FM MOBILE METER SILVER
USER'S MANUAL

Edition N°: 1.0 - 07/2005

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1. <u>INTRODUCTION</u>

<u>1.1 About Audemat-Aztec</u>

Audemat-Aztec offers a complete range of AM, FM, and TV sound metering equipment that allows radio and television broadcasters and regulation authorities to control and optimize an entire broadcast transmission chain.

Since 2000, Audemat-Aztec products have been awarded 9 times at NAB (Awards are delivered by recognized broadcasting engineers to "products that offer substantial improvement over previous technology", that is to say to innovative products).

Headquarter is in Bordeaux Mérignac, France, Audemat-Aztec has a US subsidiary located in Miami, Florida and a sales office in Singapore, Asia.

<u>1.2 About Product</u>

The equipment that you have just acquired is a new mobile FM meter dedicated to small and medium size radio stations.

AUDEMAT-AZTEC has incorporated in the FM MOBILE METER the electronic necessary to measurement the FM sub-carriers (Stereo, RDS), the measurement of the RF signal, the measurement of the power of the FM multiplex signal.

After a measurement campaign you have the possibility to export data to MapPoint PC Software to have a cartographic representation.

<u>Caution</u> : **Before starting, be sure that the supply voltage is that indicated to the back of the equipment (100/240V).**

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2. PRODUCT PRESENTATION

2.1 List of included accessories

Check that all elements are present in the box:

- 1 cigar lighter cable (power supply +12VDC)
- Power supply cable
- 1 adapter (for power supply cable)
- Serial/USB cable
- 1 magnetic antenna cable
- 1 magnetic antenna
- 20dB BNC-BNC attenuator
- 1 USB/serial adapter cable
- 1 GPS
- 1 CD-ROM included in the folder
- 1 survey satisfaction included in the folder
- Quality control included in the folder

2.2 General specifications

General features

Weight   : 570 g
Dimensions   :l=138,5mm L=211 h=44 (without feets)

Operating conditions

Specifications given for an ambient temperature of 20°C
Equipment operational between   : 0° and 50°C
Storage temperature   : -30°C to 70°C

Power supply input of the equipment

Connectique   :   100/240V

Equipment interface

- 2 push buttons
- 1 LED, 10 characters, red, alphanumeric display
- 1 wheel to move around the menus
- Fine button control, differentiation between short presses (clicks) and long presses

Antenna input

Connector   :   BNC on rear panel
Impedance   :   50 ohms
External attenuator   :   20dB, advised for using the FM MOBILE METER in high fields environments

RF receiver

FM frequency	:	87.5-108 MHz
RDS sensitivity	:	0 errors at Vrf=-90dBm, 4KHz RDS deviation, no modulation
Strong fields	:	3 AGC loops, AGC device taking the adjacent levels into account RF
level measurement	:	+/- 2dB typical; +/- 4dB guaranteed
Dynamic	:	94dB
External attenuator delivered	:	20dB (supplied)

Stereophonic decoding

Guaranteed Cross-talk	:	>20dB for a modulating signal at a deviation of 1KHz, 75KHz.
Typical cross-talk	:	30dB.

RDS data decoding

RDS indicator	:	yes, led on front panel.
Error Correction	:	yes, can be enabled from the configuration menu.
Group counting	:	yes (advanced functions).
Error counting	:	yes.
Correction counting	:	yes.
Radio Text	:	yes (advanced functions).
ODA	:	yes 3A groups (advanced functions).
Time/Date	:	yes (main menu).
PS	:	yes, main menu.
AF decoding	:	yes, main menu.
PTYN	:	yes, main menu.
PTY, DI, MS	:	yes, advanced functions.
TA/TP	:	yes, beeps when TA changes state.
SLC	:	yes, advanced functions.
IN HOUSE	:	yes, dynamic display in advanced functions.
BLOCKS RDS	:	yes
GROUPES RDS	:	yes

Headphones output

Headphones connector	:	Stereo / 3.5mm jack
Volume	:	Adjustable via front panel
Niveau maxi	:	+6dBu pour 75KHz d'excursion

FM Multiplex input (BNC socket)

Connector	:	BNC
Impedance	:	<20 ohms
Max level	:	4400mV (+6dBu)

Analysis of the Audio, MPX, Pilot, RDS levels

Type of analysis   :   DSP sampling of the Multiplex signal, 12 bits, 500KHz
Measurement validity   :   RF level preferably > 60dBµV
Multiplex level   :   peak level displayed, over 120000 samples during 300ms approx.
Audio level   :   peak level displayed, over 120000 samples during 300ms approx.
Pilot level   :   mean peak level, over 500000 samples, 1 second, (calib @6,8KHz)
RDS level   :   mean peak level, over 500000 samples, 1 second, (calib @4,0KHz)
Maximum deviation of MPX   :   +/- 140kHz
Accuracy on measure of MPX deviation : +/- 5KHz.
Accuracy on measure of audio level   :   +/- 1dB typical; +/- 2dB guaranteed
Accuracy on display of sub-carrier levels :   +/-10% typical

