



DSPGenie M-TTYusb

Mobile-TTY Transmission Tester

with TSB-121 compatible interface

Technical & Operational Manual

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DSPGenie M-TTYusb Mobile Transmission Tester

1 Introduction

1.1 Overview

The DSPGenie Mobile TTY Transmission Tester (M-TTY) was developed by DSPG to support field studies of TTY transmission over digital wireless telephones. Based on a multi-DSP testing platform it fully emulates the operation of the TextLink 9100 MT (see Figures 1 and 2 below) allowing automated testing and verification of TTY over wireless networks in field conditions and particularly Baudot-to-CTM conversion by mobile handsets as used in the United States. The tester can launch bi-directional scripts which alternate sides automatically after the GA characters. The text passes via serial connection to the TTY and then via audio connection to the handset. The tester captures incoming text from the TTY.

The M-TTY connects to a host PC via a USB 2.0 interface. The DSPG TTY tools application software runs entirely on a host PC under a Windows 2000/XP/7 operating system. This software fully supports the Gallaudet test data script format and original scoring algorithm.

The M-TTY can operate either in an interactive manual mode or in a command-based automated mode, allowing integration with the user's testing system. The automated mode allows testing over a period of many hours with large amount of data, significantly reducing the time it takes to complete a set of tests.

1.2 Key features

- Provision of DLL library of functions and test/analyse commands allowing integration with the user's test environment
- Automation of test procedures with minimal user interaction
- Automated generation of test results based on standard scoring algorithm??
- Fully compatible with DSPG's TextLink 9100 MT
- Remote control via TCP/IP and specific client/server protocol
- Intuitive GUI in an interactive operational mode
- The M-TTY Audio interface is compatible with the TSB-121 standard
- Selectable test data pattern: Gallaudet Fast typist and Slow typist scripts
- SCORE by Lober and Walsh (licensed for use by the TTY Forum in testing TTY over wireless telecommunications), and CTM_SCORE (from 3GPP TS 26.231 CTM Minimum Performance Specification) are supported
- Wireless-to-wireline or wireless-to-wireless calls are supported, depending on the number of modified TTYs available (two are needed for wireless-to-wireless calls)
- Future-proof (software upgradeable)

1.3 Internal architecture

The DSPGenie M-TTY consists of two DSP modules implementing separate Baudot/CTM soft-modems A and B. Each of the modems is fully compatible with the TextLink 9100 MT.

Modem A is always used as a Calling party and Modem B as an Answering party.

The USB interface connects the M-TTY to the user's laptop or desktop host PC running DSPG's TTY tools application software. Refer to Section 2 for application software and driver installation.

The TTY tools DLL library provides functions and commands to allow automated operation within the user's test environment.

Additionally, these commands can be executed remotely from another computer using the TCP/IP and specific client/server protocol over the LAN (refer to Section 4).

The DSPGenie M-MTTY fully emulates the operation of the TextLink 9100 MT. The block diagrams below show the compatibility between a testing environment using TextLink 9100 MT and one using M-TTY.

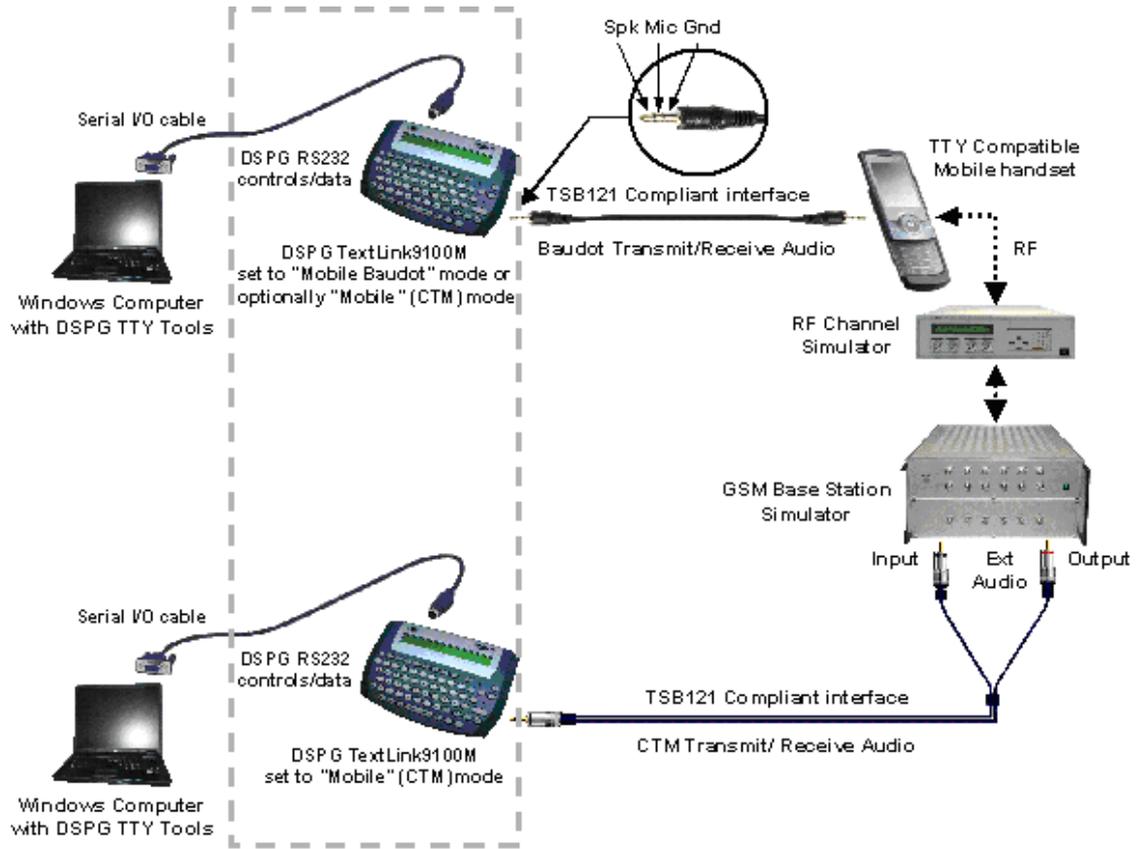


Figure 1: TextLink 9100 MT test configuration. Compare to DSPGenie M-TTY below (represented here by dashed line).

