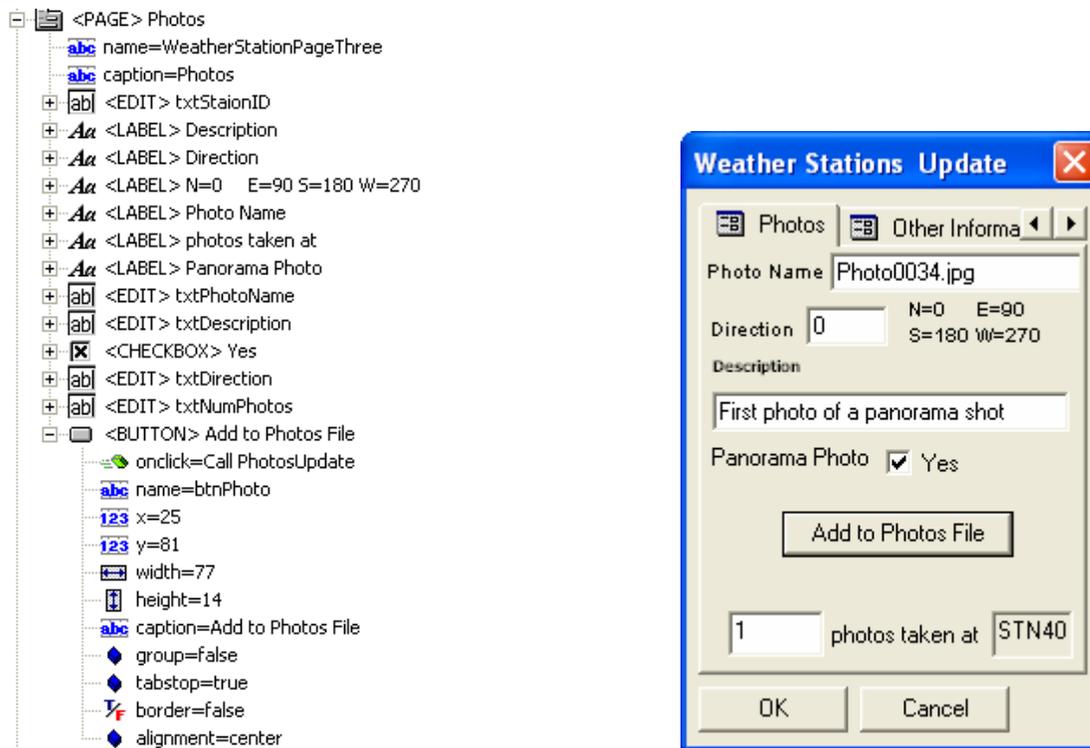


Figure 18 – The file structure tree (left), displaying the components of page 3 (right). The tree exposes important details about each control, and when expanded will reveal such information as the name of the button control that executes the PhotosUpdate sub routine in the script to add the data to the dbf file.

## Page 4 (Other Information)

The fourth page of the form is for providing details about the weather station that the user has selected on the first page. It provides the property owner, phone number, address and directions to the station. A script is used to look for the fields based on the key “STATIONID” field from the **AGRGstatInfo.dbf** file.

(Note: Currently this page is not working properly.) When a StationID is selected, this page always displays the same data that appears to be the last record of the file. After the point is placed on the map and the form is closed, the Identify Option will reveal the proper details for this page. So it appears that the data is being updated but not displayed properly while filling in the form.