Measurement of the FM Multiplex signal power

Type of analysis   :   DSP sampling of the multiplex FM signal at 500000 samples / sec.
                                       integral calculation on the signal and optimization of the mean sliding
                                       calculation of the instantaneous power over one minute conforming to the
                                       CCIR recommendation n°450-1

Accuracy: +/- 0,2dB typical; +/- 0.4 dB guaranteed for powers from 0dB to +12dB.

Measurement of the FM Multiplex signal overshoots

Type of analysis   :   DSP sampling of the multiplex FM signal at 500KHz.

Unit   :   The FM MOBILE METER indicates the mean overshoot time rate
                                       sliding over one minute in ppm (reference is unit time = 1)

Thresholds   :   75KHz +/- 5KHz, with RDS deviation = 4KHz, without pilot deviation at
6.8KHz

2.3 Rear panel
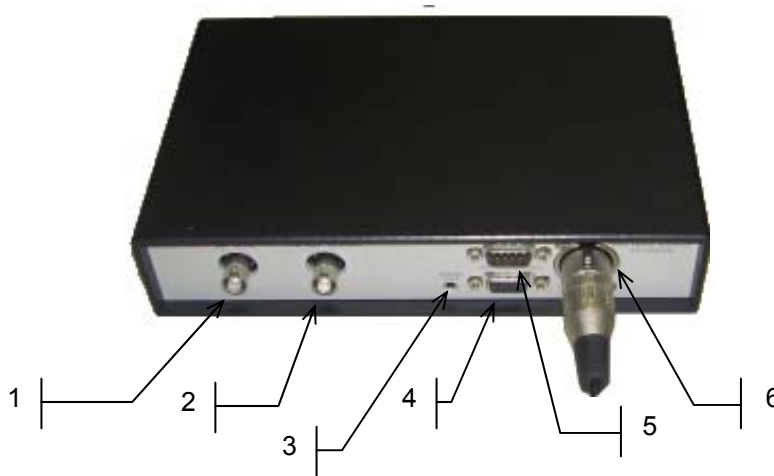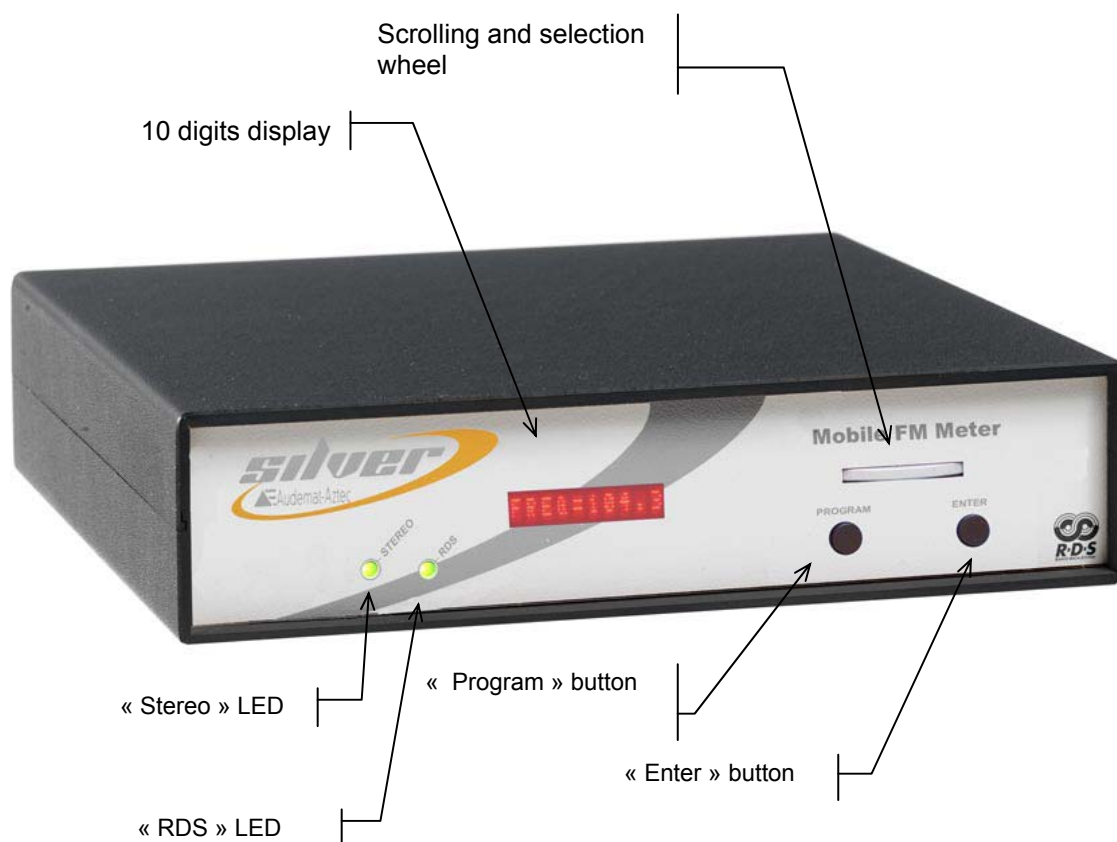

Connectors:

- **1: Antenna input** 87,5MHz - 108MHz, BNC type.

- **2: Multiplex input** BNC, level can be configured from the front panel.

- **3: Audio output 3.5mm** stereo jack, level can be configured on the front panel.
  This output can also supply an external amplifier and 600Ω headphones.

- **4: RS232 serial interface,** this connector is designed so that the connection to a PC can be made with a male-female RS232 ribbon cable or USB/serial cable.

Pin 1: non connected,
Pin 2: TX of the FM MOBILE METER,
Pin 3: RX of the FM MOBILE METER,
Pin 4: Connected to pin 6 of the same connector,
Pin 5: Ground, common to the 0V of the plug,