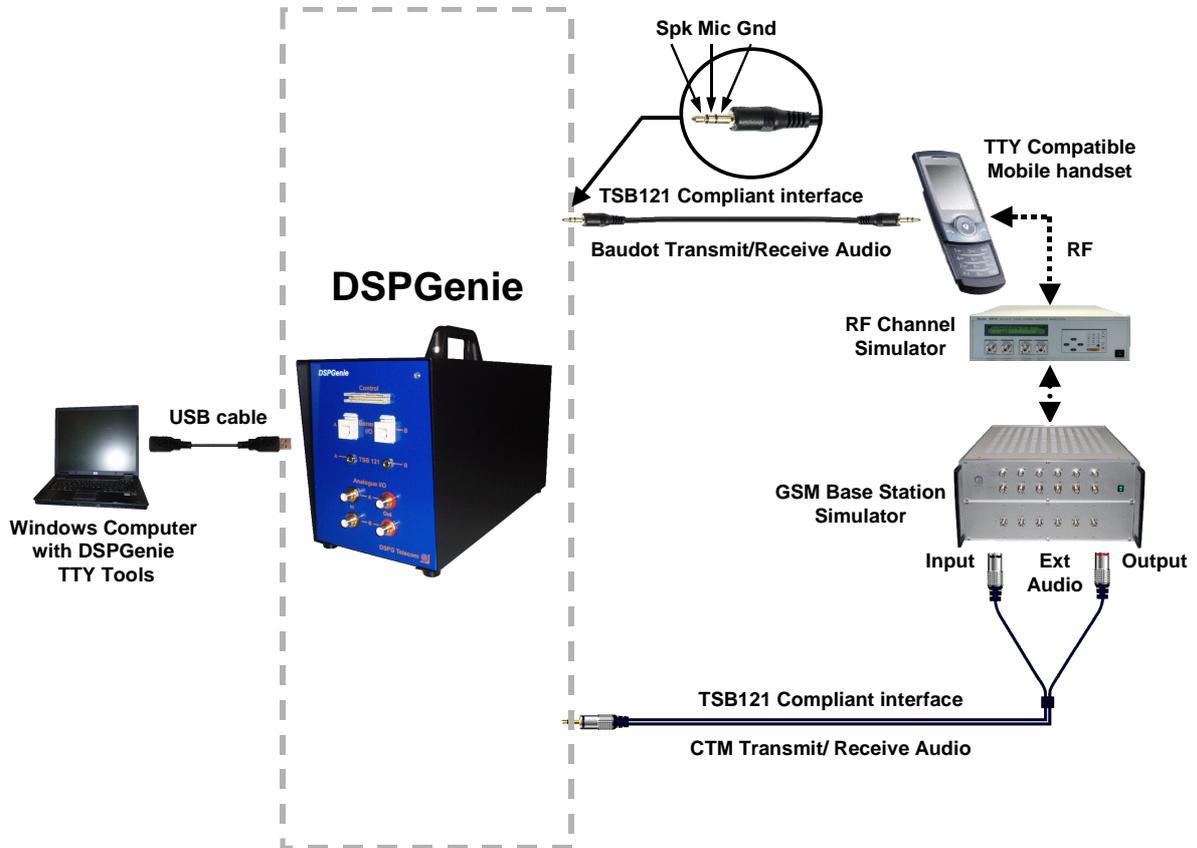


Figure 2: DSPGenie Mobile TTY test configuration. Note that only one computer is required.

2 DSPGenie M-TTY Installation Guide

This paragraph describes the installation and initial setup of the DSPGenie M-TTY software.

2.1 Host PC Specification

In order for the M-TTY application software to run correctly, the host PC must meet the following minimum system requirements:

- Operating systems: Windows 2000/XP/7
- 500 MHz processor or better
- Min. 256 MB RAM
- Min. 1 GB Hard Disk Drive
- Single USB port
- CD ROM drive
- Network Interface (only for an optional TCP/IP remote control)

2.2 DSPGenie M-TTY Application Software Installation

The DSPGenie M-TTY application software can be installed from the CD included in the delivery.

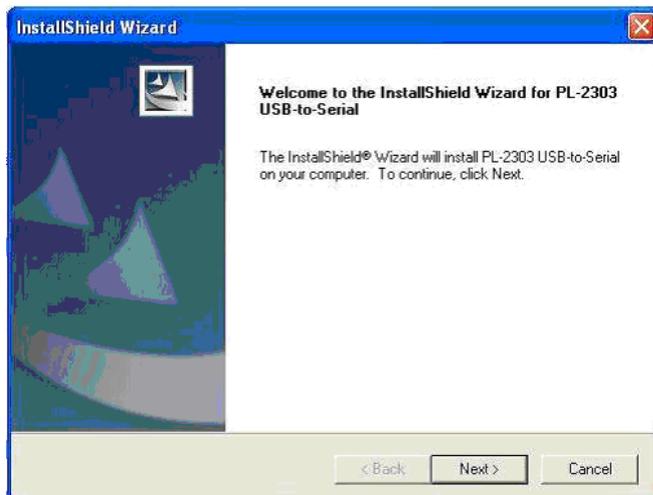
1. Insert the DSPG CD into the CD drive.
2. Copy the setup file and install.

2.3 USB-Serial Adapter Driver Installation

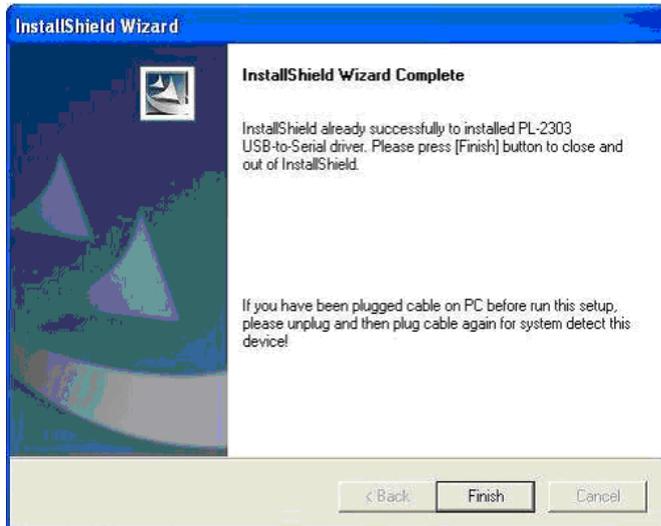
A standard USB cable is used for connection between the DSPGenie M-TTY unit and the host PC.

The host PC needs a USB-to-Serial driver to be installed that is provided with the M-TTY tester software. To install the USB-to-Serial driver on the host PC, the following steps need to be carried out:

- 1) Disconnect the USB cable from the PC
- 2) Run or double-click the InstallShield driver setup program PL-2303 Driver Installer.exe.
- 3) The InstallShield Wizard will be displayed on your screen to inform you that the PL-2303 USB-to-Serial driver will be installed on your computer. Click **Next** to continue and start the installation.



- 4) Wait until the InstallShield Wizard informs you that the driver has been successfully installed. Click the **Finish** button to close the InstallShield program. If you have plugged the USB cable into the PC while running the setup installation, please unplug and reconnect the cable for the system to detect the device.



- 5) Connect the M-TTY box with the PC USB port using a USB cable. Windows should detect the driver as "Prolific USB-to-Serial Comm Port". Before Windows installs this, it may prompt you that this device driver has not yet passed Windows XP Logo compatibility. Click **Continue Anyway**. Windows will then start to install the driver for the USB-to-Serial COM Port.



- 6) The driver installation will then continue to completion.
- 7) The Device Manager should now display Prolific USB-to-Serial Comm Port (COMxx) Devices with a device name.

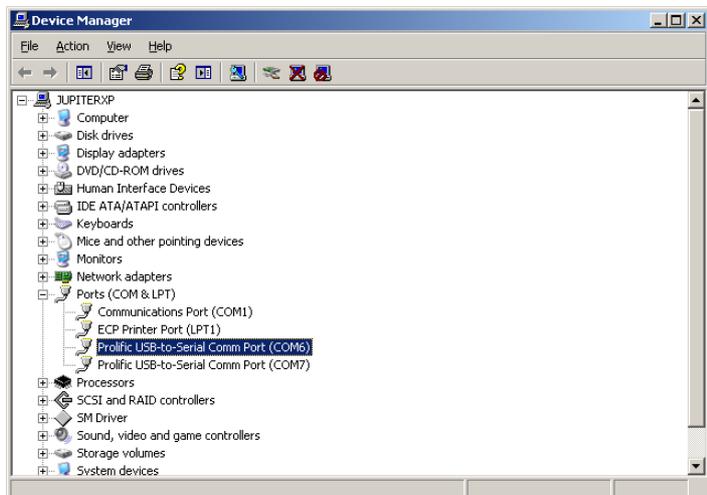


Figure 3A-D: Driver installation

3 Operation of M-TTY

3.1 Overview of the TTY tools program

Run the TTY tools application named DSPGenie Mobile TTY Tools.exe, using a shortcut from the desktop, and the main GUI window will appear, as shown in Figure 4 below.