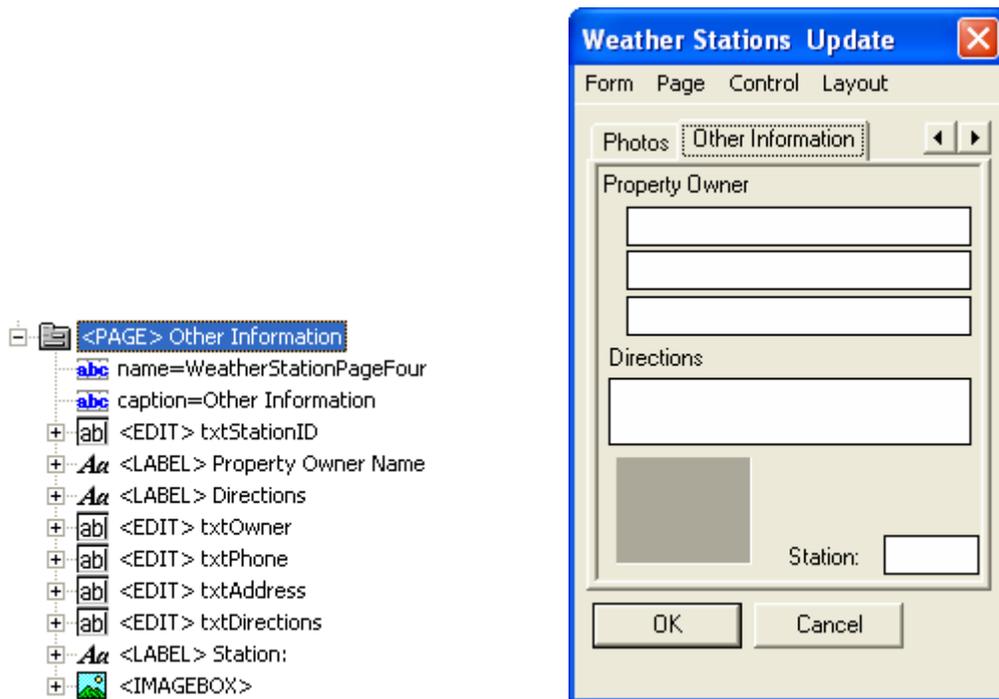


Figure 19 – The file structure tree (left), displaying the components of page 3 (right). The tree exposes important details about each control, and when expanded will reveal such information as the name of the button control that executes the PhotosUpdate sub routine in the script to add the data to the dbf file.

## WeatherUpdate2.vbs

The **WeatherUpdate.vbs** script file contains all of the scripts associated with the APL file.

The **InitializeForm** sub routine is used to initialize the settings of the components of the form, set the current data and time, extract data from files based on STATIONID, and update the next record ID. ReturnNextID function is called upon to help update the next record in the file. This routine is called upon when the pointer is lifted off of the map screen.

The **EquipmentUpdate** sub routine will update the equipment\_problems.dbf file with all or any of the problems that may be wrong with the weather station. The dbf file is opened up and all new data is added as a new record, this routine can be repeated as often as needed, simply by changing the attributes and selecting the button again. This routine is called upon when the button is pressed.

The **PhotoUpdate** sub routine will update the **station\_photos.dbf** file with all of the information for each photograph taken during the visit. The routine opens the dbf file and all new data is added as new records, this routine can be repeated as often as needed for each photo, simply by changing the attributes and selecting the button again. This routine is called upon when the button is pressed.

The **ReturnNextID** function is used to update the form with the next ID of the layer file being updated. The value is returned to the sub routine **InitializeForm** that calls this function.

```

=====
'
'       AGRG Directed Research Applications Project
'
'       weatherstations_update.vbs
'       Ted MacKinnon
'       November 25, 2003
'
' Mobile Mapping application used to assist in recording information collected
' during a visit to one of the AGRG weather stations or when using the handheld
' weather station. This tool will provide information about the existing
' stations as well as collecting information.
=====

'-----
' InitializeForm: This routine is used to initialize the settings with the
'                   form.
' Calls:           ReturnNextID function
'-----

Option Explicit

Sub InitializeForm

    Dim GetDataPath
    Dim objEFPPageOneControls
    Dim objEFPPageTwoControls
    Dim objEFPPageThreeControls
    Dim objEFPPageFourControls
    Dim objEditForm
    Dim StationAttributes, StationLocation

    Set objEditForm = ThisEvent.Object
    Set objEFPPageOneControls = objEditForm.Pages("WeatherStationPageOne").Controls
    Set objEFPPageTwoControls = objEditForm.Pages("WeatherStationPageTwo").Controls
    Set objEFPPageThreeControls = objEditForm.Pages("WeatherStationPageThree").Controls
    Set objEFPPageFourControls = objEditForm.Pages("WeatherStationPageFour").Controls

    '-----
    'Set path to the data folder where all dbf and shp files should be stored
    '-----

    GetDataPath = Application.Properties("DataPath")
    Application.UserProperties("wwDataPath")=GetDataPath

    '-----
    'Initialize DATE to current date
    '-----
    objEFPPageOneControls("dtpDate").Value = Now
    objEFPPageOneControls("dtpTime").Value = FormatDateTime(Time,4)

    '-----
    'Initialize photo number to 0
    '-----

    objEFPPageThreeControls ("txtNumPhotos").Value = 0

    '-----
    'Update the the Location of the Station based on the StationID selection
    '-----

    Set StationLocation = Application.CreateAppObject("RecordSet")

    StationLocation.Open Application.UserProperties("wwDataPath") & "\AGRG_Weather.dbf",2
    StationLocation.Find "[STATIONID] = "" & objEFPPageOneControls("cboStationID").Value &
    """"

    objEFPPageOneControls("txtLocation").Value = StationLocation.Fields("STATDESC").Value

    '-----
    'Update the Station info for query based on the StationID selection
    '-----