Pin 6: Connected to pin 4reliée à la broche 4,
Pin 7: RTS of the FM MOBILE METER,
Pin 8: CTS of the FM MOBILE METER,
Pin 9: Power supply input, nominal 12V (11 to 15 volts).

- **5 : Auxiliary connector,** dedicated to external GPS receiver connection.

- **6 : Power supply.** The FM MOBILE METER accepts supply voltages from 11 to 15 Volts.

  Pin 1: Ground
  Pins 2 and 3 : Not used
  Pin 4 : +12V

2.4 Front panel

Scrolling and selection wheel

10 digits display

Mobile FM Meter

PROGRAM   ENTER

« Stereo » LED

« Program » button

« Enter » button

« RDS » LED

1. « Stereo » LED
2. « RDS » LED
3. 10 digits display
4. « Program » button
5. « Enter » button
6. Scrolling and selection wheel

3. INSTALLATION OF THE METER SILVER SOFTWARE

3.1 Software object

This software has been designed to carry out metering campaigns using the *Meter Silver* FM controller. Its interface consists of:

- Main display and software command buttons in upper part.

- Set of display modules corresponding to different types of metered parameters (RF, RDS, GPS, Audio).
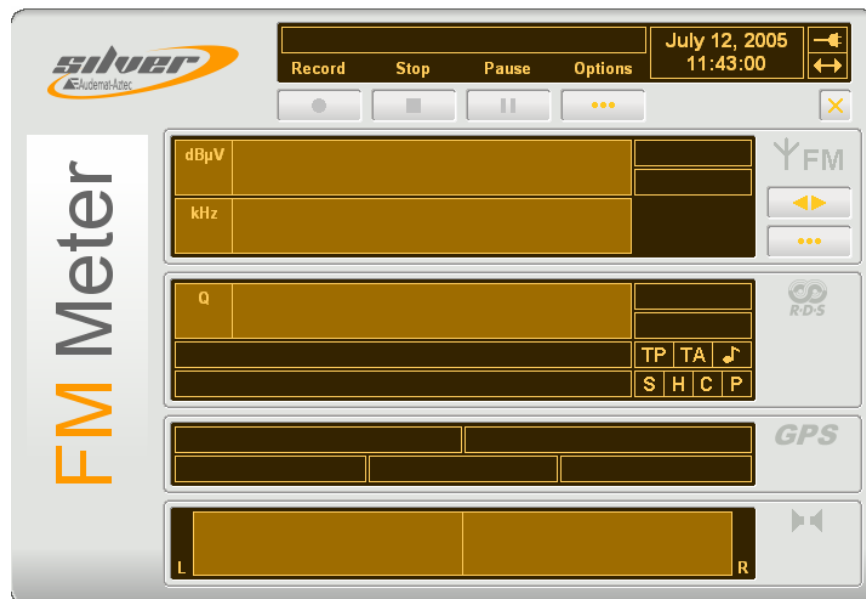
The software is run by means of an RS232C link with the controller from which measurement results will be received.

Moreover, if the computer has a sound board equipped with a line input, the software will enable the audio signal from the metered station to be simultaneously recorded.

It can also be saved in Text format and be imported into *Microsoft*'s *MapPoint* cartographical software.

3.2 Installation

The software is supplied on a CD-Rom which contains an installation program as well as this user's manual in the file form readable with *Adobe*'s *Acrobat Reader®*.