From this window you can control the M-TTY operation manually in an interactive mode.

Please note that the USB cable should not be unplugged from the M-TTY unit while the *client* application is running as this is known to cause issues with the *client*; see Section 8.3 for more information.

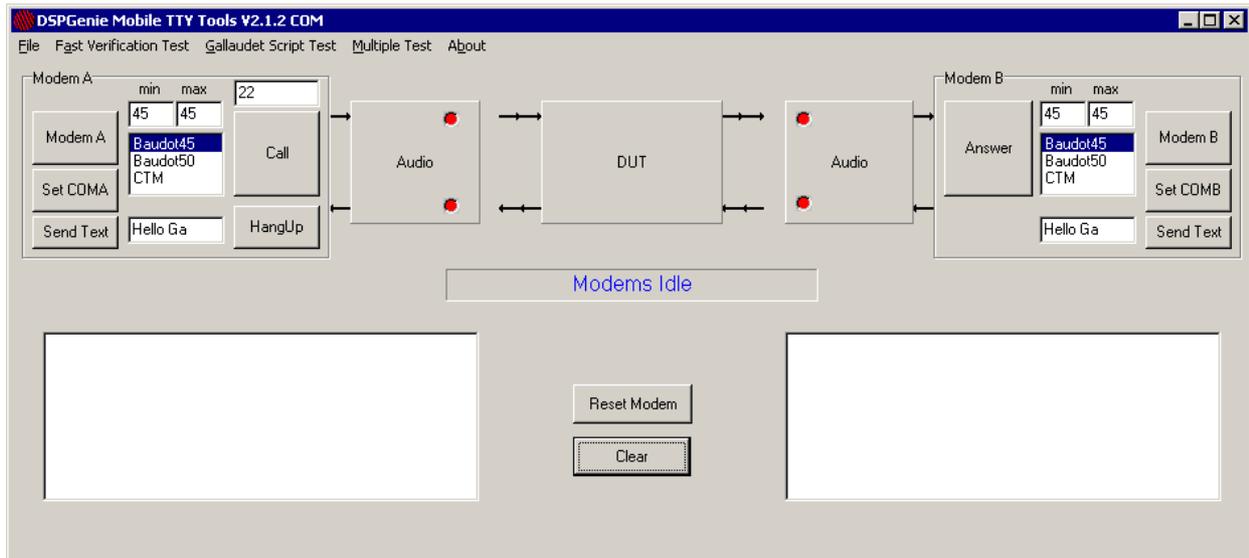


Figure 4: Main GUI window

The modem A and modem B modules are located respectively on the left and right hand sides of the Main GUI window as shown above in Figure 4. The controls within these modules allow the user to modify and verify the settings for modems A and B independently.

- For each module, the user can click and select a modem type from the modem list box.
- Pressing the **Modem A** or **Modem B** buttons will return the current settings for each modem.
- Pressing the **Set COMA** or **Set COMB** buttons will change the setup parameters of the serial ports. If the application has detected and assigned the ports automatically then the user need not press these buttons unless the port assignment needs to be changed.
- Pressing the **Call** button will activate the modems and then confirm the line speed.
- Pressing the **Send Text** buttons will send a short text sequence ('Hello GA' by default) from the left box (modem A) or the right box (modem B) to confirm the connection between the modems.

Two large message boxes, located below the Modem modules, display the modems' responses and other information relevant to the corresponding modem, including the text sent and received by each modem during the TTY transmission test. At any time the user may press the **Clear** button to wipe-blank these two message boxes.

The **Reset Modem** button will clear all the modem settings to the factory defaults (equivalent of ATZ command), after which the modems should be re-selected as required by the user.

3.2 Initialising the M-TTY

When starting the TTY tools application, all initialising routines will be executed automatically. That includes the selection of default Mobile Audio interface and initialisation of modems A and B. The two modems are interfaced using the serial ports. The initialising routine automatically detects assignments of the COM ports used for modems A and B. If the auto-detecting routine fails to detect the assignment of

the ports, a manual setup window will appear (as shown in Figure 5) to ask the user to setup the port manually.

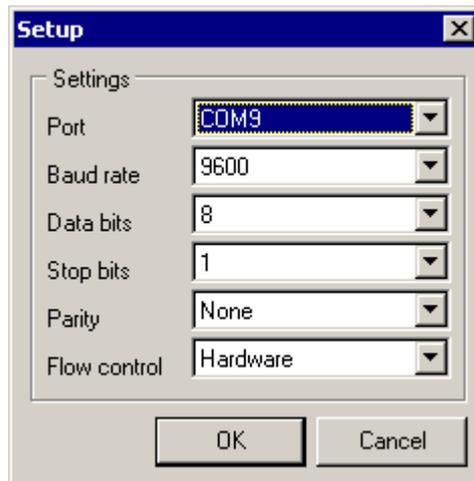


Figure 5: COM port setup window

The user can change the port number manually to make correct assignments for modem A and modem B. But other parameters must not be changed.

To find the correct assignment of the ports, the user can access the Device Manager in the system properties; an example is shown below in Figure 6.

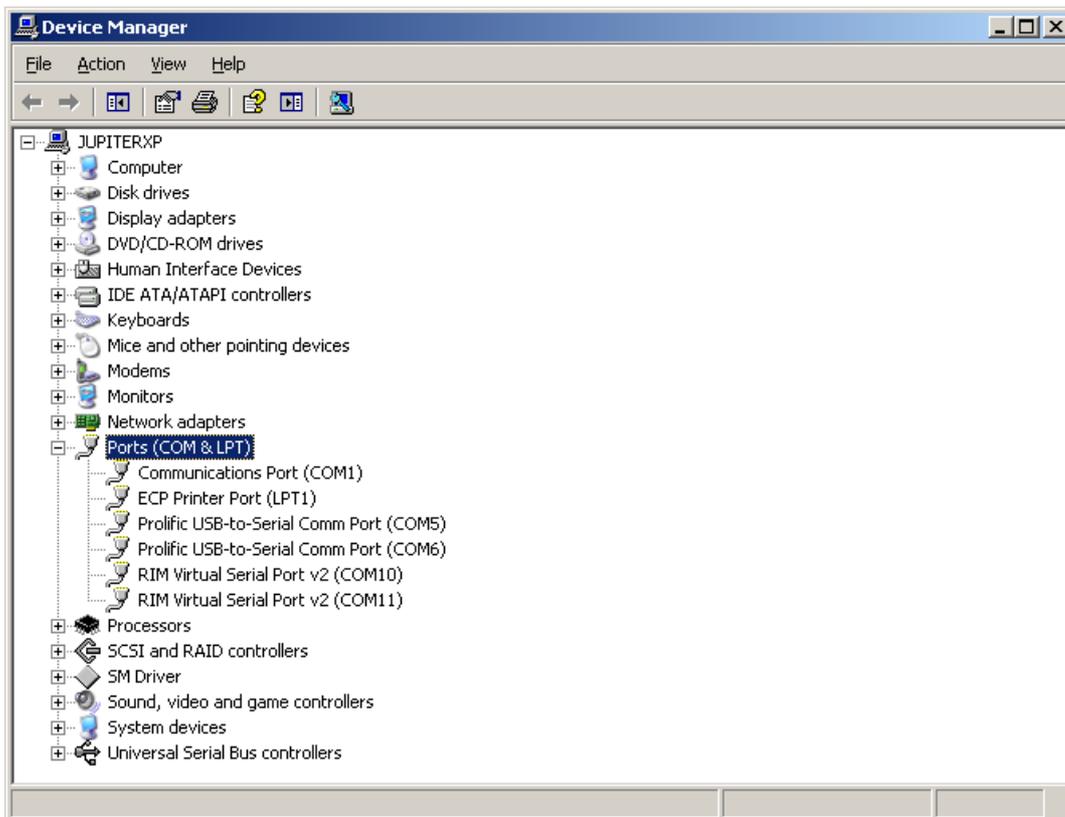


Figure 6: Port assignment window in the Device Manager

In the example shown in Figure 6, COM5 and COM6 (those identified as "Prolific USB-to-Serial Comm Port") would be assigned through the M-TTY tester.