```

```

Set StationAttributes = Application.CreateAppObject ("RecordSet")
StationAttributes.Open Application.UserProperties ("wwDataPath") & "\AGRGstatInfo.dbf", 1
StationAttributes.Find "[STATIONID] = "" & objEFPPageOneControls ("cboStationID").Value
& """"

objEFPPageFourControls ("txtOwner").Value = StationAttributes.Fields ("NAME").Value
objEFPPageFourControls ("txtPhone").Value = StationAttributes.Fields ("PHONE").Value
objEFPPageFourControls ("txtAddress").Value = StationAttributes.Fields ("ADDRESS").Value
objEFPPageFourControls ("txtDirections").Value =
StationAttributes.Fields ("DIRECTIONS").Value

'-----
'Free object
'-----

Set StationAttributes = Nothing

'-----
'Get the Weather Stations Update layer's recordset
'(To pass into the ReturnNextID Function)
'-----

Dim objWeatherStationsRS

Set objWeatherStationsRS = Layer.Records

'-----
'Update the ID of the Weatherupdate2.shp
'-----

objEFPPageOneControls ("txtFID").Value = ReturnNextID (objWeatherStationsRS, "ID")

'-----
'Free objects
'-----

Set objEFPPageOneControls = Nothing
Set objEditForm = Nothing
Set objWeatherStationsRS = Nothing
End Sub

'-----
' UpdateEquipment: This will update the problems with the equipment
'-----
Sub EquipmentUpdate

Dim PgOneControls
Dim PgTwoControls
Dim theCtrl
Dim theForm
Dim StationID
Dim EquipmentRecords
Dim GetDataPath

'-----
'Access controls on pages 1 and 2
'-----

Set theCtrl = ThisEvent.Object
Set theForm = theCtrl.Parent.Parent

Set PgOneControls = theForm.Pages ("WeatherStationPageOne").Controls
Set PgTwoControls = theForm.Pages ("WeatherStationPageTwo").Controls

StationID = PgOneControls ("cboStationID").Value

GetDataPath = Application.Properties ("DataPath")
Application.UserProperties ("wwDataPath")=GetDataPath

```

```

'-----
'Add A new record to the file and add the new data
'-----

    Set EquipmentRecords = Application.CreateAppObject("RecordSet")
    EquipmentRecords.Open Application.UserProperties("wwDataPath") &
"\equipment_problems.dbf",2

    EquipmentRecords.AddNew
    EquipmentRecords.Fields("StationID").Value = StationID
    EquipmentRecords.Fields("Date_").Value = Now
    EquipmentRecords.Fields("Time_").Value = FormatDateTime(Time,4)
    EquipmentRecords.Fields("EQUIPMENT").Value = PgTwoControls("cboEquipment").Value
    EquipmentRecords.Fields("Problems").Value = PgTwoControls("txtEquipmentNotes").Value
    EquipmentRecords.Update

End Sub

'-----
' PhotosUpdate: This will update a file with photo data
'-----

Sub PhotosUpdate

    Dim PgOneControls
    Dim PgThreeControls
    Dim theCtrl
    Dim theForm
    Dim StationID
    Dim numberOfPhotos
    Dim EquipmentRecords
    Dim GetDataPath

    '-----
    'Access controls on pages 1 and 2
    '-----

    Set theCtrl = ThisEvent.Object
    Set theForm = theCtrl.Parent.Parent

    Set PgOneControls = theForm.Pages("WeatherStationPageOne").Controls
    Set PgThreeControls = theForm.Pages("WeatherStationPageThree").Controls

    numberOfPhotos = PgThreeControls ("txtNumPhotos").Value + 1
    '-----
    ' Remind the user how many photos they have added to the dbf table
    '-----

    PgThreeControls ("txtNumPhotos").Value = numberOfPhotos
    StationID = PgOneControls("cboStationID").Value

    '-----
    ' Get the data path
    '-----

    GetDataPath = Application.Properties("DataPath")
    Application.UserProperties("wwDataPath")=GetDataPath

    '-----
    'Add A new record to the file and add the new data
    '-----

    Set EquipmentRecords = Application.CreateAppObject("RecordSet")
    EquipmentRecords.Open Application.UserProperties("wwDataPath") &
"\station_photos.dbf",2

    EquipmentRecords.AddNew
    EquipmentRecords.Fields("StationID").Value = StationID
    EquipmentRecords.Fields("Date_").Value = Now

```

```

EquipmentRecords.Fields("Time_").Value = FormatDateTime(Time,4)
EquipmentRecords.Fields("Photo_Name").Value = PgThreeControls("txtPhotoName").Value
EquipmentRecords.Fields("Photo_Dir").Value = PgThreeControls("txtDirection").Value
EquipmentRecords.Fields("Descrip").Value = PgThreeControls("txtDescription").Value
EquipmentRecords.Fields("Panorama").Value = PgThreeControls("cbxPanorama").Value
EquipmentRecords.Update

```

```
End Sub
```

```
Function ReturnNextID (objRS, strFieldName)
```

```
    Dim intMax
```

```
    '-----
    'Get the first record
    '-----
```

```
    objRS.MoveFirst
```

```
    '-----
    'Initialize the max value to the first record
    '-----
```

```
    intMax = CInt(objRS.Fields(strFieldName).Value)
```

```
    '-----
    'Loop through the records, updating the max value if necessary
    '-----
```

```
    Dim intCurrVal
```

```
    While Not objRS.EOF
```

```
        intCurrVal = CInt(objRS.Fields(strFieldName).Value)
```

```
        If (intCurrVal > intMax) Then
```

```
            intMax = intCurrVal
```

```
        End If
```

```
        objRS.MoveNext
```

```
    Wend
```

```
    ReturnNextID = intMax + 1
```