5.1.1 Software environment

The software has been designed for **Microsoft 2k** or **XP** environment.

5.1.2 Installing procedure

To install the software, proceed as follows:

- Before starting installation, close any application which may be running.

- Insert the CD-Rom into computer's drive. Click on the Silver Range and select "Meter Silver" from the proposed scrolling list. Double-click to launch the installation program.

- The first window will ask which language is to be used by the program. Select the preferred language and then click **OK** to continue: the installation assistant's first window is displayed.

- Click on **Next** to proceed to installation.

- When installation has been completed, a window will propose launching the application automatically: enable this option, if need be, then click on **Finish** to leave the installation program.

-

3. 3 Uninstalling

To delete Silver Meter's metering program, proceed as follows:

- Make sure that this program is not running.

- Select **'Parameters – Configuration panel'** from the **'Start'** menu, then double click on **Add/Delete program**.

- Select '*Silver Meter* ' from displayed list and click on **Modify/Delete**.

- The automatic procedure is initialized.

4. QUICK START UP

4.1 Connection

1/ Connect the USB/Serial cable between the PC and the « PC CONNECTION » connector.

➢ To set up a measurement on FM signal, connect the magnetic antenna using the supplied cable and select the menu "SOURCE :FM".
➢ To set up a measurement on a MPX signal, connect the input signal on the « MPX IN » using a BNC and select the menu "SOURCE : BNC".

2/ Connect the GPS receiver to the « Auxiliary controls » connector.

3/ Connect the equipment to the sector using the 100-240 power supply (with the power supply cable) or the cigar lighter cable.

4.2 Software installation

Load the RDS/RBDS Encoder silver CD-ROM software. If the program does not start automatically, double-click on the icon silver and select "Silver Encoder "in the combo-list to launch the installation program.

Select the installation language and let the installation wizard continue until the end. Choose "launch the application" to go to the main menu of the soft interface.
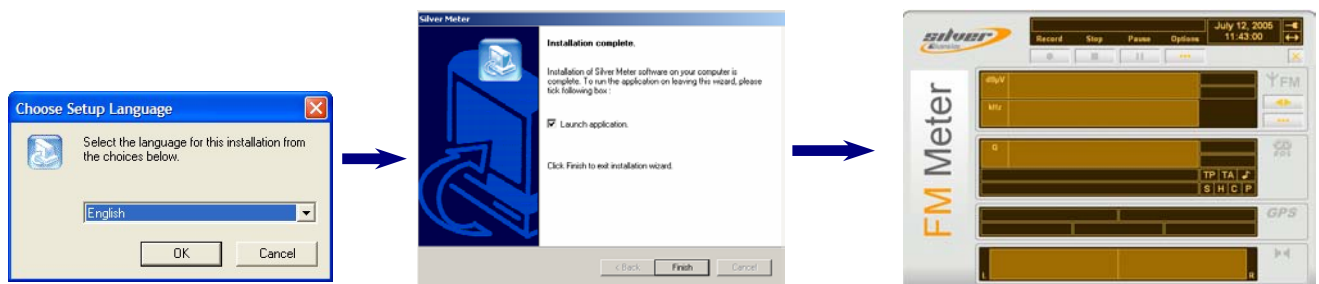

A shortcut is automatically installed on the desk:

4.3 Using the software

The software enables operating according to two modes:

- **Viewing metering**: click on this button in the FM module: and then enter the value of the frequency to be metered and enable with OK. The *Silver Meter* controller is initialized and received measurements are displayed on the different modules.

- **Viewing and recording metering**: start the acquisition as before and then click on this button: Give a name to the campaign file and enable with OK. Measurements are from now on saved and the number is indicated on the main display.

To stop both metering and recording, click on this button: and the last measurements to be carried out will remain displayed.

5. DETAILS OF FUNCTIONALITIES

5.1 MAIN WINDOW

The upper part has the main display and the software's command buttons. The display modules below are corresponding to different metered parameters. Each part is described in detail in the following paragraphs.

The symbol for active buttons appears in yellow:

When the mouse's pointer goes over an active button, its symbol appears in red:

When a function is disabled or inaccessible, the corresponding button appears in grey:

When the mouse's pointer is kept on a button, an explanatory message is displayed.

Some displays contain symbols which have two states. When the corresponding function is validated or active, the symbol appears dark on a light background:

When this function is disabled or inactive, the symbol appears light on a dark background:

5.1.1   Main display

It has indications relative to the software's general running:
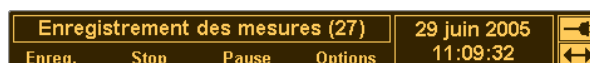
The left part indicates, in its upper part, the recording's current state (number of recorded measurements) and, in its lower part, the function of the command buttons located directly below.