3.3 Selecting modem parameters

To configure each modem:

1. Select (by double clicking) the required modem type, e.g. CTM, from the list of modems. Do this for both sides (A and B).
2. Click the **Modem A** and **Modem B** buttons to get confirmation that the modems are configured correctly (the modem type will be displayed in the two large message boxes located below the modem modules)
3. Press the **Call** button to activate the modems
4. After a few seconds, the central status box in the main GUI window should change its background colour to green and display the modem status 'Connected' followed by the line speed.

3.4 Fast Verification Test

To verify that the device is working correctly, using a double RCA cable, cross connect the RCA sockets on the front of the M-TTY tester in the following way: Input A to Output B and Input B to Output A, and click the **Fast Verification Test** tab. **(Please ensure these cables are removed during normal testing.)**

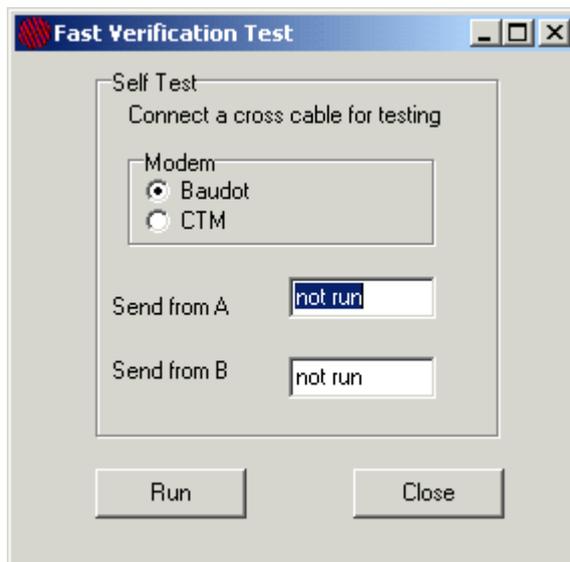


Figure 7: Fast Verification Test window

Select 'Baudot' or 'CTM' for the self-testing, then press the **Run** button. The test results will be shown as below, with passed tests highlighted in green.

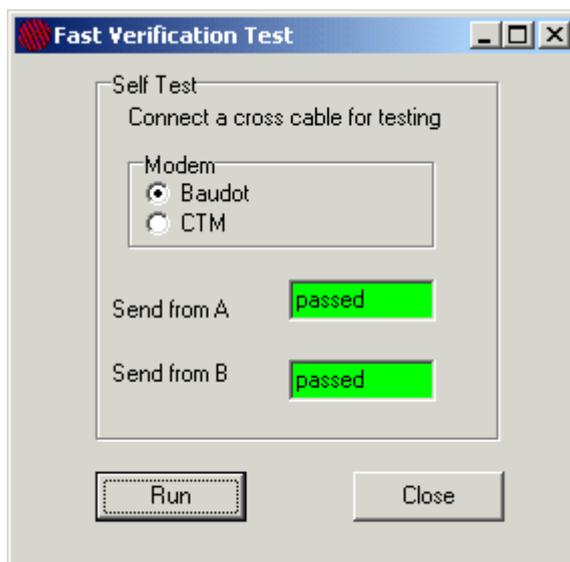


Figure 8: Completed verification test

3.5 Data Capture operation

1. After selecting modem parameters and activating the modems, press the **Gallaudet Script Test** tab on the main menu and the following Mobile TTY Test window will appear:

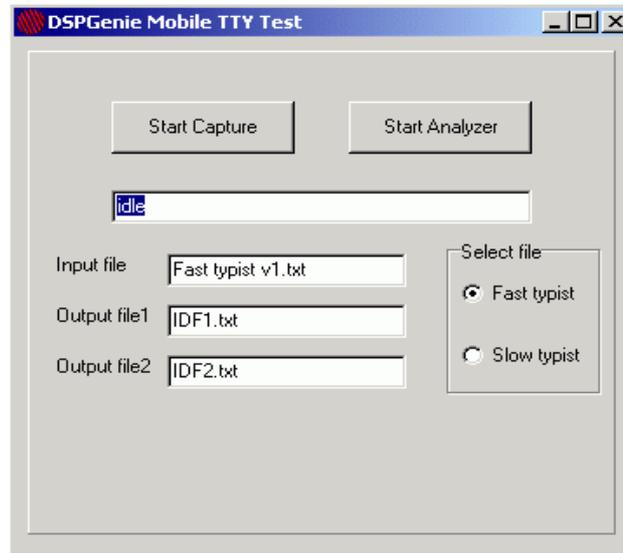


Figure 9: TTY Test window

2. Select between the 'Fast typist' and 'Slow typist' test files in the 'Select file' module on the right. The name of the selected file will appear in the 'Input file' box.
3. The output file names will be shown in the 'Output file1' and 'Output file2' boxes. IDF1.txt and IDF2.txt are the default output file names as used later by the Analyzer software.
4. A pair of image copy output files, named 1ID_date_time.txt and 2ID_date_time.txt, will also be created and saved in the subdirectory "C:\ DSPG_TTY_tools\RESULT".
5. Click the **Start Capture** button.
6. The information box in the middle of the TTY test window will show the progress status of the Gallaudet Script test, including:
 - Idle
 - Calling
 - Sending chars left: X (decreasing number of characters yet to be sent)
 - TTY Testing completed
7. The two large message boxes, located below the modem modules, will display in real time the text sent and received by each modem during the test.
8. After the test is completed, use the **HangUp** button to disconnect the modems.