The right part indicates current time and date as well as two symbols which give the state of the link with the metering equipment:

- : *Silver Meter* type of equipment is connected to the computer and has been detected by the software.

- : the RS232 link is active and measurements have been transmitted between *Silver Meter* and the software.

5.1.2 Command buttons

Buttons located under the main display enable measurements to be recorded and the software's parameter selection window to be accessed. An extra button is for leaving the application.

- ⬤ : for starting recording data after having selected a file. This button is only active if metering has been started.

- ⬛ : for stopping metering acquisition and data recording if it has been enabled.

- ‖ : for momentarily suspending acquisition and recording. Press again to start the two processes again.

- ⋯ : for access to software's main configuration parameters.

- ✕ : for leaving the application.

5.1.3 FM module

This module enables the metering frequency to be selected and RF parameters, transmitted by *Silver Meter,* to be displayed.
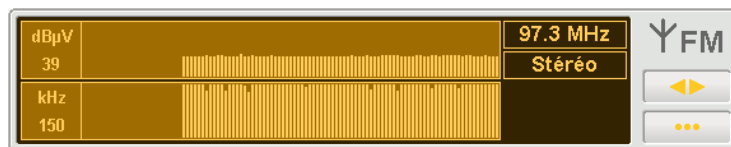

The display has two bargraphs which give the **RF level** in dBµV or dBm (upper part) and the **deviation** value in kHz or % (lower part). The left part of each bargraph gives the instantaneous value of the last received measurement. It also indicates the value of the programmed **frequency** as well as the state of the **Pilot 19 kHz** signal (Mono / Stereo).

There is a button in the right part: ◄► This enables the metered frequency to be defined: click on the button and enter desired frequency, then validate with OK.

Caution*: after programming a frequency, previously displayed measurements are deleted (in all modules).*
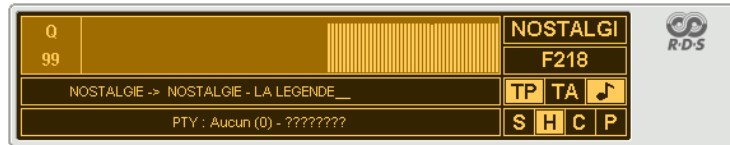
Clicking on this button: ⋯ gives access to a window which will enable the selection of deviation (kHz or % in relation to 75 kHz) and RF level (dBµV or dBm) display units:
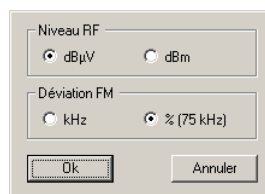
These options are saved with the software's main configuration and restored each time they are used.

5.1.4 RDS module

This module is for displaying RDS parameters transmitted by *Silver Meter*.

The left part of the display has a bargraph which indicates the value of the decoded RDS signal's **quality** (between 0 and 100) as well as two lines enabling **Radiotext** (upper line), **PTY** (in digital form, interpreted) and **PTYN** (lower line) to be displayed.

The right part gives the station's identification parameters (from top to bottom):

- : **PS** (Program Service name).

- : **PI** code (Program Identification).

- : **TP** signal state* (Traffic Program) and **TA** (Traffic Announcement).

- : **MS** signal state* (Music / Speech).

- : State* of **DI** signal's 4 bits (Decoder Identification).

: a light symbol on dark background indicates a value of 0 (inactive); a dark symbol on light background indicates a value of 1 (active).

5.1.5 GPS module

This module is for displaying GPS data transmitted by *Silver Meter*.

The display's upper line indicates the metering position's coordinates coming from the GPS receiver (Latitude, Longitude) in degrees and decimal minutes.

The lower line enables supplementary parameters (Altitude and transfer speed) and the number of received GPS satellites to be displayed.

When no valid position is available, all fields are deleted.

5.1.6   Audio module

With this module the audio signal's level, coming from *Silver Meter*, can be viewed.

It represents the linear variation of L and R signals' peak level.

Note*: the amplitude of these signals is not calibrated. It depends both on adjustments in the Silver Meter's audio output level and on the computer's sound board input level.*

5.2 RECORDING METERING

When the reception frequency has been defined, measurements supplied by *Silver Meter* are displayed on different modules but not recorded. To record measurements in a campaign file, proceed as follows:

- Click on this button: [•   ] to display the file selection window.

- Capture the name of a new file or select an existing file to replace.

- Validate with the 'Record' button.

From this moment on, received measurements will be recorded and their amount indicated on the main display. Several files are created to record data:

- **Campaign file** (*.cgn): it contains main data relative to current metering campaign as well as references to positioning and metering files.

- **Metering file** (*.mes): it contains all recorded parameter values and synchronising information with the audio file.

- **Positioning file** (*.gps): it contains positioning information from the GPS receiver.

- **Text file** (*.txt): this file is optional. It enables recorded measurements to be viewed by importing them into *Microsoft MapPoint,* cartographic software.

- **Audio file** (*.wav): recording the audio file is also optional.

5.3 SOFTWARE CONFIGURATION

This button [   ] enables access to the software's main configuration window. It has two tabs which give access to software parameters and information concerning versions of the different application elements.

5.3.1 Main configuration
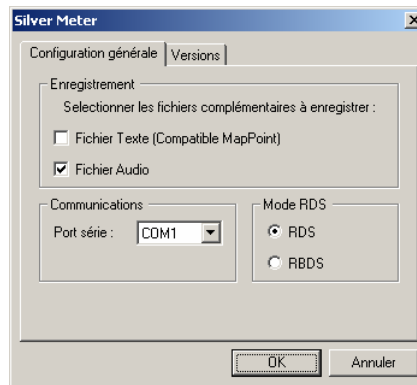
- **Recording**: this group of parameters contains two boxes to tick for enabling/disabling recording of audio and/or text files.

- **Communications**: this scrolling list is for selecting the serial port used for the link with *Silver Meter*.

- **RDS mode**: choosing this mode modifies the interpretation of **PTY** codes displayed in the RDS module.

5.3.2 Versions
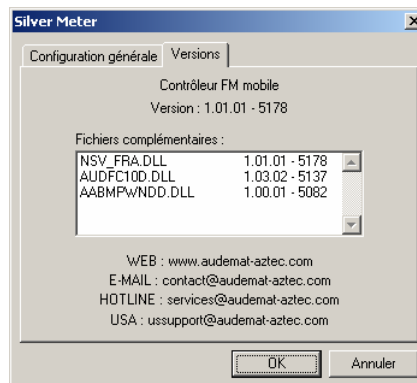
This page displays information of the metering software's version and on annexed elements (language, library files).

It also contains different Internet addresses, which are useful for getting in touch with Audemat-Aztec.

6. OBTAINING SERVICES

Headquarter:

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APPENDIX 1 : Data's export to MapPoint

1- How to use the measurements with MapPoint?

When you campaign is finished with the Mobile Meter, it's creating a file .txt in « Program files/Audemat-aztec/Silver meter ».

To visualise graphically the measurements, follow the instructions:
- Launch MapPoint
- Menu « DATA », then « Link DATA Wizard»

The windows will ask you to select the campaign file which is in « Program files/Audemat-aztec/Silver meter ».

Note : select « file type : .txt ».

- Click on « OPEN »

- Select « Tab »

- Click on « NEXT »

- Select your country
- Click on next then Finish
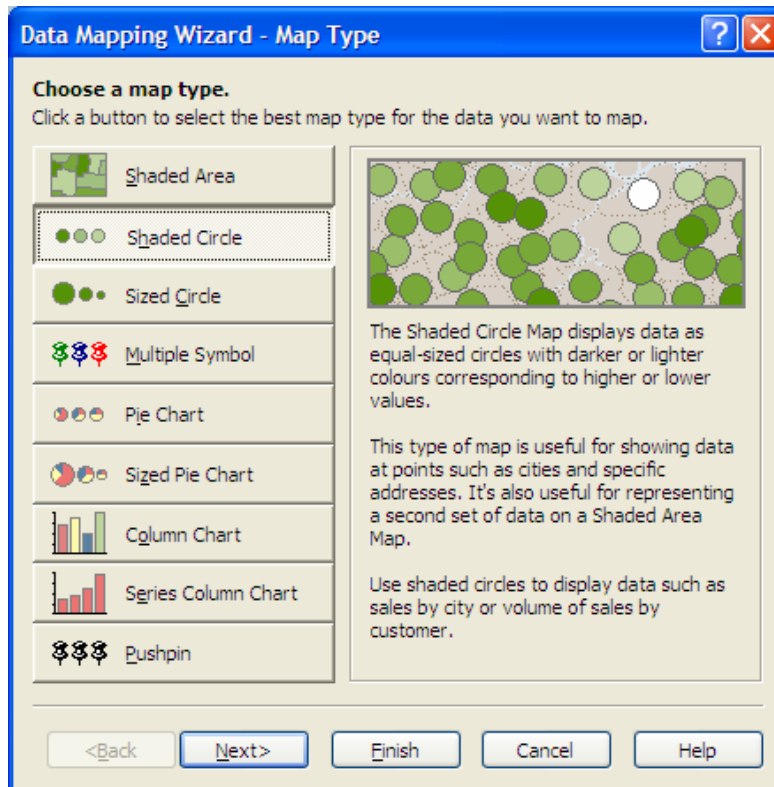
- In this window, select the representation type ("Shaded Circle" is recommended).
- Click on next.