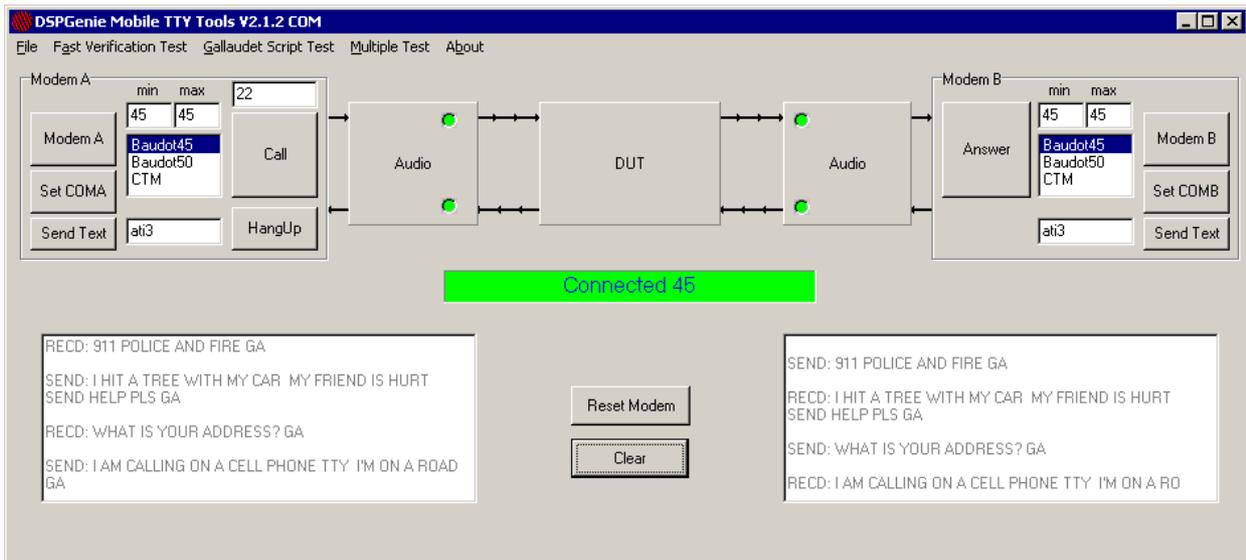


Figure 10: Main GUI window during transmission testing

3.6 Error analysis

After the data capture is completed, press the [Start Analyzer](#) button in the Mobile TTY Test window.

The M-TTY tester will calculate the error rate using the original Gallaudet score software. The default captured files [IDF1.txt](#) and [IDF2.txt](#) will be used here as input files.

The result will be saved into an Excel document called [score.xls](#) in the "C:\ DSPG_TTY_tools\RESULT" subdirectory. This file will report for each test case a pair of lines containing connection statistics and error values. For a complete overview of the results see Section 5.

3.7 Hang-up the modems

At any time the user may click the [HangUp](#) button in the main GUI window to break the test and hang-up the modems.

3.8 Reset the modems

The user may click the [Reset Modem](#) button in the main GUI to reset the modems to default parameters.

3.9 Terminating the TTY tools program

Select [File](#) from the menu bar in the main window and then [Exit](#) to terminate the program.

3.10 About

The user may click on [About](#) in the menu bar to obtain general information related to the DSPGenie M-TTY tester unit, including the current version of the application software and a list of main features.

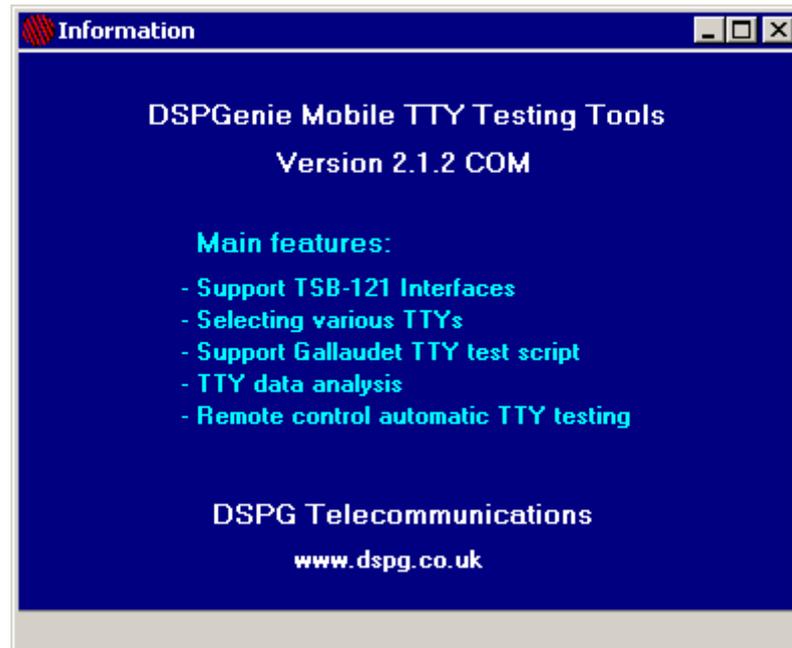


Figure 11: 'About' window

4 Automatic testing mode

The DSPGenie M-TTY tester supports automatic testing, using a TCP/IP protocol and *client/server* architecture.

M-TTY has a built-in TCP/IP server with a pre-defined set of commands and messages and can accept multiple *clients* for message broadcasting, though only one *client* is allowed to send commands to the *server*.

The library of *client* functions (DLL) is provided for the user's API to communicate with the *server* and the TTY application software. These functions define the '*client/server*' protocol.

The relationship between the TCP/IP *client*, TCP/IP *server* and the application software is presented in Figure 12.

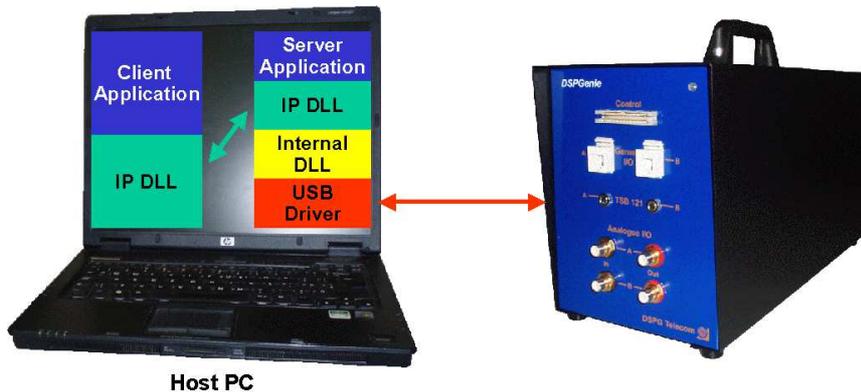


Figure 12: TCP/IP client/server relationship

4.1 Running a multi-test

The user can run a multi-test by pressing the **Multiple Test** menu bar at the top of the main GUI. A multiple test window will appear as shown in Figure 13.

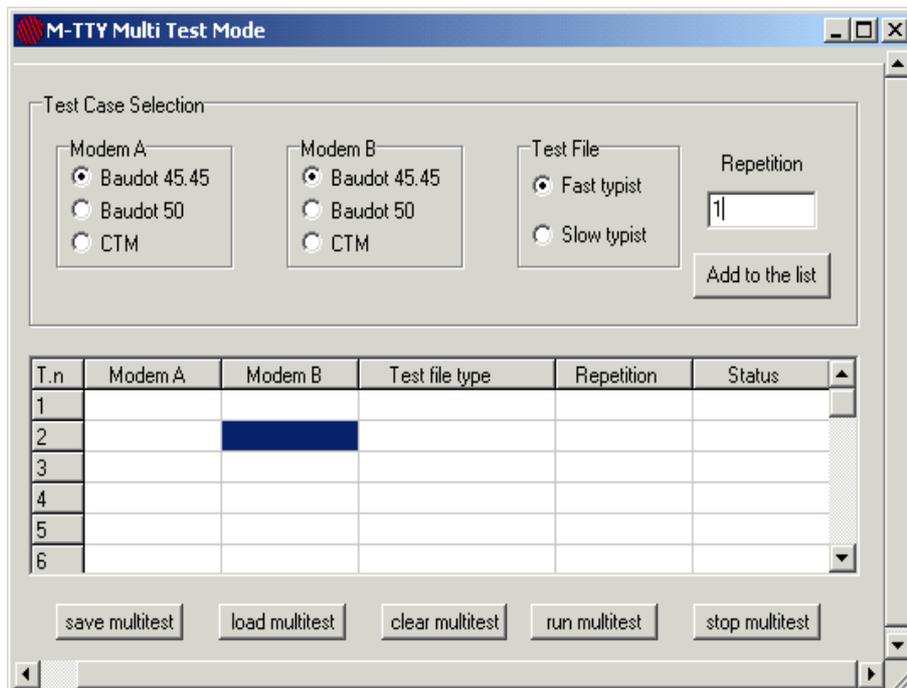


Figure 13: Multi-test window

From the M-TTY multi-test window the user can select modem types for Modem A and Modem B, test files, and the number of repetitions. Pressing the **Add to the list** button will add the selected test to the test list.