- Choose the data you want to visualise.
- Click on « Finish »
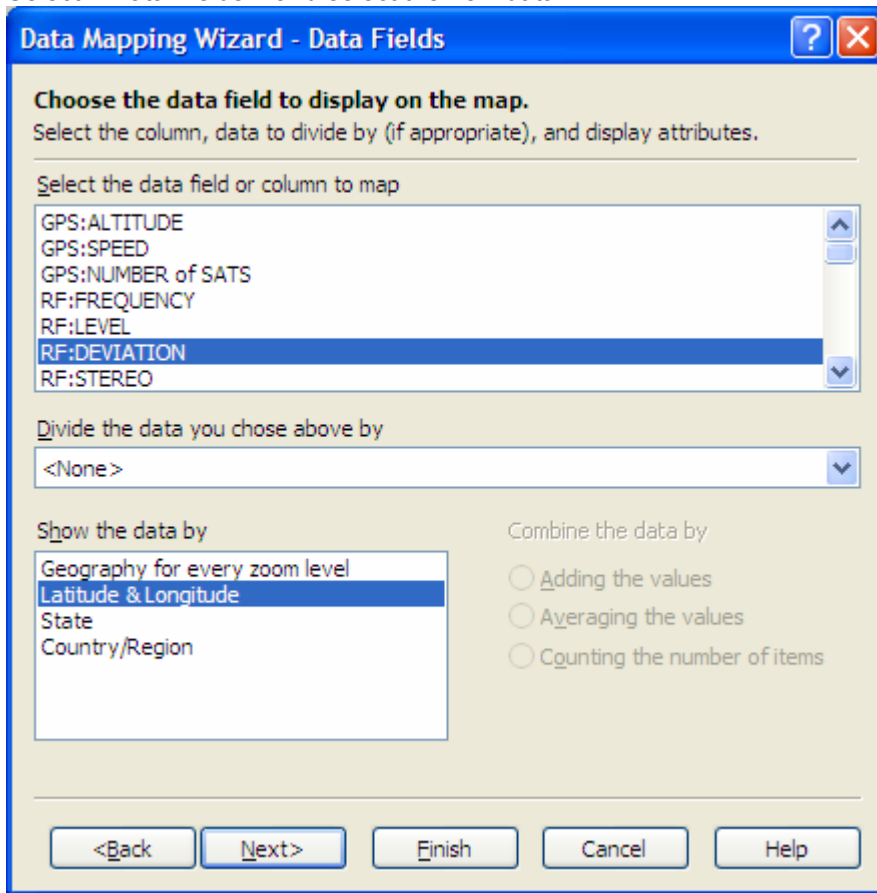
You will see the measurements you made on the map of your country.
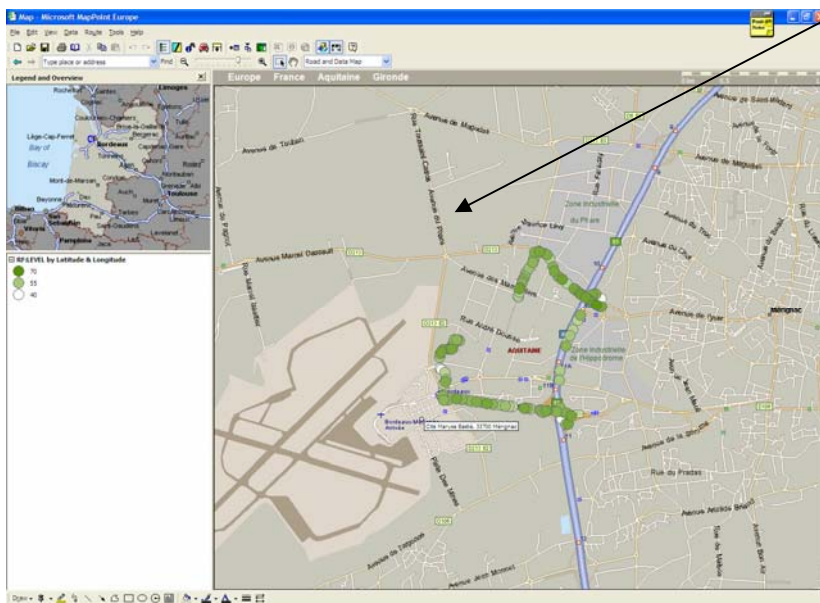
Note :if you want to change the data you may visualized, click right on your mouse on the text.
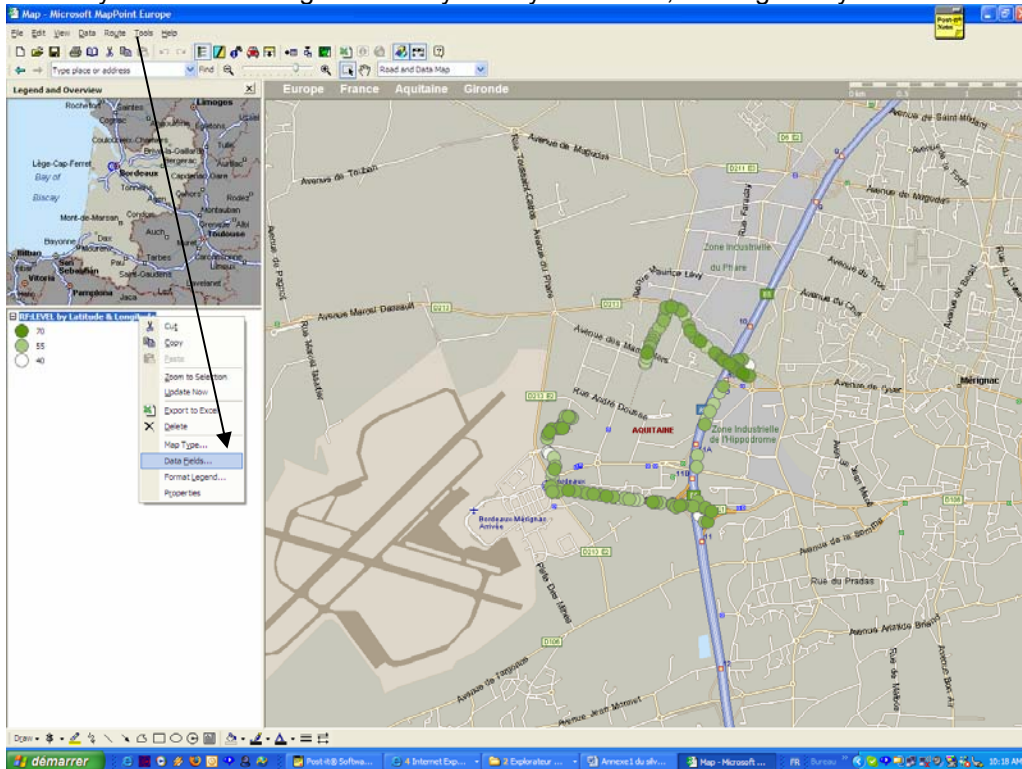
Select « Data Fields » and select the new data :