- The **save multitest** button is used to save the list selected. The default script file name is of the form `Script<data-time stamp>.mtr` (e.g. `Script2010-6-2_11_10.mtr`). The saved test script can be used next time or modified in a text editor such as Notepad to create a new script with different parameters (see Section 4.2).
- The **load multitest** button is used to load a previously saved test list.
- The **clear multitest** button is used to clear the test list.
- The **run multitest** button and **stop multitest** buttons are used to start the multitest and to terminate the multitest operation, respectively.

A multi-test operation includes establishing a connection, capturing the data and analysing the results automatically.

Figure 14 below shows two example test cases: (1) Baudot 45.45 to Baudot 45.45 connection for 1 repetition using the Fast typist file; and (2) CTM to CTM connection for 10 repetitions using the Slow typist file.

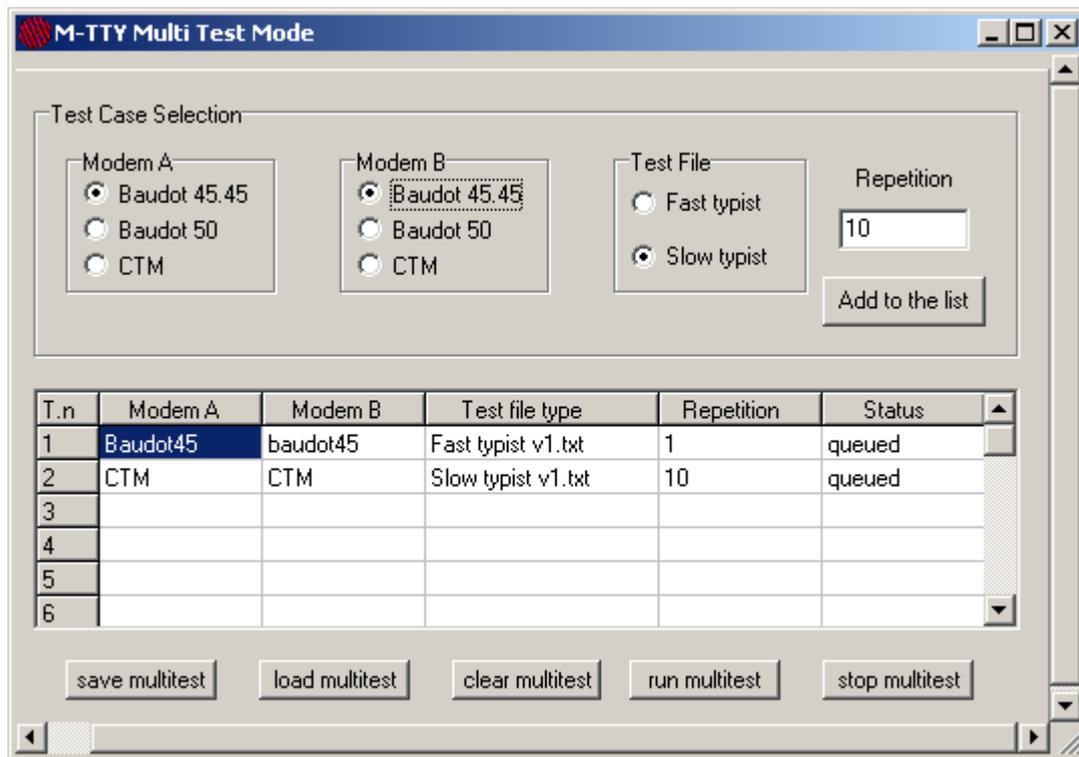


Figure 14: Multi-test window with example test cases

4.2 Creating a test script offline

A test script is a single text file which may consist of one or more test cases. One of the strengths of the DSPGenie M-TTY is the ability to pre-configure and run many test cases with just a few mouse-clicks. First however users must create a test script either through the GUI (specifically the Multi-test window; see Section 4.1) or offline in a text editor. If the script is prepared offline, the format outlined below must be followed.

Test scripts can be created in a plain text editor such as Notepad. The standard format for a test script is shown in the example below, which includes two test cases ("[Test0]" and "[Test1]"):

```
[Test0]
Repetition=1
```

```

Modem_type=0
File_type=0

[Test1]
Repetition=10
Modem_type=1
File_type=1
    
```

This example script corresponds to the two test cases shown in Figure 14.

When multiple test cases are grouped in a single test script as shown above, this is known as a multi-test. In a multi-test each test case is usually prepended by its sequential test number in square brackets (beginning with "[Test0]"), and each must be separated by a space. The parameters used in scripts are explained in Section 4.3 below.

When naming the scripts, it is useful, but not necessary, to provide a date-time stamp. The script file name does not need to follow any particular format, although it must be a text file.

4.3 Script parameters

A complete test script consists of three parameters: number of repetitions, modem type, and file type.

4.3.1 Repetitions

The user can specify the number of times the selected test case will be repeated during the test. Repetition values are entered in the "Repetition" line of the script and can range from 1 to 100.

4.3.2 Modem type

Through the script the user is able to select the required modem mode. A list of available modulations is given in Table 1 below, together with the numbers used to specify them in the script.

Modem type	Script value
Baudot 45.45 mode	0
CTM mode	1
Baudot 50 mode	2
Baudot45.45 to CTM mode	3
CTM to Baudot45.45 mode	4

Table 1: Available modem modes

4.3.3 File type

The user can choose between the Gallaudet Fast typist and Slow typist scripts.

File type	Script value
Fast typist file	0
Slow typist file	1

Table 2: Specifiable file types

5 Test results overview

The Two-Way Error Scoring software dumps data into an Excel file on the local computer. The Excel document is called score.xls and is located in the “C:\ DSPG_TTY_tools\RESULT” subdirectory. It contains identifying information about the call conditions, devices, and other information, plus scores per Lober and Walsh Score program and CTM Scoring Program 3GPP TS 26.231 CTM Minimum Performance Specification. Repeated calls are added to the same file (unless the filename is changed).

Note that scoring requires that the file output from *both* sides be present on the same computer, because the scoring programs compare the characters as *sent* with the characters as *received*.

5.1 Variables in log file

A complete summary of the results variables is presented below, in the order they appear in the .xls file.

Column	Variable name	Description
A	Local Computer ID	Identifier given by tester for the local computer (on Files screen)
B	Remote Computer ID	Identifier given by tester for the remote computer (on Files screen)
C	Start Date	Date call began (automatic)
D	Start Time	Time call began (automatic)
E	End Date	Date call ended (automatic)
F	End Time	Time call ended (automatic)
G	Seconds	Duration of call (automatic)
H	PCER %	Printed character error rate on local side of conversation
I	CCER %	Consumer character error rate1?? on local side of conversation
J	TCER %	Total character error rate2?? on local side of conversation
K	CTM %	CTM error rate on local side of conversation
L	PCER total	Total printable characters
M	PCER correct	Number of printable characters correct
N	PCER added	Number of printable characters added
O	PCER missed	Number of printable characters missed
P	PCER changed	Number of printable characters changed
Q	CCER total	Total CCER characters
R	CCER correct	Number of CCER characters correct
S	CCER added	Number of CCER characters added
T	CCER missed	Number of CCER characters missed
U	CCER changed	Number of CCER characters changed

V	TCER total	Total characters (including hidden characters)
W	TCER correct	Number of characters (including hidden characters) correct
X	TCER added	Number of characters (including hidden characters) added
Y	TCER missed	Number of characters (including hidden characters) missed
Z	TCER changed	Number of characters changed
AA	CTM total	Total characters per CTM program
AB	CTM changed	Number of characters changed per CTM program
AC	Call Type	Values = Wireless Static, Wireless In-Motion, Wireless Relay (Motion), Wireless Relay (Stationary), Landline (direct connection), Landline (acoustic connection)
AD	Direction	Values = Incoming or Outgoing
AE	Signal	Values = Strong, Medium, Weak, or user definable
AF	Username	Tester name or ID
AG	Location	Location of call, this side
AH	Network Info	Available for tester notation
AI	Device	Type of TTY or TTY modem, this side Values = Ultratec Compact TTY, Ameriphone Q90, Nxi 300 vi modem, Ultratec Intel-Modem
AJ	Port	Communication port # used on local computer
AK	Dial	Number dialed
AL	Cable ID	Type of cabling used to connect to TTY
AM	Phone Model	Model of phone tested
AN	Phone Tech	Insert type of technology used in test (e.g., CDMA, TDMA, GSM, iDEN, or other information such as type of switch, etc.)
AO	Script done	Was the script completed? Values = Yes or No (automatic)
AP	Local File	Location in which local file is stored, and file name at time of capture
AQ	Remote File	Location in which remote file is stored, and file name at time of capture
AR	Script File	Location and file name of script used at time of capture

Table 3: Variables in log file

6 User defined control interface

6.1 Connecting from an external script or program

In order to control the M-TTY software remotely from an external script or program, data sent to the server has to be formatted as shown below in Figure 18.

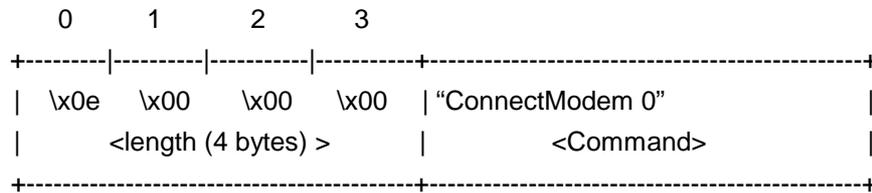


Figure 18: Structure of data to be sent to M-TTY server

The figure above shows how data should be formatted before being sent to the M-TTY server. It shows an example command "ConnectModem 0" with length 14 to be sent to the M-TTY server. The first four bytes are reserved for the length of the command.

6.2 Control commands

For automated remote control of the M-TTY application, the user can write their own control software using several simple commands that are defined below:

- ConnectModem** <mode>
 - selects the modem types and activates the modems (equivalent to **Call**)
 - Parameters: mode: 0= Baudot modem 45.45 b/s,
1= CTM modem,
2=Baudot 50 b/s
3=Baudot-CTM
4=CTM-Baudot
 - Responses: OK
ERROR: wrong command
- StartCapture** <mode> <filename>
 - selects the modem type, loads specified data file and starts the data capture execution
 - Parameters: mode: 0= Baudot modem 45.45 b/s,
1= CTM modem,
2=Baudot 50 b/s
3=Baudot-CTM
4=CTM-Baudot
 - Filename:
Fast typist v1.txt
Slow typist v1.txt
 - Responses: OK
ERROR: wrong command
ERROR: wrong file name

During the test the M-TTY server may send any of the **test error messages** to the client:

- | | |
|------------------------|---|
| ERROR: fail to connect | - modems cannot be connected |
| ERROR: test terminated | - termination by user or modems are disconnected |
| ERROR: timeout | - test can not be completed within a limited time |

Use the **MTTReset** command afterwards to clear that test error condition.

NOTE: IDF1.txt and IDF2.txt are the default output file names saved by the data capture software and used by the Analyze software. Also a pair of image copy output files, named 1ID_date_time.txt and 2ID_date_time.txt, will be created and saved in the host PC "C:\DSPG_TTY_tools\RESULT" subdirectory.

- **StartAnalyse** <filename1> <filename2> <select_parameter>

-load two data files and start the score program

Parameters:

Filename1: User specified file to be used for analysis

Filename2: User specified file to be used for analysis

Select_parameter: 0: Analysis will use **default** files (IDF1.txt and IDF2.txt, previously saved)

1: Analysis will use user specified 'filename1' and 'filename2' for calculation.

NOTE: The 'filename1' and 'filename2' must already exist in subdirectory "DSPG_TTY_tools\RESULT".

Responses: OK

ERROR: wrong command

ERROR: wrong file name

- **MTTStop**

- terminate the script without stopping the modems (remain in a connected state)

- **MTTReset**

- reset the modems after receiving any of the test error messages (equivalent to 'HangUp'); then proceed to the next test or repeat the failed one.

- **MTTClose (V1.73 only)**

- close USB and IP protocol and exit program

NOTE: All control command names are case sensitive

7 M-TTY Interfaces

7.1 TSB121 Analogue interface

The M-TTY provides two analogue input/output interfaces that are electrically compatible with the updated TSB-121 standard. These interfaces terminate on two 3.5 mm stereo jack sockets, marked 'A' for Modem A and 'B' for Modem B.

A standard pin-out is applied here, i.e. tip of the jack is a modem output (TTY TX), ring is a modem input (TTY RX) and sleeve is a common ground.

Four RCA audio connectors – two inputs and two outputs – are connected in parallel with TSB-121 interfaces. This is useful for monitoring purposes and alternative I/O connections to other equipment.

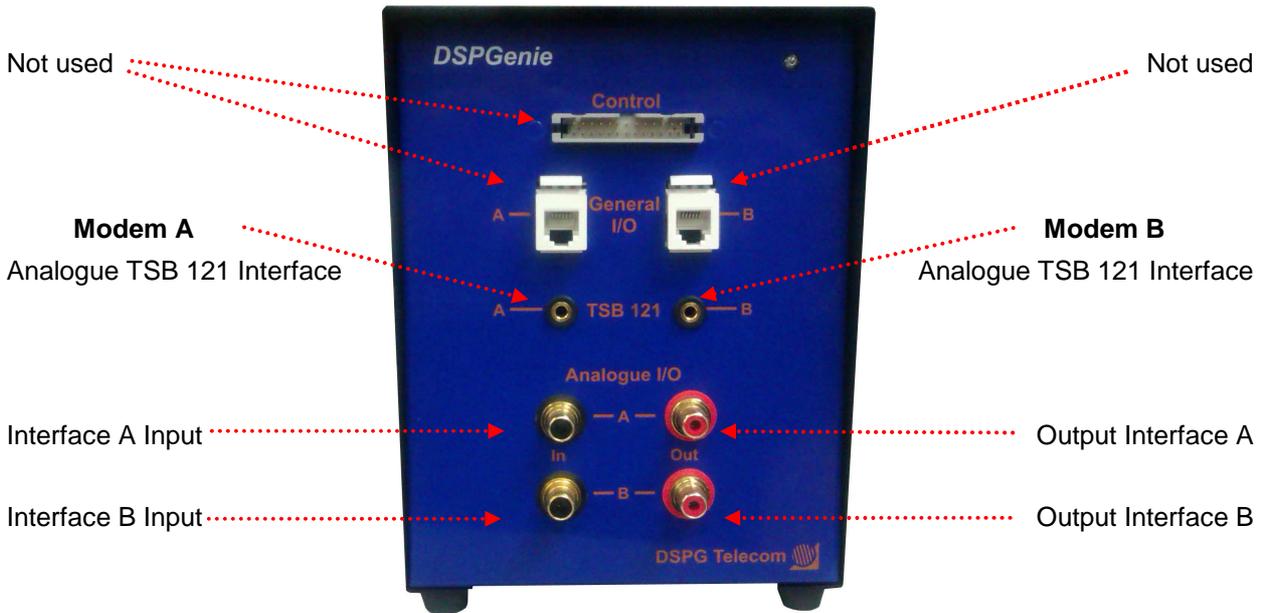


Figure 15: Front panel

The electrical parameters of these analogue interfaces are presented in the table below.