And valid by clicking « Finish ».

APPENDIX 2 : FAQs

1: I have found a +20dB attenuator delivered with the FM MOBILE METER, when must I use it?

<u>» Answer</u>
The FM MOBILE METER has a very high sensitivity and RF dynamic. However, when you are closed to a transmission site (less than 2km for example) we advice you to use the RF attenuator delivered with the product. You will have better performances and the input RF front end stage won't be saturated by heavy RF signals.

2. How can I sort out, in a measurement campaign the measurements points which are related to a known PI code and remove the others?

» Answer
The answer is in fact in point 6 of this faq: do the measurment on the frequency, fast or slow mode and then get the Excel file. Sort the Excel file result by PI code and then remove the lines which does not show the PI code of the frequency you are interested in!

3. I do not want the FM Mobile Meter to make sample every second but every kilometer... how can I do that?

» Answer
Same kind of answer than point 4 of this faq. Do the measurment in fast mode (or in slow mode) and then, from the columns "latitude" and "longitude" it's quite easy maths to extract the distance between 2 points. Another thing to do is to make perform (through Excel) an average of the points which have been measured within a 1 kilometer distance.

4. How can I get a field measurement instead of a level measurement?

» Answer
Please contact the hotline for this point.

5. The audio left and right comes from where?

 » Answer
The audio left and right comes from your MIC IN of your PC.
<u>Caution</u> : don't have a laptop integrated microphone activated.

APPENDIX 3 : Software incident report

ORIGINE

Société : ....   Rédacteur : ....

Téléphone : ....   Fax : ....   e-mail : ....

LOGICIEL AUDEMAT-AZTEC

Nom : ....   Version : ....

Ce logiciel est-il associé à un équipement :

☐ Oui   Type : ....   Version : ....   N° de série : ....

☐ Non

DESCRIPTION DU PROBLEME

Environnement informatique utilisé:

☐ Windows 95, 98   ☐ Windows NT 4.0   ☐ Windows 2000   ☐ Windows XP

☐ Autre (Préciser : ....)

Caractéristiques de l'ordinateur utilisé:

☐ Portable   ☐ Bureau   Marque : ....

Taille mémoire : ....   Espace disque disponible :..

Description :
(*Donner le maximum de renseignements sur les conditions d'apparition du problème : écran concerné, configuration utilisée, manipulations effectuées, etc... Des renseignements détaillés sont indispensables afin de reproduire l'incident rencontré et d'y apporter une solution*).
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A RETOURNER A

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