Parameter name	Value
TTY Tx AC Output Impedance	Z = 50 ohm
TTY Tx DC Resistance to GND	R = 2 kohm
TTY Tx Output Level	38 mVrms /Baudot 88 mVrms /CTM
TTY Rx AC Input Impedance	Z = 430 ohm
TTY Rx Input Level Range	(8 - 350) mVrms

Table 4: TSB-121 compliant analogue interfaces

8 Troubleshooting

8.1 Windows cannot detect the USB-to-Serial ports

Check if the USB-to-Serial driver has been installed properly. Use Windows Device Manager to see if the COM ports are displayed.

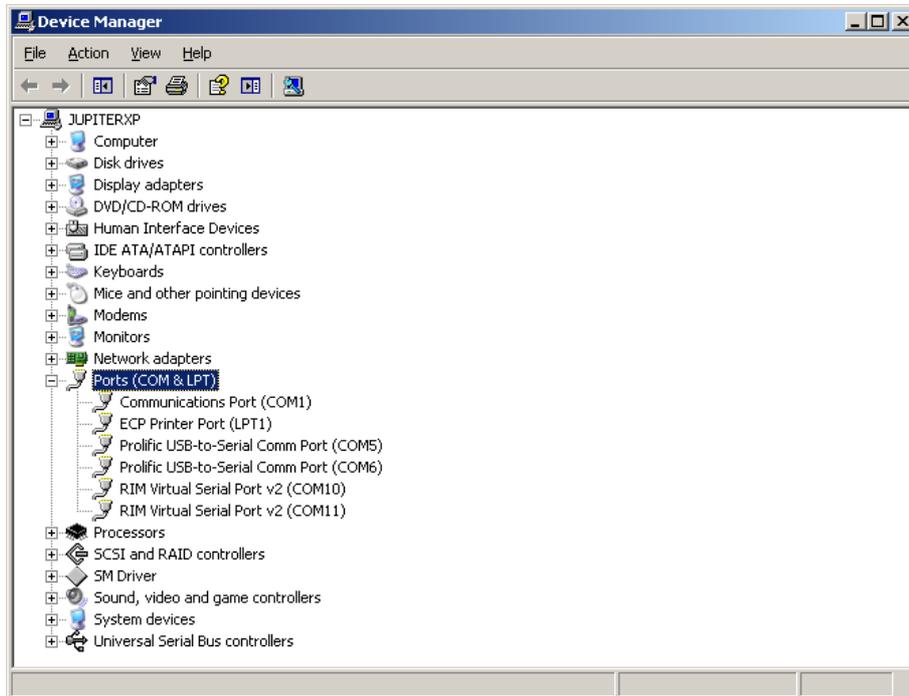


Figure 16: Windows Device Manager

For example from Figure 16 above COM5 and COM6 are detected. If they are not displayed, please check the USB cable or re-install the driver.

8.2 M-TTY application cannot automatically assign the USB ports

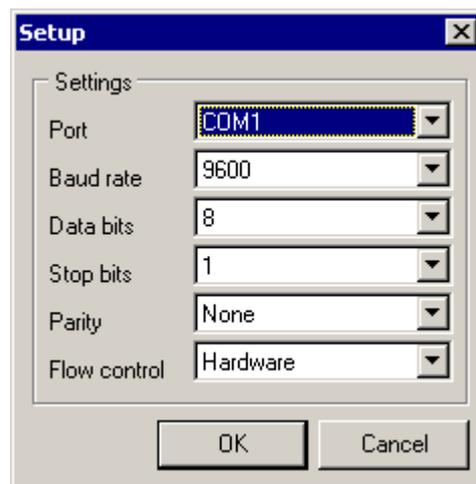


Figure 17: Port setup window

Use the Windows Device Manager to show all Ports (COM & LPT). If two USB-to-Serial ports are displayed, but the M-TTY application cannot automatically assign the port, the port setup window appears prompting the user to set up the ports manually (see Figure 17).

After the ports are set up manually, press the **Reset Modem** button and the modems will work properly. After that, unplug the USB cable and re-insert it again.

The M-TTY application should now automatically assign the ports, otherwise try to use a different USB port of the PC.

8.3 Error when assigning ports

Occasionally an error message will appear when an attempt is made to assign the ports manually. This message is typically of the form: "Unable to open com port (win error code: 2)". In this event the client may accept the selection of a pair of unsuitable ports while rejecting the correct ones, but it will then not be possible to carry out tests and the Fast Verification Test will fail.

This usually occurs if the USB cable has been unplugged from the M-TTY and then reconnected while the *client* software was open. In this situation, the *client* software should be closed and the USB unplugged from the unit once more and left in this unplugged state for 30 seconds, after which it can be reconnected. The *client* should then either auto-detect the correct ports or allow the user to assign them manually.

8.4 Modems do not work properly (modem cannot receive any characters)

The output sockets in the front panel can be used to monitor the modulated signals when the M-TTY sends text. Check if the modulated signals are sent out.

Press the **Reset Modem** button to reset the modems, then run the Fast Verification Test. Check if a cross over audio cable is used properly.

9 General specifications

Model:	DSPGenie M-TTY
Host interface:	USB 2.0
Housing:	ultra-compact, steel EMC resilient case
Dimensions:	170 x 130 x 340 mm (H x W x D)
Weight:	1.0 kg approx.
Power supply:	Powered from PC USB Port
Operating temperature range:	+10 to +40°C

10 Document history

Issue	Date	Author	Summary of changes
D1.0	31-01-2007	Dalan Wang	Draft edition
D1.1	7-02-2007	Mietek Golos	Updated specs (DSPG TTY tools v1.0)
1.2	30-08-2007	Mietek Golos	Updated specs (DSPG TTY tools v1.3c)
1.3	1-12-2008	Dalan Wang	USB version (DSPG TTY tools v1.4 USB)
1.4	4-02-2009	Dalan Wang	USB version (DSPG TTY tools v1.6 USB)
1.5	30-4-2009	Dalan Wang	USB version V2.0 with local multi-test function
1.6	23-03-2010	Dalan Wang	Fast Verification Test
2.5	10-06-2011	Dalan Wang	Serial interface implementation (DSPG TTY tools V2.12)
2.6	15-07-2011	Dalan Wang	Troubleshooting
2.7	12-03-2012	Adrian Duarte	Manual corrections
2.8	11-12-2013	Michal Golos	Manual corrections
2.9	14-01-2014	Michal Golos	Further updates and modifications

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